KIDS' SAFE & HEALTHFUL FOODS PROJECT

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Health Impact Assessment

National Nutrition Standards for Snack and a la Carte Foods and Beverages Sold in Schools

Robert Wood Johnson Foundation

PEW HEALTH GROUP

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The Kids' Safe and Healthful Foods Project is an initiative launched by The Pew Charitable Trust and the Robert Wood Johnson Foundation that provides a nonpartisan analysis and evidence-based recommendations on policies that impact the safety and healthfulness of school foods. **For more information, see HealthySchoolFoodsNow.org.**

The Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts, is a leading national initiative dedicated to promoting the use of health impact assessments in the United States. **For more information, see www.HealthImpactProject.org.**

Executive Summary

Introduction

The foods and beverages available in schools have a significant impact on children's diets and weight, with many students consuming more than half of their daily calories at school.[1] In addition to meals, nearly all students can buy foods and beverages at school, often from multiple locations, including cafeteria a la carte lines, vending machines, and school stores. These snacks and drinks are technically called "competitive foods" because they compete with school meals for students' spending; however, they are also referred to as "snack and a la carte foods and beverages" throughout this document.

Ensuring that schools sell nutritious foods is critical to improving children's diets. This is one of the goals of the Healthy, Hunger-Free Kids Act (HHFKA), passed in 2010, which directs the U.S. Department of Agriculture (USDA) to update nutrition standards for all foods and beverages sold in schools during the school day by aligning them with the current dietary guidelines.

In an effort to inform USDA as it updates nutrition standards for foods and beverages that are sold outside of the school meal programs, and to better understand how standards might affect student health and school finances, the Kids' Safe & Healthful Foods Project and the Health Impact Project, both collaborations of The Pew Charitable Trusts and the Robert Wood Johnson Foundation, worked with Upstream Public Health, a nonprofit research and policy organization, to conduct a health impact assessment (HIA).

Health Impact Assessment Background

An HIA is a prospective research tool that guides decision makers in considering the possible health impacts, and in some cases financial considerations, of proposals. HIAs recommend actions to minimize adverse consequences and optimize beneficial effects.

The goals of this HIA are to:

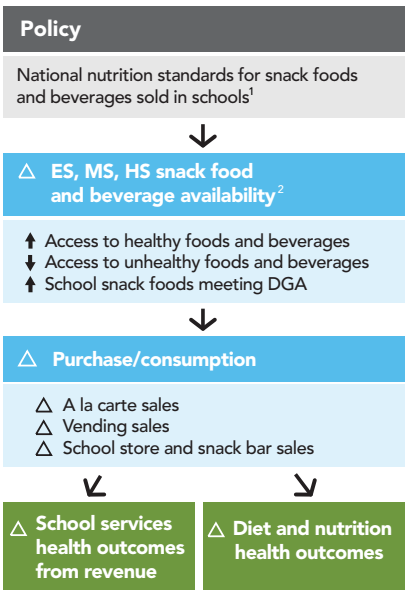
- **Synthesize** relevant data to assess potential health impacts as school districts implement USDA's updated national standards for snack and a la carte foods and beverages sold in schools.
- **Inform national and state deliberation** regarding the potential costs and benefits related to national snack and a la carte food and beverage standards in schools.
- **Identify potential health disparities and inequities** that could result from national snack and a la carte food and beverage standards.
- **Make recommendations** to USDA in order to maximize positive health outcomes and minimize potential health risks.

The research team followed the North American HIA Practice Standards Version 2[2] and the National Research Council Guidelines[3] to develop each stage of this HIA. The most comprehensive literature review to date on competitive foods in schools, as well as original empirical analysis of school financial data was conducted for this HIA. The process also required extensive interviews and involvement of a wide array of experts and stakeholders from academia, industry, the public health community, and those individuals most affected at the ground level, such as teachers, students, and parents, in planning, researching, and peer reviewing the study.

Because USDA had not yet proposed updated standards at the time of this study, the HIA examines a scenario in which items would be required to meet the 2010 Dietary Guidelines for Americans (DGA).

See Figure ES.1 for a visual mapping that summarizes the research questions and outcomes examined in this HIA.

FIGURE ES.1 Summary of Snack and a la Carte Food and Beverage Health Determinant Pathway



[1] Fund-raisers are not included.
[2] ES, MS, HS: Elementary school, middle school, high school

Key Questions and Findings

This HIA considers several key research questions related to school food services, diet and nutrition, and vulnerable populations (including low income and ethnic minority students).

Diet and Nutrition: The impact of updated nutrition standards for snack foods and beverages sold in schools on children's school-based diets was the main issue considered in this study. The analysis considered two primary nutritional concerns: (1) the total intake of calories from items sold in schools and (2) the consumption of high-calorie, low-nutrient snack foods and beverages versus healthier options. Specific questions included:

- Will the updated standards affect the availability of snacks and drinks sold in schools, student purchases of these items, and student consumption?
- Will changes in student consumption of snacks sold in schools affect different chronic disease health outcomes?

Finding: Student access to, purchase of, and consumption of unhealthy foods and beverages, and subsequently their risk for disease, decreases.

> The increase in child weight observed between 1988 and 2002 may have been prevented by an average reduction of 110–165 calories per day. This is the difference between providing an elementary school student a 150-calorie snack rather than a 250-calorie snack, as indicated by the child's daily energy needs.
>
> —"Estimating the energy gap among US children: a counterfactual approach" by Y.C. Wang, et al (*Pediatrics*, Dec 2006)

Research indicates that many schools currently sell high-calorie, low-nutrient snack foods and beverages to students of all ages, who consume them instead of healthier options. The HIA found that the implementation of strong snack and a la carte food and beverage policies that meet the 2010 DGA will decrease students' access to, purchase of, and consumption of unhealthy foods and beverages while also likely increasing their access to, purchase of, and consumption of healthier items at school. Even small changes to students' school-based diets—like replacing a candy bar with an apple—may reduce their risk of tooth decay, obesity, and chronic illness through decreased calorie, fat, and sugar intake at school. Additionally, the data suggests that strong snack and a la carte food and beverage policies tend to increase participation in the school meal programs, thus the risk of not having enough to eat also may decrease as children purchase school meals in place of less filling snacks.

School Services and Impact on Revenue: The impact of updated nutrition standards for snack and a la carte foods and beverages on student health and school district revenue were of primary concern as food sales are an important component of school budgets. Specific questions included:

- Will updated nutrition standards affect students' participation in the school meals program and school food service revenue?

- Will updated standards affect school-district or other types of revenue that pay for school services?
- If revenue changes occur, will they affect student health via changes to enrichment learning opportunities and school-supported physical activity?

Finding: Districts would likely not see a decline in revenue.

The HIA analysis found that, when schools and districts adopted strong nutrition standards for snack and a la carte foods and beverages, they generally did not experience a decrease in revenue overall. In most instances, school food service revenues increased due to higher participation in school meal programs. However, in some cases, school districts experienced initial declines in revenue when strengthening nutrition standards. The HIA concluded that, over time, the negative impact on revenue could be minimized—and in some cases reversed—by implementing a range of strategies.[i] Limited data exists on the impact of snack food and beverage policies on fund-raising revenue for school groups, such as athletic teams and student government. More research is needed in this area in order to determine how such revenue changes might influence the provision of school services, such as physical activity and enrichment programming, and thus the related effect on students' health.

Vulnerable Populations: A primary consideration of this analysis was how vulnerable populations—including students from lower-income families as well as those who are black or Hispanic[ii]—might be affected by USDA's snack and a la carte food and beverage policy. These vulnerable populations are more likely to have limited or uncertain access to adequate food;[iii] to be overweight or obese; to suffer from type 2 diabetes, hypertension, and other chronic diseases; and to have untreated dental caries, all of which are associated with reduced quality of life, more frequent school absences, and longer-term health problem.[4-10]

Finding: Vulnerable populations would benefit from stronger nutrition standards for snack foods and beverages sold in schools.

Updated nutrition standards that make healthier foods more available may have a particularly beneficial effect among vulnerable populations, who are at greater risk for nutrition-related health problems. Vulnerable populations also have higher risk of poor academic outcomes, such as lower test scores and higher dropout rates.[11,12] Because a healthy diet is linked with improved school performance, stronger nutrition standards also may have a positive impact on academic indicators, especially among vulnerable populations. The HIA explored other vulnerable populations, such as children of Asian, Pacific Island, and American Indian descent, but data was too limited to draw conclusions.

[i] Effective strategies for reversing potential declines in revenue are discussed in Section 7.3 of the full report.
[ii] Hispanic is the term used throughout this HIA to refer to "a person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race," as defined by the U.S. Office of Management and Budget. Other terms, such as Latino, may be used when citing specific literature findings.
[iii] About 15 percent of U.S. households are food insecure, defined by USDA as a household-level economic and social condition of limited or uncertain access to adequate food.

Policy Recommendations

The following policy recommendations are meant to inform USDA's efforts to update nutrition standards for snack and a la carte foods and beverages sold in schools. The recommendations reflect the outcomes and the conclusions described above, are based upon the evidence summarized in this document, and are intended to maximize health benefits while minimizing risks. Although not the primary question considered in his HIA, the research reviewed indicates that the way schools implement improved nutrition standards through marketing, engaging students, and promoting school meals can play a significant role in how both students and the schools are impacted. Thus, in addition to the following policy recommendations to USDA, the full report highlights a range of promising practices for implementation.

Recommendation 1: USDA should establish nutrition standards for all foods sold regularly on school grounds outside of the school meal programs. These standards should include:

- a requirement that schools sell items from the Dietary Guidelines for Americans list of "foods to encourage;"
- age-appropriate calorie limits for items sold individually (snacks: 100 calories for elementary, 140 calories for middle, and 180 calories for high school students; entrée items: 300 calories for elementary and middle and 400 calories for high school students);
- a maximum of 35 percent of total calories from sugar;
- maximum limits for fats (no more than 35 percent of calories from total fat, 10 percent of calories from saturated fat, and less than or equal to 0.5 g of trans fat per serving); and
- incremental reductions in sodium, with a target time frame of 10 years, to achieve full alignment with the Dietary Guidelines for Americans.

Recommendation 2: USDA should establish nutrition standards for all beverages sold on school grounds. At a minimum, these standards should:

- limit beverages sold in elementary and middle schools to only water, low-fat and fat-free milk, and 100 percent fruit juice in appropriate portions, and
- establish calorie and serving size restrictions for all beverages sold in high schools so as to ensure calories obtained from sugar-sweetened beverages during the school day are minimal.

Recommendation 3: USDA should adopt policies and practices that ensure effective implementation of the standards. At a minimum, USDA should:

- provide technical assistance and training to schools and districts;
- provide clear guidance on how the terms *infrequent*, *school day*, and *school campus* as included in the Healthy, Hunger-Free Kids Act are to be addressed;
- ensure that nutrition standards are kept up to date with future iterations of the Dietary Guidelines for Americans; and
- collaborate with states and nongovernmental organizations to monitor the implementation of the standards.

Concluding Statement

This HIA explores the potential impacts of national nutrition standards for competitive foods or foods sold in schools individually as snacks, a la carte items, and beverages. Research included an extensive literature review, interviews, stakeholder discussions, and financial analysis. Overall, the results indicate that strong nutrition standards could have a significant positive impact on the health of students with potentially increased benefits to those populations that are most vulnerable. In addition, if implemented effectively at the district and school levels, the changes can be made with little to no negative financial impact and in fact may even result in improved financial outcomes for schools and districts. Thus, USDA should establish updated standards and adopt practices—as recommended by this report—that are most likely to maximize positive health impacts while assisting schools in effectively implementing the changes.

CHAPTER 1

Setting the Table: An Introduction to Competitive Foods in Schools

1.1 Introduction

In December 2010, the U.S. Congress passed and the President signed into law the Healthy, Hunger-Free Kids Act, setting the stage for a range of improvements in school meals and the school nutrition environment. One change outlined in Section 208 of the Act directs USDA to regulate all foods and beverages sold on the school campus throughout the school day. Foods sold outside of the school meal programs include venues such as vending machines, school stores, and a la carte lines, and what is sold varies greatly in schools across the country. A set of national nutrition standards for these foods could have a significant impact on the health of students and the financial health of schools across the United States.

Background on the Issue

USDA defines *competitive foods* as items sold at school outside of the school meal, including all reimbursable school meal programs—school lunch, school breakfast, and afterschool snack programs.[13] These foods and beverages include a la carte sales during mealtimes and items sold throughout the school day in vending machines, food carts, school stores, and snack bars, or through fund-raisers. They are technically called competitive foods because these options compete with items offered in school meal programs for inclusion in a child's daily diet. Whenever possible, this report avoids using this term as it has been found difficult to understand by the general public; rather, such items are referred to as "snack and a la carte foods and beverages."

HIA Background

An HIA is a prospective research tool that is used to inform decision makers regarding the possible health impacts of proposals. HIAs recommend actions to minimize adverse consequences and optimize beneficial effects.[14] The World Bank, International Finance Corporation, and a growing number of private companies

voluntarily use HIAs as part of international lending standards and project planning studies because there is a strong business case for proactively identifying and addressing health effects in major investment decisions. The use of HIAs in the United States is increasing rapidly, driven in part by a growing body of data linking decisions made outside the health sector—in transportation, housing, and urban planning, for example—to rates of many diseases. A number of HIAs have addressed nutrition and school-related proposals, such as a farmers' market,[15] a physical education policy in California,[16] Baltimore's recent land use plan,[17] Hawaii County's agriculture plan,[18] and the 2002 federal Farm Bill.[19]

This HIA explores the potential health and financial effects USDA's updated snack and a la carte food and beverage regulations could have on children and their schools. The Kids' Safe and Healthful Foods Project and the Health Impact Project—both collaborations of The Pew Charitable Trusts and the Robert Wood Johnson Foundation—contracted Upstream Public Health, a nonprofit health policy advocacy organization experienced in HIA and nutrition policy, to conduct this HIA in anticipation of USDA releasing its proposed regulation in spring 2012.

About this Report

This HIA summarizes the most current understanding regarding how a federal policy on snack and a la carte foods and beverages sold in schools would impact health. It provides science-based recommendations to inform new regulations that best improve health. The HIA is organized as follows:

Chapters

1. Introduces the subject matter
2. Describes the HIA research methods
3. Synthesizes the current conditions related to snack food and beverage policies and health outcomes
4. Summarizes how snack food and beverage policies could affect school services through revenue
5. Summarizes the evidence on how a national policy could impact diet- and nutrition-related health outcomes
6. Discusses the implications of the HIA's findings and areas needing more research
7. Suggests policy recommendations for USDA and promising practices for states, school districts and schools to help improve the school food environment in support of a national snack food and beverage policy

Appendices

1. Provides reference information such as the 2010 DGA and the 2007 IOM recommendations for snack and a la carte foods and beverages sold in schools
2. Offers additional details on HIA research methods
3. Details policy classification results
4. Provides additional context to the current conditions chapter
5. Reviews how this HIA met practice standards
6. Provides details on the state policies reviewed for this HIA
7. Detailed list of works cited

1.2 HIA and National Policy

Health impact assessments are distinct from other assessment tools because they explore the root causes of health, known as health determinants, in order to understand the potential health consequences of a policy proposal.[20] An HIA aims to ensure a careful consideration of any possible unintended consequences, benefits, and impacts of policies before they are adopted. An HIA's purpose is to suggest feasible actions that can be implemented to maximize the benefits and minimize the harms of any decision.

This HIA focuses on health determinants in the broad school food environment. It is intended to connect existing research on the impact of policy and programs affecting children's school nutrition and school services to upcoming national policy changes.[i]

Other types of health studies, such as health risk assessments and regulatory impact analyses, may accompany certain federal rule-making processes, but these differ from HIA. Health risk assessments typically provide only a narrow focus on the amount of risk people will incur if exposed to a potentially harmful substance. A regulatory impact analysis (RIA) is more commonly used by USDA and is mandated for major regulations by Executive Order 12,866.[21] An RIA is completed by agency staff (or a contractor), and is required to provide a detailed and systematic appraisal of the potential impacts of a new regulation with the primary goal of completing a cost-benefit analysis for the rule, generally expressed in economic terms. An HIA offers several unique benefits beyond a health risk assessment or an RIA.

- It focuses on human health outcomes and incorporates input from a broad range of stakeholders, in this case school personnel, business leaders, and decision makers. This approach can improve the specificity of the analysis and ensure that people affected by a decision have an opportunity to provide active and constructive input.
- It has proven to be an effective tool for cross-sector collaboration. The relationships and the trust that are built among partners during the process increase the likelihood of routine consideration of issues around health in future policy proposals.
- It makes recommendations with the goal of maximizing predicted health benefits and minimizing any potential health risks.

This HIA adds a unique perspective to existing research on the school food environment by considering how updating national standards for snack and a la carte foods and beverages sold in schools could impact social, economic, and environmental factors in schools and, in turn, how these changes could influence children's school-based dietary behaviors and nutrition-based health outcomes. One of the goals of this assessment (see Table 1.1) is to identify the costs and benefits resulting from national standards that might otherwise be overlooked.

The most common concern related to the issue at hand is how to balance children's health with increasingly strained financial realities in schools. This report includes original research that sheds light on this important challenge and retroactively examines past impacts on school district revenue made by the implementation of nutrition standards and policies at the school, district, and state levels. It also makes recommendations on how USDA can strongly support children's health while taking into account the practicalities of implementation.

[i] This report's findings relate only to changes concerning snack foods and beverages sold in schools. These foods are just one part of the entire school food and nutrition environment. Studies indicate that comprehensive changes related to food and physical activity—including changes to foods offered, policies about fund-raisers, nutrition education, and increased physical education or opportunities to be physically active—are needed to change social norms and behaviors among schools and students.

TABLE 1.1 Snack and a la Carte Food and Beverage Policy Health Impact Assessment Goals

- **Synthesize** the literature to summarize health effects of nutrition and school district financial changes that will result from USDA setting national nutrition standards for snack and a la carte foods and beverages sold in schools.
- **Inform national and state discussions** about trade-offs related to snack and a la carte food and beverage policy elements.
- **Evaluate and communicate comparative outcomes** of different scenarios for the forthcoming USDA rule.
- **Identify potential health disparities** and inequities resulting from national nutrition standards for snack and a la carte foods and beverages sold in schools.
- **Make recommendations** to increase positive health outcomes and minimize potential health risks.

States and local school districts have historically led the way in adopting policies to address nutrition standards for snack and a la carte foods and beverages sold in schools.[22] In order to better inform the decision-making process for national standards, this report considered what potential changes in student consumption patterns, as well as changes in revenue for school districts, school organizations, and school food services, might mean for children's health. By extrapolating these findings from the state level, outcomes for similar standards implemented at the national level could then be predicted. This research serves as the foundation for recommendations to USDA regarding the development of national standards and for guidance to states and school districts on how to address the health and financial impacts of implementing such standards.

1.3 Children's Dietary Health: Rationale for National Snack and a la Carte Food and Beverage Standards

Children's nutrition is a national priority for policy makers, public health advocates, and educators. In addition to supporting physical health, good nutrition contributes to student learning.[23,24] In comparison to national recommendations, American children generally do not eat enough fruits, vegetables, whole grains, or calcium-rich foods, while they often overeat calories, added sugars, sodium, and saturated fats.[25-27] Such dietary habits are taking a toll on children's health. The past three decades have been marked by a troubling trend of overweight and obesity prevalence rates more than tripling among children and adolescents.[28-30] Overweight children and adolescents are at an increased risk of health problems, including cardiovascular disease, depression, high blood pressure, type 2 diabetes, breathing problems, sleep disorders, and high cholesterol.[31-36] They may also experience increased bullying, which is related to poorer mental health and decreased physical activity.[37] Overweight children are also more likely to become obese as adults.[38]

As of 2008, the medical costs associated with obesity in the United States were conservatively estimated to be $147 billion per year, a near doubling from 1998 levels.[39] Increasing concern about children's dietary health and the obesity crisis has focused researchers, government agencies, national associations and organizations, and First Lady Michelle Obama's Let's Move campaign on the school food environment,

emphasizing that more healthy foods and beverages need to be within children's reach.[40-49] A national competitive foods policy will enable schools to support healthier dietary behaviors in children.[50,51]

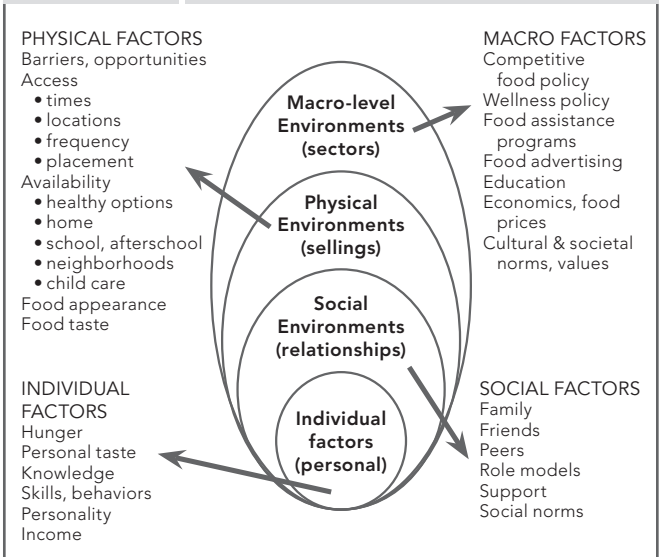
The School Food Environment

Various strategies addressing children's diet, nutrition, and health converge in the school food environment. Schools are responsible for educating youth, which many argue extends to supporting children's diet. Most children in the United States attend public schools.[52] For "food insecure" children who don't know from where their next meal will come, school food is an important meal source.[53] Overall, children eat between one-quarter and one-half of their daily food at school and consume a substantial portion of calories there as well.[54,55]

The *school food environment* is defined as the school setting for students' dietary intake, including when and where children obtain food and the types of options that are available. This environment consists of foods and beverages in school meals—including the breakfast and lunch programs, fund-raisers, hallway and lunchroom vending machines, lunchroom a la carte lines, snack and other food carts, and school stores. The environment also includes food items that are not for sale, such as classroom party foods, treats, and student rewards. Local wellness policies governing nutrition in schools affect the times when food is accessible, the variety of options available to students, and the social messages children receive about food.

A socioecological framework developed by Mary Story, R.D., Ph.D., of the University of Minnesota School of Public Health, and her colleagues reveals the connections between snack and a la carte food and beverage policies and other elements that shape students' eating behavior at school.[56] Figure 1.1 shows that a student's eating behaviors are a result of a complex interaction of personal factors within social, physical, and macro level environments. For example, macrolevel eating environments include distant, strong forces, such as social norms about eating, food marketing, food prices, and, most relevant to this HIA, food-related policies. Though these factors are considered "upstream" from an individual's daily eating behavior, they have a trickle-down effect that ultimately impacts health at the population level.[57]

FIGURE 1.1 Socioecological Model of Dietary Behavior



SOURCE: Mary Story et al., "Creating healthy food and eating environments: Policy and environmental approaches," *Annual Review of Public Health 29* (2008): 253–72.

Numerous factors interact to impact eating behaviors. A child's decision to eat a carrot happens where he or she eats, in physical settings such as the home, school, neighborhood, and community eateries. A decision to eat a carrot depends on what is immediately available. If the school does not have carrots, that choice is gone.

A child's choice can also be guided by friends' opinions about carrots, a personal taste for carrots, or role-modeled behavior when teachers and parents think carrots are delicious.

The school district policy takes the first step in making sure carrots are available and supports children's learning about foods. Social networks and personal food preferences are also important in shaping healthy eating behaviors when the child leaves school. Policies that change school food environments can shape, or be shaped by, social norms at school, among friends, and at home. The snack food and beverage policies this report examines target the school environment; however, it is important to note that policies at the macro level that influence food access in one physical environment may also affect other settings by changing the food culture.

History of Snack and a la Carte Food and Beverage Standards and Policies

Snack foods and beverages have been a part of the school food environment since the inception of the National School Lunch Program (NSLP) in 1946. Historically, sales of these items have been used to fund school athletic and extracurricular programming, but beginning in the 1960s parents and doctors began to express concern due to their lack of nutritional value.[58] Schools continued selling snack and a la carte foods and beverages as a way to fill gaps in school food services funds and to raise money for other activities as budgets were cut, until 1970, when the Child Nutrition Act of 1966 was amended to give the USDA Secretary the authority to regulate these items (see Figure 1.2).[59-64] During the 1970s, organizations on both sides of the debate pressured Congress to rescind, and then restore, USDA's authority, though in a more narrow capacity.

In 1979, USDA still had very limited authority over competitive foods, regulating only those defined as "foods of minimal nutritional value" (FMNV). The proposed regulation to limit where and when these

FIGURE 1.2 History of Snack and a la Carte Food and Beverage Regulations in Schools

1946 National School Lunch Act: School lunches begin.

1966 Child Nutrition Act requires USDA to develop nutrition guidelines for NSLP.

1970 Child Nutrition Act is amended; USDA is granted authority to regulate snack foods and beverages sold in schools; no soft drinks or candy sales are allowed at lunch.

1972–1973 National Soft Drink Association introduces amendment to eliminate restrictions; USDA authority is rescinded.

1973 Hearings on vending machine competition with NSLP reveal loss of revenue to snack food and beverage sales and poor nutritional impact on children's diets.

1973–1975 Bills to restore USDA authority fail; snack foods and beverages increase in schools.

1977 USDA authority to regulate snack foods and beverages is restored.

1979–1985 Amended rule establishes category for "foods of minimal nutritional value," which is battled in court and issued in 1985.

2001 USDA report to Congress finds that snack foods and beverages are undermining nutrition from school meal programs.

2004 Reauthorization Act requires local school districts to establish wellness policies.

2006 Alliance for a Healthier Generation food and beverage standards are released.

2007 Institute of Medicine's guidelines are released.

2010 Healthy, Hunger-Free Kids Act requires USDA to set standards for all foods sold in schools.

SOURCE: E. Fried and M. Simon, "The competitive food conundrum: Can government regulations improve school food?" *Duke Law Journal 56*, no. 6 (2007):1491–1539.

items could be sold was battled in court between the soft drink industry and USDA until 1985, when it was determined that FMNV sales, including soda, would only be prohibited in the cafeteria at lunchtime.[65] FMNV items were defined as foods that provide less than 5 percent of the recommended daily allowance (RDA) for eight nutrients (protein, vitamins A and C, niacin, riboflavin, thiamin, calcium, and iron) and included such foods as soda water, water ices, chewing gum, and certain candies.[66,67] Any foods providing at least 5 percent of one of these eight nutrients could be sold in schools free of nutrition requirements.

In contrast, school meals offered through the School Breakfast Program (SBP) and the NSLP are required by USDA to meet nutrition standards, providing up to one-third of the RDA of specific nutrients.[68] In a 2001 letter to Congress, USDA expressed concern that snack foods and beverages may undermine the nutritional integrity of school meals, as many of them are low-nutrient food options providing added fat, sugars, and calories.[69-76] Additionally, these foods discourage participation in school meal programs and send mixed messages to children who learn about nutrition in schools.[77] As a result, the 2004 reauthorization of the Child Nutrition Act required school districts to develop nutrition standards for snack and a la carte foods and beverages as part of local wellness policies. Although many districts did put nutrition standards in place as required, they remained weak as of 2008.[78-81]

In 2006, the Alliance for a Healthier Generation (Alliance)—a joint initiative of the American Heart Association and the William J. Clinton Foundation, the American Beverage Association, and several major beverage companies—announced a voluntary agreement to limit portion sizes and calorie content of all beverages sold to students during the regular and extended school day. In the same year, several major food manufacturers agreed to limit snack foods sold in schools to those meeting the nutrition guidelines set by the Alliance. The nutrition guidelines adopted under the agreement—based on the 2005 Dietary Guidelines for Americans as well as the American Heart Association's Dietary Guidelines for Healthy Children—established restrictions for calories, total fat, saturated fat, trans fat, sugar, and sodium.[82-84]

In 2007, the Committee on Nutrition Standards for Foods in Schools of the Institute of Medicine (IOM) applied the 2005 DGA to nutrition standards for single-item snack foods and beverages sold in schools. The final IOM report, *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth*, emphasizes that calories and nutrients consumed in school and during school-related activities contribute significantly to school-age children's total dietary intake.[85] The committee developed nutrient recommendations using the core principle that federally reimbursable school nutrition programs should be the primary source of foods and beverages offered at school.[86] Thus, snack foods and beverages would be treated as stand-alone items, not as part of a whole meal pattern. Additionally, the committee intended for the standards to ensure all foods and beverages offered or sold on the school campus would contribute to an overall healthful eating environment.[87] The IOM tailored the 2005 DGA for children's overall dietary intake to snack foods and beverages, which allowed it to recommend specific limits on dietary fat, sugar, calories, and serving sizes for products sold during the school day (see Appendix 1).[88]

1.4 Snack Foods and Beverages and the 2010 Healthy, Hunger-Free Kids Act

In 2010, Congress made historic improvements to the school food environment upon passage of the HHFKA, which required in section 208 for the Secretary of Agriculture to establish science-based nutrition standards for all foods sold in schools throughout the school day (see Figure 1.3). The intent of this legislation is to restrict access to the least-healthy foods being sold in schools and to align overall dietary intake with national dietary guidelines. In addition to establishing nutrition standards for such foods, the HHFKA requires the Secretary of Agriculture to define the terms *school campus*, *infrequent* and *school day*. Currently, USDA has no such operational definitions. The U.S. Department of Education has defined *school day* as "any day, including a partial day in which children are in attendance at school for instructional purposes, including children with and without disabilities." However, this definition is used only with respect to disciplinary procedures.[89] USDA will have to provide further guidance addressing the hours that determine the school day for states that do not already do so.

A variety of current state nutrition policies and local school districts define the school day time frame. For example, Tennessee's school day starts 45 minutes before the first period and ends 30 minutes after the last period;[90] Connecticut's school day, on the other hand, begins with the arrival of the first child at school and ends after the last instructional period;[91] and Texas's school day starts with the first breakfast period and ends after the last instructional period.[92]

FIGURE 1.3 Section 208 of the 2010 Healthy, Hunger-Free Kids Act

The U.S. Secretary of Agriculture is required to establish "science-based nutrition standards for foods sold in schools other than foods provided under this Act (PL 111-296) and the Richard B. Russell National School Lunch Act (42 U.S.C. 1751 et seq.). The nutrition standards shall apply to all foods sold

i. outside the school meal programs;
ii. on the school campus; and
iii. at any time during the school day.

The secretary is required to establish standards that are consistent with the most recent DGA (2010) published under section 301 of the National Nutrition Monitoring and Related Research Act of 1990 (7 U.S.C. 5341), including the food groups to encourage with students and identified nutrients of concern. The secretary is also required to consider the following in drafting these guidelines:

i. authoritative scientific recommendations for nutrition standards;
ii. existing school nutrition standards, including voluntary standards for beverages and snack foods and state and local standards;
iii. the practical application of the nutrition standards; and
iv. special exemptions for school-sponsored fund-raisers (other than fund-raising through vending machines, school stores, snack bars, a la carte sales, and any other exclusions determined by the secretary), if the fund-raisers are approved by the school and are infrequent within the school.

The new standards are to take effect at the beginning of the school year that is not earlier than one year and not later than two years following the date on which the regulations are finalized. The Department of Agriculture and the Department of Health and Human Services are required to update the standards when a new edition of the Dietary Guidelines for Americans is released.

SOURCE: Healthy, Hunger-Free Kids Act of 2010, Pub. L. No. 111-296, 124 Stat. 3183 (2010).

CHAPTER 2

Health Impact Assessment Methods

The research team followed the North American HIA Practice Standards Version 2[93] and the National Research Council Guidelines[94] to develop each stage of this HIA. An HIA involves six key stages: screening, scoping, assessment, recommendations, reporting, and monitoring and evaluation. (see Figure 2.1)

FIGURE 2.1 Steps in an HIA

1. **Screening** determines the need for and value of an HIA.
2. **Scoping** develops a plan and timeline for the HIA that defines research questions, health determinants, health outcomes, and vulnerable populations.
3. **Assessment** evaluates the direction and magnitude of potential health impacts using existing data, expertise, current conditions, and literature.
4. **Recommendations** identifies actions based on information in the assessment that will minimize adverse effects and optimize potential beneficial ones.
5. **Reporting** communicates the findings and recommendations.
6. **Monitoring and Evaluation** tracks changes in health indicators or implementation of HIA recommendations and evaluates the impacts of the HIA on the decision making process.

SOURCES:
1. R. Bhatia et al., *Minimum Elements and Practice Standards for Health Impact Assessment* (Oakland, CA: North American HIA Practice Standards Working Group, 2010).
2. T. Henderson et al., *Health Impact Assessment: Oregon Farm to School and School Garden Policy, HB 2800* (Portland, OR: Upstream Public Health, 2011).
3. P. Harris et al., *Health Impact Assessment: A Practical Guide* (Sydney, Australia: Centre for Health Equity Training, Research and Evaluation [CHETRE], Part of the UNSW Research Centre for Primary Health Care and Equity, UNSW, 2007).
4. *Improving Health in the United States: The Role of Health Impact Assessment* (Washington, DC: National Research Council of the National Academies, 2011).

This HIA used a diverse set of evidence and methodologies in the scoping and assessment stages, including integrated literature reviews, an analysis of state policies and their impacts, and interviews of key stakeholders (see Table 2.1). Following community-based research practices, this HIA also incorporated stakeholder perspectives in the scoping, assessment, recommendations, and reporting stages, described further in Appendix 2.[95]

This chapter provides details on the scoping and assessment stages; details on all other stages can be found in Appendix 6.

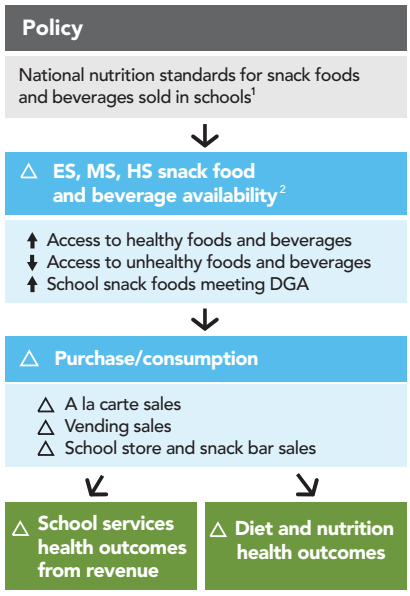
TABLE 2.1 HIA Research and Assessment Methods

Methods	Brief Description	Assessment Use
Literature review	Integrated meta review of peer-reviewed empirical studies and available grey literature	Current conditions; assessment of impacts
Policy scenarios	Developed from Section 208 of HHFKA	Could not use
Secondary data	Summary of existing data and scan of existing state policies	Current conditions
Policy revenue analysis	Original empirical analysis; used secondary data to examine the relationship between state policy and food-related revenue	Assessment of impacts
Stakeholder input	Interviewed advisory committee and key informants	Applicability of other findings to specific groups; context for assessment of impacts

2.1 HIA Scope: Origins of the Health Determinant Pathway and Research Questions

Scoping is a key stage of an HIA in which a plan and timeline are developed, and in which the scope of the health determinants to be studied during the assessment stage are narrowed and possible connections (or pathways) between proposed policy elements and predicted health outcomes are identified. The use of a health determinant pathway diagram, or logic model, typically guides this process and enables the subsequent development of research questions. Figure 2.2, which also appears in the executive summary, outlines the research team's hypothesized connections between updating nutrition standards for snack and a la carte foods and beverages sold in schools and the resulting effects on the selection of items available to students.

FIGURE 2.2 Summary of Snack and a la Carte Food and Beverage Health Determinant Pathway



[1] Fund-raisers are not included.
[2] ES, MS, HS: Elementary school, middle school, high school

As mentioned in the introduction, the Healthy, Hunger-Free Kids Act gave the Secretary of Agriculture authority to update nutrition standards for all foods sold in schools throughout the school day. Given that these are national standards, the study area of the HIA encompasses the 50 states and the District of Columbia. The HHFKA allows the Secretary

of Agriculture to provide exemptions for infrequent fund-raisers, thus they were not included in the scope of this HIA.

The research team hypothesized that updating national nutrition standards for all foods sold in schools would likely affect the nutritional quality of foods and beverages offered in elementary, middle, and high schools. These changes could include both increased availability of healthier foods and beverages and decreased availability of less healthy options. The research team further hypothesized that such differences in product availability are likely to shift the purchasing patterns of students, and thus could impact revenue for school services as well as student health outcomes, including chronic disease risk and student learning.

Two central research questions emerged from this scoping (see Figure 2.3). First, will a national standard for snack foods and beverages impact (either positively or negatively) school district revenue and will those changes subsequently affect student health? Second, will the anticipated changes in diet and nutrition resulting from a national standard for snack foods and beverages sold in schools impact (either positively or negatively) children's health? Within these two broad areas of inquiry, a more specific set of research questions was developed to guide the investigation of the links among policy, practices, health determinants, and health outcomes (see Appendix 2).

FIGURE 2.3 Key Research Questions

School Services—Will a national standard for snack and a la carte foods and beverages impact school district revenue and health?

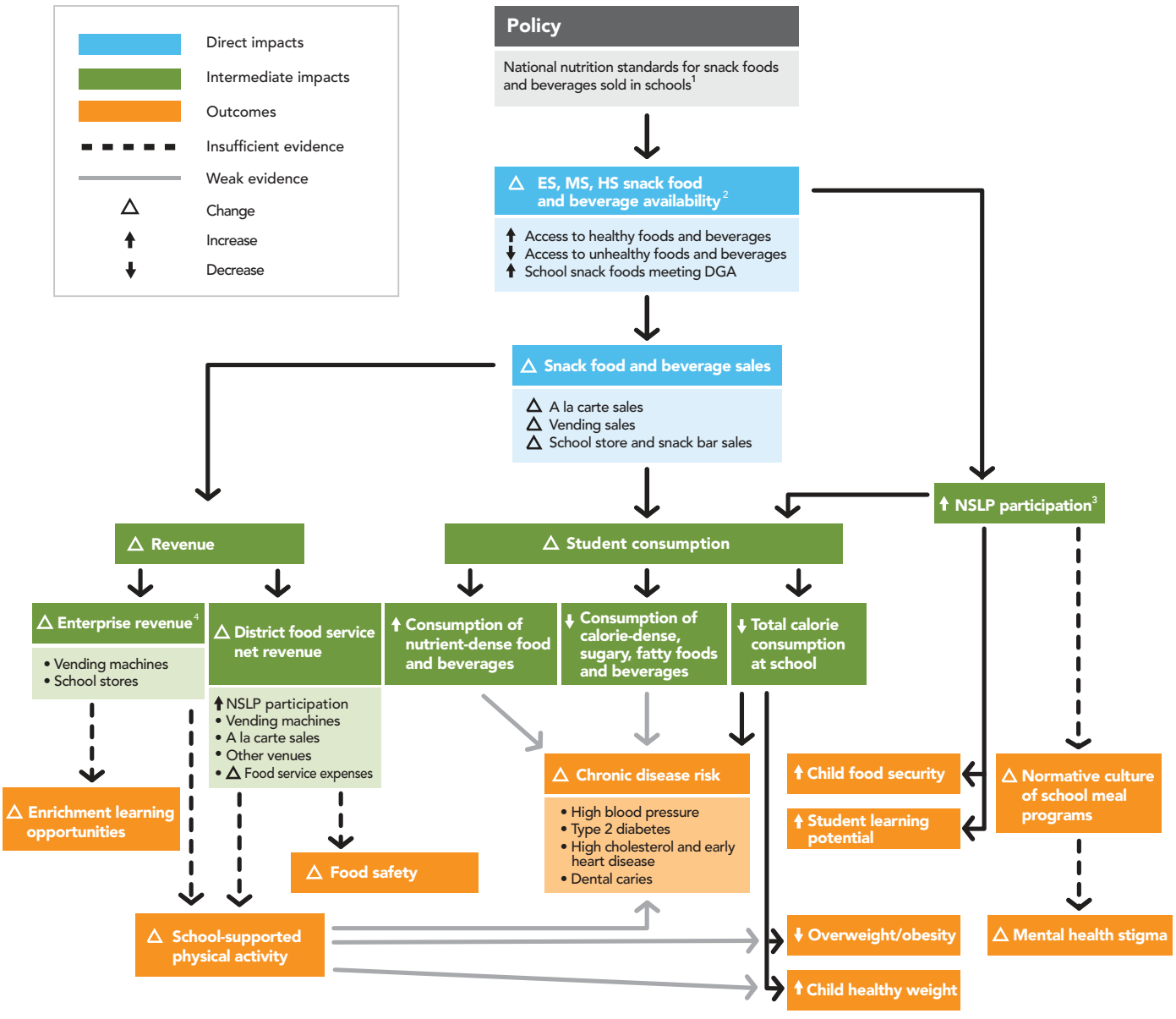
- Will updated nutrition standards affect students' participation in the school meal programs and school food service revenue?
- Will updated standards affect school-district or other types of revenue that pay for school services?
- If revenue changes occur, will they affect student health via changes to enrichment learning opportunities and school-supported physical activity?

Diet and Nutrition—Will a national standard for snack and a la carte foods and beverages impact student diet and nutrition?

- Will the updated standards affect the availability of snacks and drinks sold in schools, student purchases of these items, and student consumption?
- Will changes in student consumption of snacks sold in schools affect different chronic disease health outcomes or risks of those outcomes?

Figure 2.4 offers a detailed visual mapping of the research questions and outcomes examined in this HIA. The expanded detailed pathways for the school services and diet and nutrition health determinants are presented in Chapters 4 and 5.

FIGURE 2.4 The Snack and a la Carte Food and Beverage Health Determinant Pathway



A health determinant pathway is a tool, similar to a logic model, often used in HIA practice. Initially, the health determinant pathway guides the development of research questions; later, it is used to map out possible connections between the proposed policy elements being examined and the predicted health outcomes. This figure is a summary diagram of the health determinant pathway used in this HIA.

[1] Fund-raisers are not included.
[2] ES, MS, HS: Elementary school, middle school, high school
[3] NSLP: National School Lunch Program
[4] Enterprise revenues, as defined in the LEA Finance survey, includes revenue from vending machine sales as well as funds from any activity for which a fee is charged to external users for goods or services, whether or not it is food and beverage based.

2.2 Assessment Methods

Integrated Literature Review

The research team used an integrated, structured literature review approach for health outcomes in both the school services and diet and nutrition health determinant pathways. Search terms specific to each pathway's health outcomes and determinants were used in a subset of 10 electronic databases and through Google Scholar.[96] A full description of the scoring process is included in Appendix 2, and a detailed listing of the literature review is in Appendix 7.

For a list of specific search terms and databases used for each health outcome, see Appendix 2.

To be included in this review, articles had to address at least one of the research questions, be published or released in English between 1999 and 2011, and cover a public school-based population in the United States. Both qualitative and quantitative literature were included. In addition, the team examined reference lists, review articles, database-generated related article lists, grey literature, and related author publication lists for additional eligible articles.

The research team used scoring criteria to help determine the quality of each piece of literature, taking into account the extent that bias was minimized.[97,98] Team members reviewed more than 300 articles and scored and evaluated the weight of evidence to predict potential impacts based on the overall (1) quality of articles; (2) quantity of articles; and (3) consistency of findings within the literature.

Policy Scenarios

Because USDA had not proposed specific rules at the time of the analysis, the research team used the guidance in Section 208 of the HHFKA, the 2010 DGA, and the IOM's 2007 report, *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth,* to draft two plausible policy scenarios that may be put forth by USDA in its draft rule: (1) nutrition standards meet the principles of the 2010 DGA; (2) nutrition standards meet the 2007 IOM recommendations plus those from the Alliance for a Healthier Generation (see Appendix 2 for a more detailed description of policy scenarios). When the research team attempted to apply the two scenarios to the assessment model, however, they determined that the two scenarios were not dissimilar enough to account for age-based differences in nutrient needs and to evaluate the resulting potential differences in health impacts. Thus, the research team chose to discard the approach of using two policy scenarios and instead applied the basic principles of the 2010 DGA.

State Policy Measures

This HIA used the School Nutrition-Environment State Policy Classification System (SNESPCS) from the National Cancer Institute's Classification of Laws Associated with School Students (CLASS) as the basis for identifying competitive food policies at the state level. CLASS scores state-level codified laws for nutrition in schools for elementary, middle, and high school age levels.[99,100]

The CLASS system for nutrition reflects statutory laws enacted by state legislatures and administrative laws promulgated by state administrative agencies. The research team chose CLASS because it is anchored both to the 2005 Dietary Guidelines for Americans and the 2007 IOM recommendations, is available by state for the longest time span (currently 2003–2008), and provides sufficient detail on the various elements of state policies.[101] Using this data, the research team developed an overall categorical policy index ranging from 0 (no policy) to 3 (strong) to create the policy indicators for the analyses. For a description of how the research team converted the original CLASS scale to the 0-3 scale, see Appendix 3.

There are limitations to the CLASS system. First, it focuses only on statutory laws and resulting regulations; therefore, it will not capture nutrition policy stemming from school board or state department policies that have not been codified into law or did not require legislative action. Second, because state statutes and regulations often set a baseline policy, individual school districts' wellness policies may be stricter, but will not be captured by this classification. Lastly, while an overall state ranking on snack and a la carte food and beverage policy can be developed from CLASS data, it was not designed specifically, nor are there set rules, for calculating ranking measures across the individual policy domains scored within CLASS.

TABLE 2.2 Policy Analysis Outcome Measures

Measures	Definition	Rationale
Enterprise revenue[1]	Includes vending machine revenues but also funds from any activity for which a fee is charged to external users for goods or services, whether or not it is food and beverage based.	This is dependent upon food and beverage and other types of enterprise revenue.
Food service revenue	This includes revenue generated from federal meal reimbursements (free and reduced students) as well as student-paid meals and a la carte sales.	This relates to both student meal participation and a la carte purchases.
Meal participation	Based on estimates of average daily participation in lunch and breakfast programs. These include total participation for lunch and breakfast separately, as well as breakdowns by free and reduced lunch versus student paid. Overall participation measures the sum of breakfast and lunch.	Policies on snack and a la carte foods and beverages may affect student meal participation.
Expenditures[2]	Food service-specific expenditures only, in total and by employee versus food expenses.	Policies on snack and a la carte foods and beverages may affect school services' expenditures.
Revenue per student participation	Calculated in total and by source; estimates of revenue per participating student with and without controls for the observable factors noted above (breakfast versus lunch participation and federal versus local revenue).[3]	This provides information on how revenues may be changing outside of meal participation.
Total revenue	Food service-specific revenue (i.e., school meals and a la carte) is combined with enterprise revenue, which includes revenues from vending machines and other venues (e.g., school stores).	The sum of these revenue streams provides a measure of the net change across all areas of food-related revenue.
Combined revenue and expense measures	The combined measures of revenue and expenditure are ratios of revenue to expenditures. These ratios are calculated for (1) food service revenue and expenditures only, and (2) the sum of enterprise and food service revenues to food service expenditures.	This provides a "profit/loss" measure across the revenue and expenditure categories.

[1] Twelve states have no reported enterprise revenue within the study period, eight of which are states included in the study. Two states report enterprise revenue in only five of the six study years. These observations are excluded (Minnesota in 2003, North Carolina in 2008) from the analyses where enterprise revenues are involved. Given this, the research team estimates the policy effects on enterprise revenue, and any measures including it, for all states included in the study analyses generally (except for the two exceptions noted above) and for only those states with positive enterprise revenue.
[2] Expenditures for enterprise-related labor or commodity costs were not available in the NCES CCD data.
[3] Changes in federal revenues per participating student may reflect fluctuations in the mix of free and reduced-price meals or in buying federal food commodities. Changes in local revenue per participating student may reflect variations in prices charged or in the mix of a la carte items and meals sold. Both measures will vary with mix of breakfast and lunch participation.

State Finance Measures

The primary source of school food-related finance data is the Local Educational Agency (LEA) Finance Survey that is part of the Common Core of Data (CCD) of the National Center for Education Statistics (NCES). The LEA Finance Survey collects specific and consistent finance data from local school districts that can be aggregated to the state level. These include revenue in total by type (food service-specific and enterprise) and by source (local, state, federal); and expenditures (food service-specific only) in total and by type (wages, benefits, commodities) (see Table 2.2 on page 20). Data on school meal program participation, as well as some specific revenue sub-categories (e.g., free versus reduced-price federal revenue), have been obtained either from USDA or through state statistics compiled by the Food Research and Action Center.

Enterprise revenues, as defined in the LEA Finance Survey, specifically include those funds from any activity for which a fee is charged to external users for goods or services.[102] Vending machine sales fall into this category, as do non-food and non-beverage sales (e.g., school supplies sold in a school store).[103] As such, the impact on each state's enterprise revenue by any policy change will be dependent upon the ratio of food and beverage sales to other nonfood items.

State Policy Analysis: Impact on School Revenue

This HIA conducted original empirical analysis to examine the relationship between snack and a la carte food and beverage policies and school-related finances at the state level. Using the overall snack food and beverage policy scores for the 50 states and the District of Columbia, policy strength was compared against changes in revenues between state-years (an observational unit of analysis). Revenue changes were also explored for states moving from no policy to a policy, as well as for states transitioning to a stronger policy.

Control Variables

A set of general control variables for student and school system characteristics that could influence outcomes was included in all analyses. The school system characteristics include the total number of students, the number of schools providing school lunch, and the number of schools providing breakfast.

The student characteristic measures account for potential differences in student preferences (e.g., for meal participation or types of meals or food) and income. These include the percentage of the state population with food insecurity (measured as an average of the current and two prior years), the poverty rate for children and adolescents under the age of 18, the percentage of school-age children of non-Caucasian race or ethnicity, the percentage of children in elementary school, and the percentage of children in middle school. Student gender was not available within the data sets used.

These data were drawn from the Food Research and Action Center, the U.S. Census, Bureau of Labor Statistics, and the State Nonfiscal Public Elementary/Secondary Education Survey used in the NCES CCD.

Stakeholder Involvement

This HIA involved an advisory committee, stakeholder interviews, and a peer review process (see Appendix 2 for details on sampling and how input was used beyond interviews). The HIA used structured interviews with field experts to revise its research scope, to confirm or expand on literature and secondary data findings, and to gather input on policy recommendations. Interviews informed the research team on how to apply literature and policy analysis findings to different groups, such as children, school nutrition service professionals, or district administrators from a firsthand perspective.

Interviews were confidential and phone-based and followed a semi-structured script. Interview participants were selected using purposive sampling and a stakeholder analysis. Participants included students, school district representatives, parents, policy experts, school board members, and vending representatives (see Appendix 2 for a list of interview participants).

Assessment of Impacts and Development of Policy Recommendations

HIAs evaluate the potential impact of a policy proposal on various health outcomes and populations.[104-107] In chapters 4 and 5, this HIA uses assessment information to predict what could happen when USDA updates national standards for snack foods and beverages. Table 2.3 explains how judgments of potential impacts were made throughout the analyses.

The assessment of impacts is a starting point for developing policy and implementation recommendations. An HIA can offer alternatives to a proposal and/or mitigation measures; make suggestions to other affected agencies about the policy being analyzed; and offer indicators to monitor, elements for reassessment or adaptation in the future to deal with uncertainties discovered in the HIA, and future avenues for research.[108] Details regarding the policy recommendations in this HIA and how they were developed can be found in Chapter 7.

TABLE 2.3 HIA Impact Characterization Elements and Definitions

Impacted and most vulnerable populations	Vulnerable populations are disproportionately more susceptible to health impacts. These include children, the elderly, communities of color, those with pre-existing health conditions, and low-income individuals, as well as inner-city, rural, or frontier populations with limited resource access. This report uses "most impacted" to indicate sub-populations among all vulnerable children.
Magnitude of impact	The numbers of people affected, the direction of the impact, and the extent of the impact. **Strong impact:** Effect results in moderate or severe injury, harm, or illness (e.g., health outcome) that requires some intervention or, conversely, a reduction of risk for such an illness or health outcome. **Moderate impact:** Effect results in annoyance, minor injury, or risk of illness that does not require intervention or, conversely, a reduction of that risk. **Small impact:** Effect is not perceptible but may contribute to risk of illness or, conversely, a preventive effect over time. **Uncertain:** Effect is unclear **No effect:** None **Many:** (more than 1 million children) **Moderate number:** 500,001 to 999,999 **Few:** 500,000 or less
Likelihood of impact on outcome	How likely health impacts are to occur based on the evidence. This report use likelihood measures from *Health Impact Assessment—A Guide for Practice*. • **Unlikely:** Logically implausible effect with substantial evidence against mechanism of effect • **Possible:** Logically plausible effect with limited or uncertain supporting evidence • **Likely:** Logically plausible effect with substantial and consistent supporting evidence and substantial uncertainties • **Very likely/Certain:** Adequate evidence for a causal and generalizable effect • **Insufficient evidence** or **Not evaluated**
Quality of evidence	This measure indicates the quality, quantity, and consistency of the evidence base for a particular direction, likelihood, or magnitude of impact on a specific health outcome. The characterization measures are initially based on the literature evidence and added or reduced by one star with data analysis and input from stakeholder or case studies. ~ Sufficient evidence not available to evaluate this outcome with confidence * <5 studies, inconsistent results, and the claim is consistent with public health principles ** 5+ studies of weak and moderate quality with consistent or mixed results; 5+ studies of mixed quality with mixed results *** 5–10 strong studies with consistent findings **** 10+ strong studies with consistent findings

SOURCES:
1. T. Henderson et al., *Health Impact Assessment: Oregon Farm to School and School Garden Policy, HB 2800* (Portland, OR: Upstream Public Health, 2011).
2. Human Impact Partners, *HIA Report Guide*, December 2010. Available at: www.humanimpact.org.

CHAPTER 3

Current Conditions: The School Food Environment and Students' Health

This chapter summarizes the current state of the school food environment, as well as health trends among school aged children. Specifically, the school service-related and diet- and nutrition-related outcomes examined in detail in Chapters 4 and 5 of this HIA are covered in order to establish a baseline against which the potential impacts of USDA's proposed guidelines can be assessed. It describes existing:

1. School meal participation levels and food security in public schools;
2. Access and availability of snack and a la carte foods and beverages;
3. State and district policies governing snack and a la carte foods and beverages;
4. Estimates of school and school district use of revenue from snack and a la carte food and beverage sales;
5. Student purchase and consumption of snack and a la carte foods and beverages;
6. Child weight status, overweight and obesity, and physical activity; and
7. Chronic illness trends among children.

3.1 Current School Lunch Participation and Food Security

The federal government authorized schools to serve lunches to students in need in the 1946 National School Lunch Act.[109] Designed to help feed hungry children, school meal programs must be operated on a nonprofit basis and meet the current (2010) Dietary Guidelines for Americans. In exchange for meeting these and other criteria, schools receive a federal reimbursement for each meal served. In addition to this reimbursement, schools participating in the NSLP also receive USDA foods, or "entitlement" foods, to supplement the meals.[i] The program is intended to be revenue neutral with each participating child's meal covered by the federal reimbursement and USDA foods credit (see Table 3.1) or the price the child pays

[i] In the 2011–2012 fiscal year, schools participating in the NSLP were entitled to receive USDA foods at a value of 22.25 cents for each meal served.

for the meal. In some cases, a state may decide to also contribute additional funds to the reimbursement of meals.

Close to 95 percent of public schools in the United States participate in this program, translating into more than 31 million students served annually (as of 2011).[110] During the 2011 fiscal year, more than 66 percent of the 31.7 million students participating in the program received a free or reduced-price lunch, with eligibility based on need and determined by household income.[111] For the period July 1, 2011, through June 30, 2012, a family must earn no more than 130 percent of the poverty level to qualify for a free lunch ($29,055 for a family of four), and no more than 185 percent of the poverty level to qualify for a reduced-price lunch ($41,348 for a family of four).[112] The federal government reimburses these meals in a tiered fashion. In the 2011–2012 school year, the government reimbursed $2.77 for each free meal, $2.37 for each reduced-price meal, and $0.26 for each paid meal served in a school in the 48 contiguous states. These reimbursements are higher for schools in Alaska and Hawaii, as well as for those schools that are serving a large number of students in the free or reduced-price categories, as indicated in Table 3.1. The students receiving these meals are not expected to pay anything if they qualify for a free lunch; however, those qualifying for a reduced-price lunch are expected to pay up to $0.40 per meal, and those receiving a paid meal are responsible for paying whatever price is set by the school district.[113]

See Appendix 5, Table A5.1 for details on state-by-state enrollment, reflective of total population levels in each state.

TABLE 3.1 Program Reimbursement Rates for School Meals (July 1, 2011–June 30, 2012)

		National School Lunch Program			School Breakfast Program	
		< 60% of F/R meals+	≥ 60% of F/R meals+	Maximum rate	Non-severe need*	Severe need*
Contiguous states	Paid	0.26	0.28	0.34	0.27	0.27
	Reduced-price	2.37	2.39	2.54	1.21	1.50
	Free	2.77	2.79	2.94	1.51	1.80
Alaska	Paid	0.43	0.45	0.53	0.40	0.40
	Reduced-price	4.10	4.12	4.35	2.11	2.58
	Free	4.50	4.52	4.75	2.41	2.88
Hawaii	Paid	0.31	0.33	0.39	0.30	0.30
	Reduced-price	2.85	2.87	3.03	1.46	1.80
	Free	3.25	3.27	3.43	1.76	2.10

+ F/R: free/reduced-price meals

* If 40 percent or more of a school's lunches served are free or reduced-price meals in the preceding year, the school is considered to be in severe need.

Meal and snack payments to states and school food authorities expressed in dollars or fractions thereof.

SOURCE: U.S. Department of Agriculture, *2011–2012 Reimbursement Rates*, accessed December 15, 2011, www.fns.usda.gov/cnd/governance/notices/naps/nsl11-12t.pdf.

While a majority of funding comes from the federal government, state agencies administer the school meal programs through local school food authorities (SFAs), which are individual schools or school districts. SFAs manage the process locally, ensuring that applicants for the school meal programs receive the intended services, and states monitor the SFAs' performance. Both are responsible for making certain that federal standards are met.

School Meals and Food Security

School meals play a critical role in addressing child food insecurity, or lack of adequate food, which affects children's health and can adversely affect their academic performance. Several studies indicate that household food insecurity is associated with nutrient deficiencies, poor cognitive development, behavioral and psychosocial dysfunction in both children and adults, and generally poor health (see Table 3.2).[114-118] Additional studies demonstrate that child hunger is associated with lower academic achievement and contributes in the long term to a less competitive workforce. Workers who experienced hunger as children are not as well-prepared mentally, physically, emotionally, or socially when compared to their better-fed counterparts.[119]

Food Security

USDA breaks food insecurity into two categories: (1) low food security and (2) very low food security.

Low food security: household reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake.

Very low food security: household reports of multiple indications of disrupted eating patterns and reduced food intake.

SOURCE: U.S. Department of Agriculture, Economic Research Service, "Food Security in the United States: Definitions of Hunger and Food Security," last updated September 7, 2011, www.ers.usda.gov/Briefing/FoodSecurity/labels.htm.

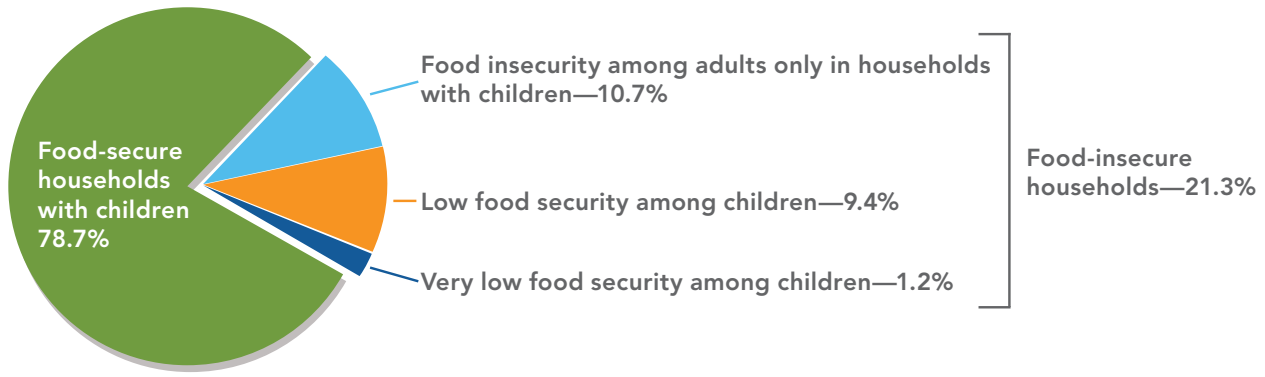
TABLE 3.2 Effects of Childhood Food Insecurity

Physical Health	Mental Health	Academic Performance
Low birth weight	Behavioral and emotional problems	Academic problems
Fair/poor health	Lower social skills	Lower math scores
Hospitalization	Difficulty getting along with others	Repeating a grade
Iron deficiency anemia	Psychosocial dysfunction	Suspension from school
Chronic illness	Aggression and anxiety	Higher levels of hyperactivity
Stomachaches, headaches, colds	Depression, thoughts of death, attempted suicide	Higher levels of absenteeism and tardiness
Increased BMI, weight gain		

SOURCE: J. Cook and K. Jeng, *Child Food Insecurity: The Economic Impact on Our Nation* (Feeding America, 2009).

In 2009, nearly one-quarter of children (21.3 percent) lived in food-insecure households where adults, children, or both were experiencing low or very low food security (see Figure 3.1).[120] One child in 10, or 4.2 million children, is considered food insecure or is experiencing very low food security (10.6 percent). More black (17.2 percent) and Hispanic children (18.7 percent) are food insecure or experiencing very low food security compared to white non-Hispanic children (7 percent).[121] These numbers have been steadily climbing since 2005, when 15.6 percent of children were in food-insecure households, and 8.2 percent of children were considered food insecure.[122]

FIGURE 3.1 Households with Children by Food Security Status (2009)



SOURCES:
1. Calculated by the Economic Research Service using data from USDA's December 2009 Current Population Survey Food Security Supplement.
2. U.S. Households with children by food security status of adults and children, 2009.

3.2 Current School Food Access and Availability

As discussed in Chapter 1, the school food environment is inclusive of all food sources in a school. In addition to school breakfast and lunch, most children have access to snack and a la carte foods and beverages while at school. Options for purchasing these items include a la carte sales during mealtimes, as well as items sold in vending machines, food carts, school stores, snack bars, and fund-raisers. Multiple studies between the 2004 and 2011 school years, using nationally representative information and various methodologies, show consistently that snack foods and beverages are widely available to U.S. children, with variation across school levels and types of venues (see Appendix 5, Table A5.2).[123-135]

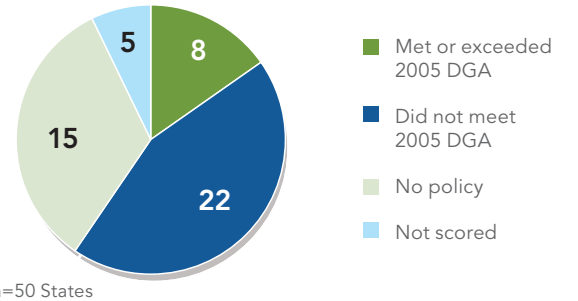
State nutrition policies have historically set a policy floor for the food environment in local school districts. To date, 39 states have some type of policy in place affecting what or when snack foods and beverages can be sold (see Appendix 7). These policies vary in content and strength. One study found that state policies restricting unhealthy snack foods in elementary and middle schools were significantly associated with schools offering less of these items, while district policies did not show this relationship.[136] The same study found that neither state nor district policy restrictions were associated with reductions in high school snack food availability, indicating that high schools may have more complex challenges in implementing such policies.[137]

This HIA examined state and district policies using data from CLASS and other studies such as those conducted by Bridging the Gap, a nationally recognized research program. Policies were compared to the 2005 and 2010 DGAs and the 2007 IOM recommendations, *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth*, where possible. The 2005 DGA remains relevant since the primary recommendations differ very little from the 2010 version (see Appendix 1).

State Snack and a la Carte Food and Beverage Nutrition Policies

The CLASS scores use data from 2008 and include policies affecting nutrient standards for snack foods and beverages by school level and venue. In reviewing this data, most states do not have policies in place meeting nutrition standards in the 2005 DGA. Only eight of the 45 states that were scored (17 percent) met or exceeded these guidelines (see Figure 3.2). It is important to note, however, that five states had policies that were excluded from the scoring system, and another seven have since strengthened their state policies.[138-140]

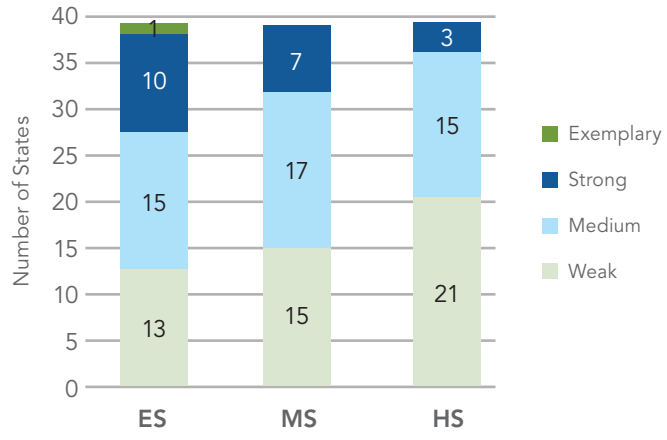
FIGURE 3.2 State Snack and a la Carte Food and Beverage Policy Strength by CLASS Score (2008)*



*n=50 States

The HIA also compared state nutrition policies to the IOM's 2007 recommendations. A recent study examining state policies from 2010 found that more than half of states (28 states, or 56 percent) had policies requiring schools to implement nutrition standards of some type for snack and a la carte foods and beverages.[141] Of these, only six states had policies rated "exemplary" or "strong" on the nine IOM nutrient standards of (1) dietary fat, (2) total sugars, (3) calories, (4) sodium, (5) nonnutritive sweeteners, (6) caffeine, (7) Tier 1 foods,[ii] (8) water, and (9) sports drinks (see Figure 3.3).

FIGURE 3.3 State Policy Strength on IOM Nutrient Standards by School Level (2010)*



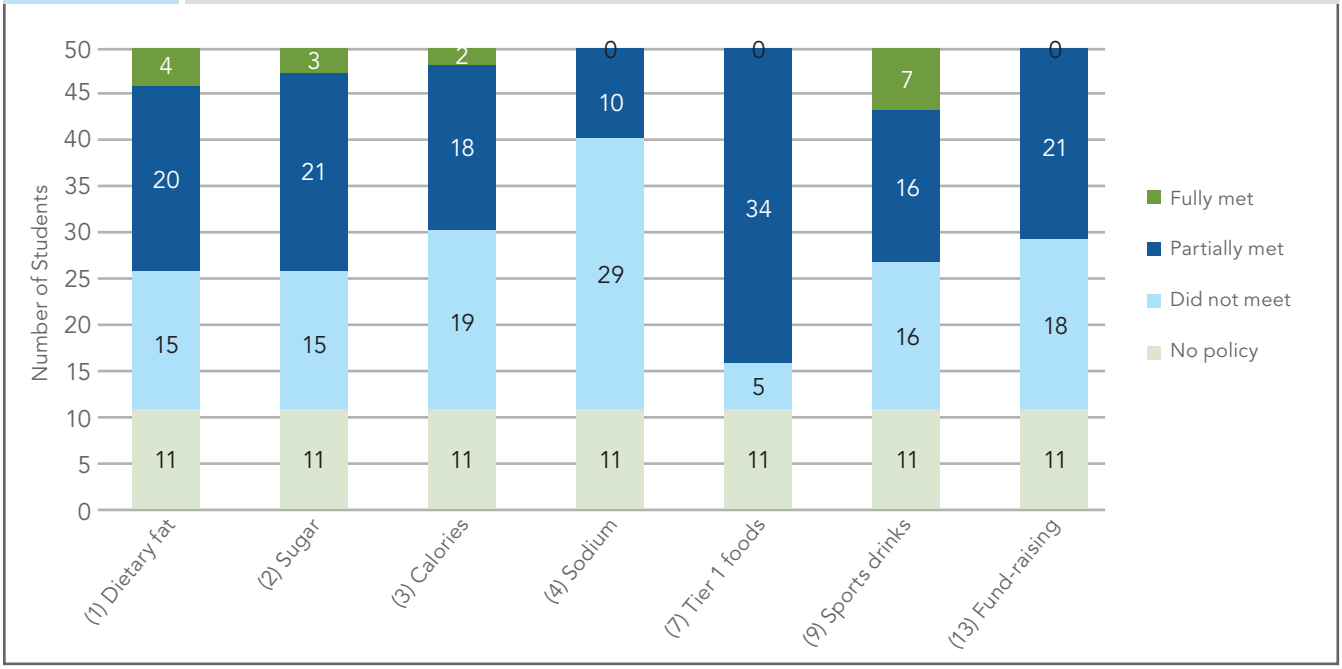
*n=39 States

These findings are similar to the aforementioned results comparing CLASS to the 2005 DGA (see Figure 3.2). The CLASS system reveals that state policies are generally stronger in elementary schools than in middle and high schools. Of the 30 states scored in CLASS that identified having some level of nutrition policy applying to snack foods and beverages sold in vending machines, a la carte lines, and other venues such as school stores or snack bars, one-third (9 of 30) had lower levels of restrictions in middle schools, and nearly half (14 of 30) had weaker restrictions in high schools (see Appendix 2).

[ii] Per the 2007 IOM Report, *Nutrition Standards for Foods in Schools*, Tier 1 foods are defined as fruits, vegetables, whole grains, and related combination products and nonfat and low-fat dairy that are limited to 200 calories or less per portion as packaged and adhere to additional limits on total fat, saturated fat, trans fat, sugars, and sodium.

Of the nutrients examined by IOM, state policies have given the least regulatory attention to setting limits on sodium, total calories, and fund-raisers. Only 10 states partially meet IOM standards on sodium, 20 states partially or fully address IOM standards on calorie limits, and 21 states partially meet IOM standards on fund-raisers. Nearly half the states partially address or fully meet IOM nutrient standards setting limits on dietary fat (24 states), setting limits on sugar (24 states), providing access to Tier 1 healthy foods (34 states), and limiting sports drinks (23 states) (see Figure 3.4).

FIGURE 3.4 How 2010 State Food Policies Met IOM Standards



District Wellness Policies and Snack and a la Carte Food and Beverages

Since 2004, school districts have been implementing wellness policies that include nutrient standards for foods sold outside of the school meal programs. A study conducted by Bridging the Gap found that between the 2006 and 2008 school years, there were 16 percent more students in districts with wellness policies that included such guidelines, indicating a positive trend.[142] Additionally, an analysis of a representative sample of school district wellness policies in the 2008–2009 school year indicated that at least two-thirds of all students were in districts with some level of nutrition guidelines in place at the time (see Table 3.3).[143] However, these district policies usually do not address all the requirements included in the law. District guidelines often do not apply to all products or venues on campus, and many guidelines apply only to certain times of day.[144]

TABLE 3.3 Percentage of Students in Districts Nationwide with Wellness Policy Provisions (2008–09 School Year)

	ES students (%)	MS students (%)	HS students (%)
Nutrition guidelines for snack foods and beverages			
No policy or weak policy[1]	29	33	40
Strong policy[2]	70	67	60
Fund-raisers during the school day			
No policy or weak policy	64	75	87
Strong policy	36	24	14

[1] Weak policy provisions offered suggestions or recommendations, with some requiring action, but only for certain grade levels or times of day.
[2] Strong policy provisions required action and specified an implementation plan or strategy.
All numbers rounded. Due to rounding, some percentages may not sum to exactly 100. Exact numbers are available at www.bridgingthegapresearch.org.
SOURCE: Health Policy Center, Institute for Health Research and Policy, *Bridging the Gap* (Chicago: University of Illinois at Chicago, 2010).

Many studies indicate that more schools have been restricting access to various foods in the past five to 10 years. The Centers for Disease Control and Prevention (CDC) found that from 2006 to 2008, the percentage of schools in which students could not purchase candy or salty snacks increased in 37 of 40 states evaluated (from 45.7 percent in 2006 to 63.5 percent in 2008).[145] Similarly, compared with 2006, the percentage of secondary schools in which students could not purchase regular soda was significantly higher in all 34 states examined, and the percentage of schools in which students could not purchase sports drinks was significantly higher in 23 of these states in 2008.[146]

Similar to state policies, district policies are generally stronger at the elementary and middle school levels than in high schools by overall strength and by specific food and beverage content restrictions. According to 2008–2009 data from Bridging the Gap:

- One-quarter to one-third of all elementary- and middle-school students attended schools with district policies requiring stronger restrictions on sugar.
- Four in 10 middle school students attended schools in districts with stronger restrictions on fat, compared to three in 10 elementary and high school students.[147]
- Less than 15 percent of students attended schools with district policies requiring stronger limits on trans fats, sodium, or calories in snacks.[148]
- More elementary students than middle or high school students were in districts with a complete competitive food ban, or a ban on locations where products can be sold.[149]
- More than one-third of elementary students and high school students and more than half of middle school students were in schools with district policies that have a "strong" policy[iii] restricting drinks with added caloric sweeteners such as regular soda.[150]
- Most students did not attend schools that restricted sugar or calories in flavored milk or fat in milk, or that placed serving size limits on beverages.[151]

[iii] STRONG POLICY PROVISIONS required action and specified an implementation plan or strategy, as defined in Table 3.3.

- More elementary students (14.5 percent) than middle (2.5 percent) or high school (1.25 percent) students attended schools in districts with a complete beverage ban, or a ban on locations where products can be sold.[152]

See Appendix 5 and Tables A5.3 and A5.4 for more details on food and beverage content restrictions in districts with wellness policies addressing snack foods and beverages.

Alliance for a Healthier Generation Competitive Food Standards

In the 2007–2008 school year, 26 percent of public elementary and 50 percent of middle and high school students were in a school that had implemented, or was in the process of implementing, the nutritional guidelines for competitive foods set by the Alliance for a Healthier Generation.[153,154] In the same year, 33 percent of public elementary students, 60 percent of middle school students, and 70 percent of high school students attended a school where the Alliance School Beverage Guidelines were being implemented or were already in place.[155] The Alliance's guidelines cover foods and beverages sold in school vending machines, a la carte lines, snack bars, fund-raisers, and school stores, thereby both encouraging healthy items while also limiting calories, fats, sugar, and sodium.

See Appendix 1 for a comparison of the Alliance's guidelines with the 2010 DGA principles and the 2007 IOM guidelines.

Differences in Snack and a la Carte Food and Beverage Availability by School Level

According to the third School Nutrition and Dietary Assessment (SNDA III) study, in the 2004–2005 school year, at least one source of snack foods and beverages was available in 80 percent of elementary schools, 97 percent of middle schools, and 100 percent of high schools during the school day.[156] In addition, 5.8 percent of elementary schools, 14.6 percent of middle schools, and 49.6 percent of high schools allowed students to purchase these foods and beverages before classes began in the morning; and 4.4 percent of elementary schools, 12.2 percent of middle schools, and 41.1 percent of high schools allowed students to purchase these items during any school hours when meals were not being served.[157]

The Bridging the Gap studies indicate that although there have been decreases since the SNDA III study, as of the 2007–2008 school year, 62 percent of children in elementary schools, 69 percent of children in middle schools, and 83 percent of students in high schools were still able to purchase a food or beverage from at least a vending machine or other venue (not including a la carte).[158,159] More recently, the School Nutrition Association's 2011 nationally representative member survey indicated that nine of every 10 districts (91 percent) offer a la carte service selling snack foods and beverages to some extent. A la carte service is most likely to be available at the high school or middle school levels, declining somewhat at the elementary school level (especially in the smaller districts).[160]

The Bridging the Gap reports indicate middle and high school students generally have more healthy snack food and beverage options available to them than elementary students (see Table 3.4). During the 2007–2008 school year, just over one-third of public elementary school students were consistently able to purchase fresh fruits, vegetables, or salad through at least one venue.[161] This contrasts with the 2006 School Health Programs and Policy Study, which found that, during a typical week, three-quarters of elementary schools sold fruit, and two-thirds sold lettuce, vegetable, or bean salads in a la carte venues.[162] For secondary students, three-quarters had fruits, vegetables, and salads available in the 2007–2008 school year.[163]

TABLE 3.4 Percentage of Students Who Have Access to Various Options in Snack and a la Carte Food and Beverage Venues (2007–08 School Year)

Snack food and/or beverage	ES students (%)	MS students (%)	HS students (%)
Fruits, vegetables, salads	38	76	82
Salty or sweet snacks[1]	44	61	77
Healthier drinks[2]	55		
Bottled water[3]	40	96	99
Low- or no-calorie drinks	18		
Sugar-sweetened drinks (MS, HS includes regular soda)	17	71	92
2% or whole milk	38	61	72

[1] Included less-healthy foods such as potato chips, candy, ice cream, cakes, cookies, and french fries.
[2] "Healthier drinks" follow the Alliance beverage guidelines for middle and high school, and include bottled water, 100% fruit juice, 1% milk, and skim milk.
[3] For middle and high schools, bottled water is incorporated in the healthier drink category.

SOURCES:
1. L. Turner et al., *School Policies and Practices to Improve Health and Prevent Obesity: National Elementary School Survey Results: School Years 2006–07 and 2007–08, Vol. 1* (Chicago: University of Illinois at Chicago, 2010), www.bridgingthegapresearch.org.
2. L. D. Johnston et al., *School Policies and Practices to Improve Health and Prevent Obesity: National Secondary School Survey Results, School Years 2006–07 and 2007–08, Vol. 1* (Ann Arbor, MI: Institute for Social Research, 2011), www.bridgingthegapresearch.org/research/secondary_school_survey.

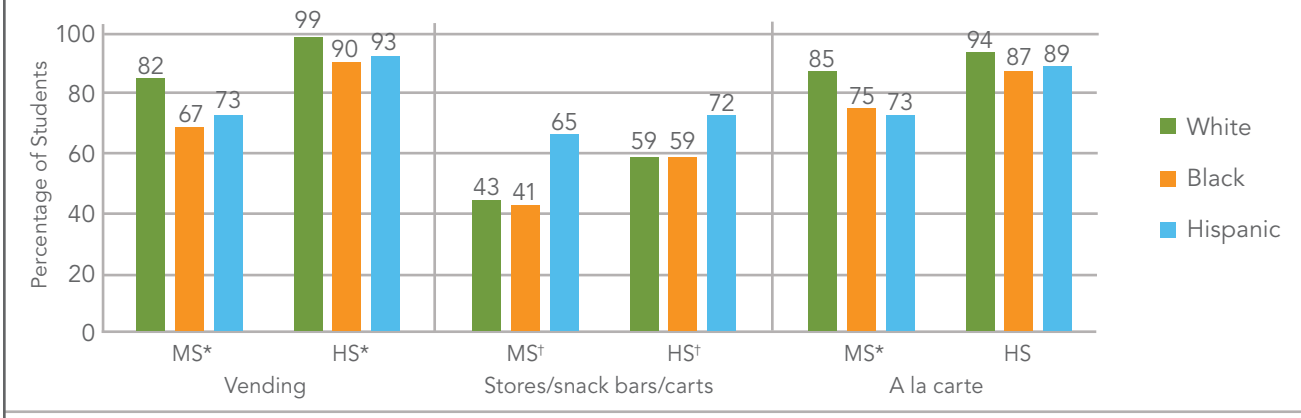
One nationally representative study found that the mean number of "more-healthy" food items, such as low-fat and low-sugar items, available to students was significantly lower for middle school students (1.9 items) than for high school students (2.4 items).[164] High school students, on average, have a greater variety of food types from which to choose, both more and less healthy.[165]

Vulnerable Populations: Differences in Student Access to Snack Foods and Beverages

The studies reviewed for this HIA showed variations in access to snack foods and beverages based on student or school socio-economic status (SES), student ethnicity or race, student age, and venue. In a national study from 2004 to 2005, black middle school students were significantly more likely than white and Hispanic students to have access to a la carte lunch items.[166] Findings from another study using the same data determined that Hispanic students appear to have greater access throughout the day to soft drinks sold in vending machines. In the 2004–2005 school year, among middle schools, 18 percent of Hispanic students had access, compared to 9 percent of white and 6 percent of black students.[167]

There were no significant differences in high schools across the sub-groups. By the 2008 school year, Latino middle and high school students had greater access to school stores, snack bars or carts compared to white or black students.[168] In that same study, white middle and high school students had greater access to vending machines and a la carte options than black or Latino students[169] (see Figure 3.5).

FIGURE 3.5 Percentage of Students with Access to Venues Selling Snack and a la Carte Foods and Beverages by Student Race and Ethnicity (2008)



* Differences between white students versus black and Hispanic students were significant at p<.05.
† Differences between Hispanic students versus white and black students were significant at p<.05.
SOURCE: L. D. Johnston et al., *School Policies and Practices to Improve Health and Prevent Obesity: National Secondary School Survey Results, School Years 2006–07 and 2007–08, Vol. 1* (Ann Arbor, MI: Institute for Social Research, 2011), www.bridgingthegapresearch.org/research/secondary_school_survey.

In 2004–2005, among both middle and high schools, children with a higher socioeconomic status had greater access to beverages in vending machines—both healthy and unhealthy options—including low-fat milk, fruit or vegetable juice, and sugary drinks.[170] Bridging the Gap researchers found similar results for the 2008 school year in which students attending higher SES high schools had statistically greater access to snack foods in vending machines (100 percent compared to 91 percent) and a la carte lines (98 percent compared to 86 percent).[171]

Students attending public elementary schools in the Northeast and South had much greater access to beverages (68.1 percent and 72.9 percent, respectively) than did public elementary school students in the Midwest and Western United States (48.5 percent and 50.2 percent, respectively).[172] Among public school students with access to at least one beverage venue, those in the South, compared with those in the West, were significantly less likely to have only healthy beverages available (24.9 percent versus 38.8 percent) and significantly more likely to have higher-fat milk available (60.2 percent versus 41.1 percent).[173] There may also be differences in snack food and beverage availability across schools, school districts, and states. For example, a study found that smaller schools in Kansas had significantly fewer vending machines than large schools: a median of three compared to a median of 6.5.[174]

3.3 Current School and School District Use of Revenue from Snack and a la Carte Foods and Beverages

In a 2003 U.S. Government Accountability Office report examining food service revenue across six states, federal meal reimbursements provided 53 percent of total food service revenues while other food sales, including snack foods and beverages, contributed 39 percent.[175] Of the six states, Ohio and Virginia reported that snack food and beverage sales provided more revenue to schools than federal reimbursements for school years 1996—1997 through 2000—2001.[176] In a different study of California school districts researchers found equally significant contributions of snack food and beverage sales to food service bottom lines, with 60 percent of school district administrators reporting that a la carte sales account for up to 40 percent of food service revenues.[177,178] Administrators typically use the revenues from these sales for discretionary spending in schools to supplement a variety of enrichment activities for students.[179-181]

However, in the 2008 School Lunch and Breakfast Cost Study II, the United States Department of Agriculture found that, on average, school districts were underpricing foods and beverages sold outside of school meal programs at mealtimes by 39 percent.[182] Revenues from non-reimbursable items sold, such as those in a la carte lines, fell short of the cost of producing those items by a total revenue to cost ratio of 61 percent.[183] This finding indicated that funds designated for reimbursable meals at lunch and breakfast were being used to make up for shortfalls in snack and a la carte food and beverage sales.

Revenues Received from a la Carte Sales

SNDA III provides information on the current conditions of the net revenue schools receive from the sale of a la carte foods and beverages.[184] When examining a la carte revenue during a target week, the most commonly reported range across all school levels (50 percent) was at the low end—$1-<$100. When broken down by grade level, the most commonly reported weekly revenue from a la carte foods was:

- Elementary: 63.9 percent of schools reported weekly revenue of $1 - <$100;
- Middle: 47.3 percent of schools reported weekly revenue of $100 - $400;
- High: 32.0 percent of high schools reported weekly revenue of $1 - <$100.

However, the SNDA III data on a la carte revenues does not take the budgetary shortfall discussed above into account. See Appendix 5, Table A5.5 for additional details.

Beginning in the 2012-2013 school year, section 206 of the Healthy Hunger Free Kids Act (P.L. 111-296) requires that the proportion of total school food service revenue from items sold outside of the meal programs be equal or greater than the costs of selling those items, which will allow for more accurate revenue data to be captured in the future.

Revenues Received from School Stores and Vending Machines

SNDA III also reports annual revenues received from snack food and beverage sales in school stores and vending machines (see Appendix 5, Table A5.6). Of the schools included in SNDA III, no elementary schools reported having school stores and only 17.2 percent reported having vending machines available

to students. Similarly, none of the middle schools reported having school stores; however, 81.7 percent had vending machines available to students. In middle schools, the groups receiving the most money from vending machines were schools' general accounts (51.3 percent); school food service (24.0 percent); and other school district departments or funds (18.7 percent). Of the high schools, 24.8 percent reported having access to student stores and 96.7 percent reported having vending machines available to students. Within high schools, those receiving the highest percentage of money from school stores were the schools' general accounts (37.0 percent), followed by associated student body organizations, such as business classes or clubs (27.5 percent) and student councils, activities, and clubs (21.5 percent). The high school organizations receiving the most funds from vending machines sales were schools themselves (52.0 percent); athletic departments (32.8 percent); and student councils, activities, and clubs (28.4 percent).

The monthly net income to schools or SFAs from school stores or vending machines is shown in Table 3.5.[185] The sample size for elementary schools reporting was to small to estimate net income from school stores or vending machines. This was also the case for middle schools and school stores. However, for vending machines, among middle schools, the highest percentage (29.8 percent) receiving funds reported monthly income in the $100–$999 range. Of high schools included in SNDA III, a majority of schools (24.5 percent) indicated that they receive $100–$999 a month from school stores and (45.7 percent) $100–$999 from vending machines.

TABLE 3.5 Monthly Net Income to School or SFA from School Store or Vending Machines

Monthly net income to school or SFA from school store	ES (%)	MS (%)	HS (%)	All schools†
Less than $100	–	–	8.3	22.2
$100 to $999	–	–	24.5	44.4
$1,000 to $5,000	–	–	24.0	14.2
More than $5,000	–	–	5.5	1.9
No income to school or district	100	100	19.2	10.8
Don't know	–	–	18.5	6.5
Number of schools reporting	**143**	**127**	**125**	**395**
Monthly net income to school or SFA from vending machines (not including food service income, as reported by principals)	ES (%)	MS (%)	HS (%)	All schools†
Less than $100	*	24.9	4.1	20.2
$100 to $999	*	29.8	45.7	31.3
$1,000 to $5,000	*	7.4	13.5	10.4
More than $5,000	*	0.0	2.1	0.9
No income to school or district	*	0.9	0.0	1.3
Don't know	*	37.0	34.6	36.0
Number of schools reporting	**12**	**47**	**64**	**123**

– No schools reported
* Sample sizes are too small for reliable estimates.
† "All schools" is a total for ES, MS, and HS, as well as additional schools not fitting into these discrete categories (e.g., a school with grades K-8).

SOURCES:
1. U.S. Department of Agriculture, Food and Nutrition Service, *School Nutrition Dietary Assessment Study III: Vol. I: School Foodservice, School Food Environment, and Meals Offered and Served* (Washington, DC: U.S. Department of Agriculture, Food and Nutrition Service, 2007).
2. School Nutrition Dietary Assessment III, Principal Survey, school year 2004–2005. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the NSLP.
3. School Nutrition Dietary Assessment III, Foodservice Manager Survey and Principal Survey, school year 2004–2005. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the NSLP.

Regional and Sub-Regional Differences in Snack and a la Carte Food and Beverage Sales

Snack food and beverage sales and revenues vary regionally. For example, a study of Kansas school districts found that rural districts were 2.4 times more likely than urban and suburban districts to have low to moderate a la carte sales.[186] Of the 206 rural districts, 33 percent had low a la carte sales and 67 percent had moderate and high a la carte sales. Of the 76 urban and suburban districts, 21.1 percent had low a la carte sales and 78.9 percent had moderate and high a la carte sales. For the districts with low a la carte sales, these items had lower nutritional quality, and fewer free or reduced-price lunches (40 percent) were served compared to districts with high a la carte sales.[187] Variations such as these indicate that the possible impact of a nationwide snack food and beverage policy will not be uniform across school districts.

3.4 Children's Snack and a la Carte Food and Beverage Behaviors: Purchase and Consumption

National Data on Children's Consumption

The proportion of calories that children consume from different types of foods and nutrients has changed in the past 40 years. Between 1971–1974 and 1999–2000, children consumed a lower percentage of calories from fat and saturated fat and an increased number of calories from carbohydrates.[188] In 2004, research found that children consumed an average of 527 "empty calories" over a 24-hour period from foods low in nutrition and high in energy density.[189] Currently, sugar-sweetened beverages (SSBs) are the leading contributor to childhood energy consumption, accounting for 10 to 15 percent of total calories consumed.[190-192]

Research indicates children's fruit and vegetable consumption is lower than recommended by the 2010 DGA. When examining data from the 1999–2002 National Health and Nutrition Examination Survey (NHANES), research found that non-Hispanic black children and adolescents consumed significantly more dark-green vegetables and fewer deep-yellow vegetables than Mexican-American and non-Hispanic white children and adolescents.[193] Total fruit intake was significantly higher by Mexican-Americans than non-Hispanic white children and adolescents. Children and adolescents most at risk for higher intakes of energy-dense fruits and vegetables (e.g., fruit juice and fried potatoes) were generally boys, adolescents, children at risk for overweight or currently overweight, and those living in households below 350 percent of the poverty level.[194]

Data from the 2009 Youth Risk and Behavior Survey indicate that nationwide, about one-third of students had eaten fruit or drunk 100 percent fruit juices two or more times during the seven days before the survey.[195] Overall, the prevalence of having eaten fruit or drunk 100 percent fruit juices two or more times a day was higher among black (37.3 percent) than white (32.2 percent) students, and higher among black male (39.6 percent) and Hispanic male (35.9 percent) students than black female (35.0 percent) and Hispanic female (32.4 percent) students, respectively.[196] Nationwide, 1.8 percent of schoolchildren had eaten vegetables three or more times a day during the seven days before the survey. The prevalence of having eaten vegetables three or more times per day was higher among Hispanic male (15.9 percent) than Hispanic female (11.5 percent) and white male (12.8 percent) students.[197] Nationwide, 22.3 percent of schoolchildren had eaten fruits or vegetables five or more times during the previous seven days.[198]

Data from the 2010 National Youth Physical Activity and Nutrition study found that high school students consumed a median of 1.2 servings of fruits and vegetables per day.[199] Non-Hispanic black students and Hispanic students ate a lower median number of vegetables (1.0 and 1.2, respectively) than non-Hispanic white students (1.4).[200] Overall, about one-third of high school students consumed less than one serving of fruit (28.5 percent) and less than one serving of vegetables a day (33.2 percent). The authors conclude that "these results make it likely that the majority of students are not meeting the daily fruit and vegetable recommendations for adolescents participating in <30 minutes of daily physical activity: 1.5 cups of fruit and 2.5 cups of vegetables for females and 2 cups of fruit and 3 cups of vegetables for males. The recommendations are higher for adolescents participating in more physical activity."[201,202]

Purchase and Consumption in Schools

The differences in access to snack foods and beverages noted in the previous section contribute to student purchasing patterns and, therefore, consumption. While research indicates that schools have been reducing access to unhealthy foods over time, there is still a wide array of unhealthy options available to students.

Researchers examining SNDA III found that one-third of elementary school children, nearly half of middle school children, and more than half of high school children are eating snack foods and beverages from various venues while at school.[203,204] Of the children consuming these items, more than half (53 percent) are consuming desserts or snacks that are energy-dense and low in nutrients.[205,206] Children eating school lunches were less likely than nonparticipants to eat these foods.[207] Overall, students not participating in the NSLP were nearly twice as likely to eat one or more snack foods and/or beverages during the school day (37 percent compared to 19 percent).[208]

As indicated in Table 3.6, in the 2004–2005 school year, SNDA III found that, in elementary school, the most common sources of snack foods were fund-raisers such as bake sales, classroom parties, and teacher rewards, followed by vending machines.[209] Vending machines and a la carte lines were the most common sources among middle school and high school students.[210]

TABLE 3.6 Sources of Snack and a la Carte Foods and Beverages (2004–05 School Year)

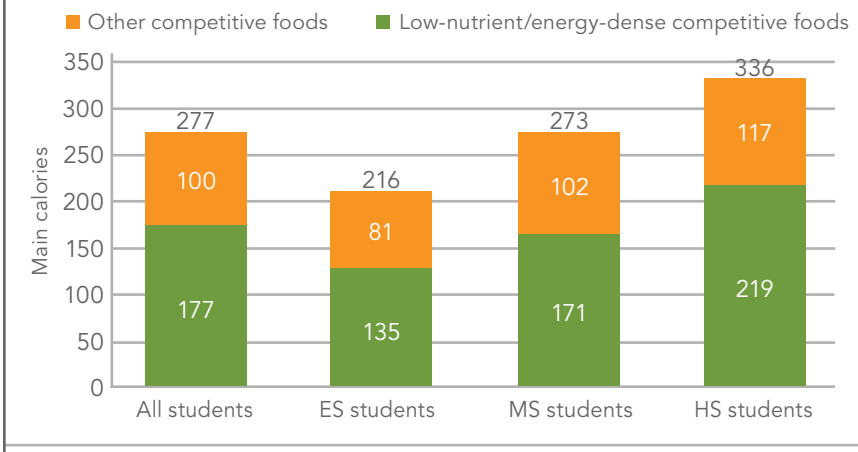
Source	ES students (%)	MS students (%)	HS students (%)
Any venue	29	44	55
Vending machines	15	22	41
School stores	3	4	10
A la carte	4	21	25
Snack bars	0	11	12
Fund-raisers, parties, rewards, other	27	12	15

SOURCE: U.S. Department of Agriculture, Food and Nutrition Service, *School Nutrition Dietary Assessment Study III: Vol. I: School Foodservice, School Food Environment, and Meals Offered and Served* (Washington, DC: U.S. Department of Agriculture, Food and Nutrition Service, 2007).

Research examined for this HIA confirmed that children consume between one-quarter and one-half of their daily energy intake at school.[211] For example, using the SNDA III data from 2004 to 2005, it was determined that sources of foods and beverages eaten or obtained at school contributed a range of 34 to 35 percent of total energy intake, depending on the grade level.[212] On average, children who consumed one or more snack foods and beverages obtained 177 calories from low-nutrient, energy-dense sources, with high school children consuming nearly two-thirds more total calories than elementary age children (see Figure 3.6 and Table 3.7).[213,214]

The most commonly consumed items outside of the school meals are foods and beverages that are low in nutrients and high in energy density.[215] The number of calories that students consume from low-nutrient, energy-dense foods and the percentage of students who consume SSBs increase as children progress from elementary school, to middle school, and finally into high school.[216,217] One study found that on an average school day, more than 65 percent of students consumed SSBs.[218]

FIGURE 3.6 Average Number of Calories Obtained from Snack and a la Carte Foods and Beverages in Schools among U.S. Public School Children



Based on weighted data from SNDA III, one 24-hour dietary recall, school year 2004–2005. All students (n=984), elementary school (n=208), middle school (n=348), high school (n=428).

SOURCE: M. K. Fox et al., "Availability and consumption of competitive foods in US public schools," *Journal of the American Dietetic Association* 109, suppl. 2 (2009): S57–66.

Differences in purchase and consumption of these items can be found when looking at regional, ethnic, and SES differences in and among schools. One study found that children in the South, black non-Hispanic, and low-income children were significantly more likely to consume soft drinks at school, based on availability.[219] In a 2005 national survey, compared to non-Hispanic whites, surveyed children who were non-Hispanic black, Hispanic, or "other" showed an increased likelihood of purchasing from a vending machine at least once a week.[220]

TABLE 3.7 Snack and a la Carte Foods and Beverages Contribution to Daily Energy Intake

	ES students (%)	MS students (%)	HS students (%)
Calories obtained from consuming one or more low-nutrient, energy-dense snack foods	135	171	219
Percent of daily energy intake from low-nutrient, energy-dense snack foods	7	8	10
Percent of daily energy intake from all snack foods	11	13	15

SOURCE: M. K. Fox et al., "Availability and consumption of competitive foods in US public schools," *Journal of the American Dietetic Association 109,* suppl. 2 (2009): S57–66.

In Florida, the proportions of students buying lunch from vending machines were significantly higher in association with the availability of beverage vending machines, smoking status, non-Hispanic black race or ethnicity, Hispanic ethnicity, and being an older age.[221]

3.5 Child Weight Status, Physical Activity, and Diet-Related Chronic Diseases

Child Weight Status

There have been significant increases in the percent of children who are overweight since the 1960s.[222] Although the prevalence of obesity varies by race, age, and region, obesity is an issue that touches children across the United States (see Tables A5.7 and A5.8 in Appendix 5).

In 2008, the prevalence of obesity was 19.6 percent among all children 6–11 years old and 18.1 percent among 12–19 year olds.[223] Between 2003 and 2007, low-income, publicly insured, black, and Hispanic children were significantly more likely to be overweight or obese.[224,225] In 2007, after adjusting for socioeconomic, behavioral, and state residence factors, black and Hispanic children had 71 percent and 76 percent higher odds of being obese and 55 percent and 78 percent higher odds of being overweight than their white, non-Hispanic peers.[226] Another 2007 study indicated that Hispanic, non-Hispanic white, and American Indian children had 3 to 3.8 times higher odds of being obese or overweight than Asian children; and children from low-income and low-education households had 3.4 to 4.3 times higher odds of being obese than children from higher socioeconomic households.[227] Children in Illinois, Tennessee, Kentucky, West Virginia, Georgia, and Kansas had more than twice the adjusted odds of being obese than children in Oregon.[228]

Child Physical Activity

Both calorie intake and expenditure are important in weight maintenance, with physical activity playing an important role.[229] Research indicates that adolescents and teens are not getting the recommended 60 minutes per day of moderate to vigorous physical activity (MVPA) as suggested by the Dietary Guidelines for Americans.[230] In one study using cross-sectional date from the 2003–2004 NHANES, researchers found that physical activity declined dramatically across age groups between childhood and adolescence and continued into adulthood.[231] For example, nearly half (42 percent) of children between six and 11 obtain 60 minutes a day of physical activity, while less than one-tenth (8 percent) of adolescents reach this level.[232] Similarly, in a longitudinal study from 1991 to 2007, it was found that at age nine, children engaged in MVPA approximately three hours a day on both weekdays and weekends.[233] By the time adolescents reached 15 years, they were engaging in MVPA for only 49 minutes per weekday and 35 minutes per weekend day. Furthermore, boys were found to be more active than girls, spending 18 and 13 more minutes per day in MVPA on the weekdays and weekends, respectively.[234]

Type 2 Diabetes, High Cholesterol, and High Blood Pressure

As the numbers of children who are overweight and obese have risen, so too has the prevalence of obesity-related chronic illness.[235] In the United States, there are varying levels and trends of obesity-related illnesses among youth. The leading chronic disease among children and adolescents is type 2 diabetes; it has grown alongside the rate of childhood obesity and risen to affect one out of every 400 children in the United States (see Appendix 5, Table A5.9).[236,237] More adolescents ages 10–19 are experiencing type 2 diabetes mellitus than younger children ages 0–9.[238] In 2001, there were no significant differences by ethnicity in the prevalence of type 2 diabetes.[239] However, if current trends persist, it is estimated that one in three children born in the United States in the year 2000 will go on to develop type 2 diabetes at some point in their lives; make that nearly one in two if the child is black or Hispanic.[240]

Similarly, while trends have lagged behind obesity, the prevalence of high blood pressure among youth has been increasing since the late 1980s (see Appendix 5, Table A5.10).[241] Despite a decrease in age-adjusted high blood pressure prevalence between 1963 and 1988, it is again on the rise, with black and Mexican American youth disproportionately affected. Although hypertension affects more than 10 percent of obese children with a body mass index (BMI) in the 95th percentile, high blood pressure is only one cardiovascular risk factor, in addition to high cholesterol, that threatens obese and overweight youth into adulthood (see Table A5.11).[242,243] Between 1999 and 2002, there were no overall differences by race or ethnicity in blood pressure; however, black and Mexican American males had higher blood pressure than their white male peers.[244] Between 1999 and 2006, more boys, older teens (18–19), non-Hispanic whites, and obese children had higher lipid abnormalities, such as high cholesterol or triglycerides, which is an important risk factor for cardiovascular disease, than their peers (see Appendix 5, Table A5.11). As the incidence of childhood overweight increases, chronic diseases typically associated with adult obesity are also expected to grow.[245]

Childhood Tooth Decay

Although childhood tooth decay, or cavities, has decreased since wide-scale implementation of population-based fluoridation efforts, the risk persists as this is the most common childhood disease. A little more than half (54 percent) of children had a cavity in at least one primary or permanent tooth between 1999 and 2004, and about the same percentage of adolescents ages 13 to 15 years had a cavity during the same time period.[246] Nearly two in 10 (19 percent) children ages 2 to 19 years have untreated tooth decay.[247]

Low-income children and black, non-Hispanic children and Mexican-American children have higher rates of untreated tooth decay than their white, non-Hispanic counterparts.[248] For data collected on children ages 6 to 19 years from 2001 to 2004, 28 percent of black, non-Hispanic children and 31 percent of Hispanic children of Mexican origin had untreated tooth decay, compared to 19 percent of white, non-Hispanic children. Low-income children were also disproportionately affected by untreated tooth decay in 2001–2004: 31 percent of children below 100 percent of the poverty level, compared to 15 percent of children ages 6–19 at or above 200 percent the poverty level.[249]

Dental disease can lead to pain, a lack of ability to focus in school, and reduced quality of life, including the inability to eat healthier foods as a result of tooth loss.[250] It is commonly reported in literature that more than 51 million school hours are lost each year due to dental-related problems.[251-254] Researchers in North Carolina found that children with poor oral health were nearly three times more likely to miss school as a result of dental pain.[255] Tooth decay and poor oral health that begin in childhood may be associated with longer-term health problems.[256,257]

Health Disparities and Vulnerable Children

This HIA examines how specific subgroups of vulnerable children—including low-income, black, and Hispanic students—might be differentially affected by a USDA policy on snack and a la carte foods and beverages. This question is important because, at baseline, these students have higher rates of many illnesses that could be affected by the policy and may, therefore, be particularly sensitive to changes that result from the updated USDA standards. As delineated in the body of this chapter, low-income, black, and Hispanic children have higher rates of food insecurity; they are more likely to be overweight or obese; and they are more likely to have untreated tooth decay, which is also associated with reduced quality of life, more frequent school absences, and longer-term health problems.

Available data indicate that the school food environment could contribute to the observed disparities. Although findings are not entirely consistent, two national studies suggested that black and Hispanic students may have greater access to foods such as a la carte lunch items and soft drinks sold in vending machines at school, and lower access to healthier options in vending machines. Further data collection may be warranted to better evaluate this question and to allow improved tracking and management of impacts on vulnerable children when the updated nutrition standards are implemented.

CHAPTER 4

Potential Impact of a National Competitive Foods Policy on School Services

This chapter explores whether a national snack food and beverage policy will impact school district revenue and thus student health. As discussed in Chapter 2, key research questions include:

- Will updated standards affect students' participation in the school meal programs and school food service revenue?
- Will updated standards affect school-district or other types of revenue that pay for school services?
- If revenue changes occur, will they affect student health via changes to enrichment learning opportunities and school-supported physical activity?

The research team hypothesized that setting a national snack and a la carte food and beverage policy floor will change the types of foods that are available for sale in elementary, middle, and high schools, and that such changes in the types of foods offered might also affect school meal participation, food service revenue, and student consumption habits (see Figure 4.1). For example, the team predicted that a national snack and a la carte food and beverage policy could result in fluctuations in sales of these items in some districts where the existing policy restrictions do not meet the 2010 DGA. These changes could then affect children's health outcomes as changes in the food available outside of the school meal could contribute to potential beneficial increases in school meal participation. Such an outcome can also lead to increased food service revenue (see Figure 4.1).

Changes in what can be sold in vending machines, school stores, and food carts could also affect the net revenue of certain school groups, including athletic teams, student government, and teacher- or administrator-led groups.

In cases where money does not go to school food service administrators, these funds are often reported as part of school district enterprise revenue in which schools earn income by charging users for activities

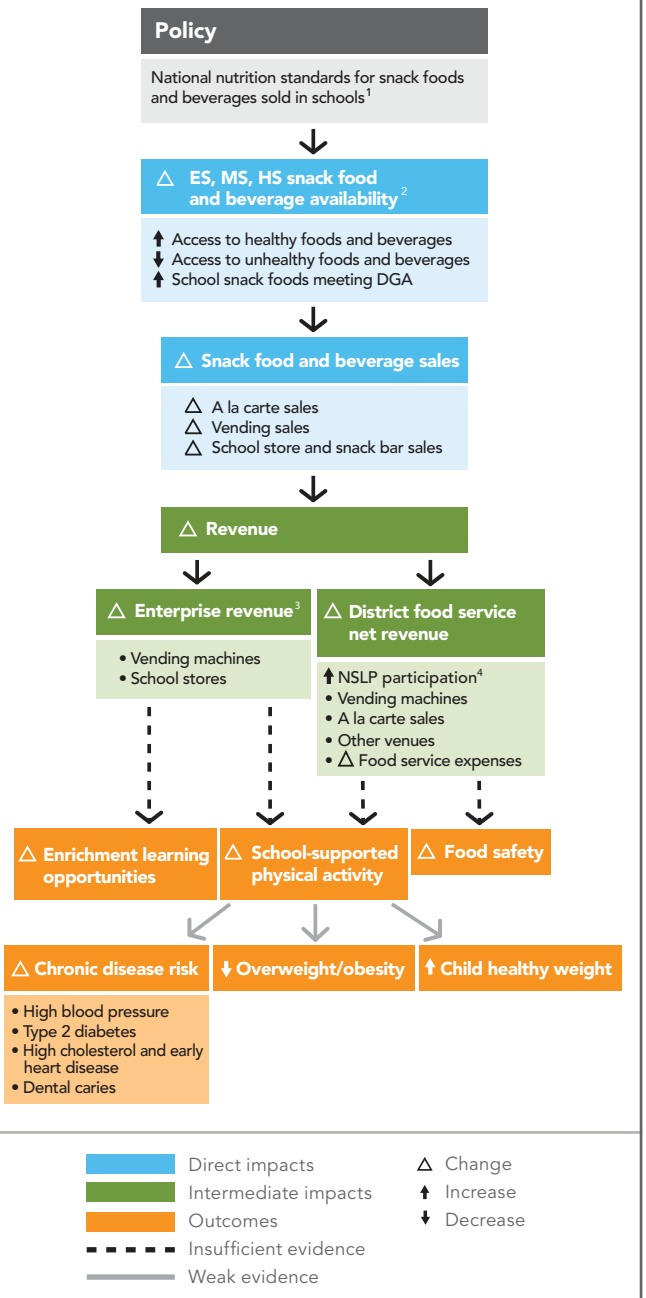
or services, or by selling either food or nonfood items for profit. School district enterprise revenue could be affected by a national policy that changes the types of foods and beverages sold in school stores, vending machines, and other venues outside of the cafeteria. These potential shifts may impact the availability of student enrichment activities, such as student government or clubs, and school-supported physical activities, such as sports teams, that can affect children's health. This HIA was not able to make a firm judgment of potential impacts in this area due to lack of sufficient information.

Section 208 of the HHFKA gave the Secretary of Agriculture the authority to exempt infrequent fund-raisers from nutrition standards. Thus, this HIA does not explore what impact these regulations might have on revenue from such sales.

In reviewing the literature on this topic, several notable characteristics emerged:

- School wellness policies and, by extension, snack food and beverage policies, vary considerably from school district to school district and state to state. Consequently, the results of studies that have examined the impact of such policies on school service revenues reflect, in part, the diversity of school wellness policies.
- Policies varied by study and included a range of interventions, such as restrictions on access to snack foods and beverages based on time of day or venue; differential pricing for healthier food choices; and marketing and educational strategies, including posters, student groups, and outreach.[258-272]
- Studies focus predominantly on public middle and high schools, though several studies also include public elementary schools.[273-277]

FIGURE 4.1 School Services Health Determinant Pathway



[1] Fund-raisers are not included.
[2] ES, MS, HS: Elementary school, middle school, high school
[3] Enterprise revenues, as defined in the LEA Finance survey, includes revenue from vending machine sales as well as funds from any activity for which a fee is charged to external users for goods or services, whether or not it is food and beverage based.
[4] NSLP: National School Lunch Program

- Studies included a mix of urban, rural, and suburban samples. The majority of the studies reviewed are state-specific and are often exclusive to regions of certain states.
- Many of the studies included limited sample sizes, hindering the generalizability of their findings to broader populations. To date, there are no nationally representative studies that examine the relationship between state-level snack food and beverage policies and food service revenue.

This chapter presents findings from a literature review, stakeholder interviews, and original empirical analysis of state policy and revenue changes in order to answer these questions. Each of the following sections of this chapter further explores the direct and intermediate impacts and health outcomes of the school services health determinant pathway as outlined in Figure 4.1.

4.1 Direct Impacts

Will a national snack and a la carte food and beverage policy affect the number of schoolchildren participating in the school meal programs?

The literature review and policy analysis demonstrate a consistent relationship between snack food and beverage sales (namely a la carte foods) and school meal participation; specifically, as access to snack and a la carte foods and beverages decreases, school meal participation increases.[278-280]

Literature Review

In addition to participation in school meals increasing as a result of decreased access to snack and a la carte foods and beverages, changes in nutrition policies and standards (i.e., stricter guidelines) have also been found to be positively correlated with participation in NSLP as described by Wharton and colleagues in a literature review of four peer-reviewed papers and three state-based reports on the impacts of food-related policies on revenues.[281] Their review did not support the claim that changes in food policies affecting the school nutrition environment will negatively impact school food service revenues. In fact, there appears to be little evidence or support for the argument that eliminating snack and a la carte foods and beverages, or implementing nutrition standards for them, will negatively affect the school food service environment.

State-by-State Policy Analysis

As discussed in Chapter 2, this HIA used data from the Classification of Laws Associated with School Students in the financial analysis. Using this data, the research team developed an overall categorical policy index, ranging from 0 to 3, designed to reflect policy strength (see Table 4.1).

TABLE 4.1 Overall Snack and a la Carte Food and Beverage Policy Scores

Rank	Score	Definition
No policy	0 (none)	No state policy (as defined by the SNESPCS) or a policy that provides recommendations but no requirements. State policies with recommendations only were treated as no policy since they do not require any policy response from school districts.
Restrictions but no standards	1 (weak)	All or a majority of specific policy measures have requirements but no specific standards for those requirements.
Restrictions do not meet DGA	2 (moderate)	All or a majority of policy measures have requirements and specific standards, but the standards do not meet the 2005 DGA.
Meets or exceeds DGA	3 (strong)	All or a majority of policy measures have requirements and specific standards that meet the 2005 DGA or approach IOM recommendations.

The state-by-state policy analysis of the relationship between implementing snack food and beverage policies and meal participation supports the conclusion that states that move from no policy to any sort of policy experience an overall increase in total meal participation.

Increases in meal participation are largely driven by rises in lunch participation, particularly free and reduced-price meal participation, as shown in Table 4.2. These numbers reflect each state's total from all reporting school districts (see Chapter 2). Overall meal participation (the sum of breakfast and lunch) increased significantly, on average by between 1.7 percent and 2.6 percent, for states moving from no policy to some sort of policy (first three columns). Overall breakfast participation appears virtually unchanged by policy shifts.

Further, there appeared to be an association between increasing snack food and beverage standards and greater free or reduced-price meal participation within states that began with no policy in place, though this was more evident among states moving from no policy to a policy with some level of restrictions without nutrient standards (level 1). Meal participation went down when states moved from a level 1 or level 2 policy to a level 3 policy where nutrient standards aligned with the 2005 DGA (far right columns of Table 4.2), but none of the effects were statistically significant.

The general trend in average paid meal participation indicates that states that shifted from no policy to a policy with some restrictions (level 1) or some nutrient standards (level 2) experienced nonsignificant reductions in paid meals. However, states moving from no policy to a policy meeting the 2005 DGA (level 3) experienced nonsignificant increases in paid meals. The estimated effects of moving from either a level 1 or level 2 policy to a policy that meets or exceeds the 2005 DGA were positive. States that shifted from having only a few nutrient standards in their food policy restrictions (level 2) to a policy aligning with the 2005 DGA (level 3) experienced relatively large and statistically significant increases in paid meal participation, on average by 7.3 percent.

The separate free and reduced-price lunch and breakfast effects generally mirrored those for overall free and reduced-price meal participation, with the change in breakfast participation somewhat larger and more consistently negative. Only states moving from a level 2 policy with some nutrient standards to a level 3 policy aligning with the 2005 DGA experienced a statistically significant increase of 5.7 percent in paid lunch participation (see bottom far right column of Table 4.2).

TABLE 4.2 Impact on School Meal Participation When Snack and a la Carte Food and Beverage Policies Are Strengthened

Change from / to	No policy / Level 1	No policy / Level 2	No policy / Level 3	Level 1 / Level 2	Level 1 / Level 3	Level 2 / Level 3
Change in overall meal participation	1.7% *	2.3%	2.6% *	0.6%	0.8%	0.2%
Change in lunch	1.9% *	2.7%	2.6% *	0.8%	0.7%	-0.1%
Change in breakfast	0.6%	0.0%	0.0%	-0.6%	-0.6%	0.0%
Free/reduced-price participation	2.4% *	3.5%	0.9%	1.0%	-1.5%	-2.6%
Lunch	2.6% *	3.9%	0.8%	1.3%	-1.8%	-3.1%
Breakfast	1.7%	2.3%	0.6%	0.6%	-1.1%	-1.7%
Paid participation	-0.5%	-4.2%	3.0%	-3.7%	3.5%	7.3% *
Lunch	-0.1%	-2.8%	3.0%	-2.7%	3.0%	5.7% *
Breakfast	-2.7%	-9.2%	-1.7%	-6.6%	0.9%	7.5%

* Statistically significant ($p<.05$)
Level 1 = Policy restrictions do not have nutrient standards.
Level 2 = Policy restrictions have standards but do not meet the 2005 DGA.
Level 3 = Policy restrictions have standards that meet or exceed the 2005 DGA.

Policy levels based on CLASS scoring (see Chapter 2).

4.2 Intermediate Impacts

What is the impact of a snack and a la carte food and beverage policy on food service revenue?

Because of the financial significance of snack foods and beverages in many schools, recent studies have begun to explore the relationship between the implementation of policies and changes in school food service revenue.[282-284] The majority of the research examined for this HIA shows that more rigorous standards for snack and a la carte foods and beverages do not negatively impact school food services' net revenue at the district level. Rather, the evidence shows that school food service fiscal health is likely to improve as a result of updating nutrition standards for snack foods and beverages.

The evidence shows that school food service fiscal health is likely to improve as a result of updating nutrition standards for snack foods and beverages.

However, in interviews for this assessment, most school administrators expressed concern about the potential negative impact of a national snack food and beverage policy on school food service revenues resulting from changes to a la carte sales. This apprehension stems from the fact that a la carte food and beverage sales can have a substantial effect on overall food service revenue.[285-288] There is a commonly held misconception that school districts need to sell snack foods and beverages, particularly a la carte items, in order to help support the school meal programs. However, a national USDA cost study conducted in 2008 showed that money earned through reimbursable school meals actually fund a la carte foods, not the other way around. The study found that by an average of 29 percent, revenues from nonreimbursable foods (such as those sold a la carte) fell short of the cost of producing those items, thus schools often pulled funds from subsidized meals to cover expenses related to purchasing and preparing snack food

and beverages.[289,290] Along those lines, a 2003 study of all 1,256 Texas school districts reports that annual income from vending machines was more than $54 million but resulted in up to $60 million in lost income from school meals. It also found that in 2001, the "total deficit for school food operations in these school districts was $23.7 million, which had to be subsidized from other district funds."[291]

As mentioned in Chapter 3, practices to offset the true cost of snack foods and beverages have been addressed in Section 206 of the HHFKA, which requires schools to ensure that non-program foods (e.g., a la carte items) sold in competition with federal meal programs are sold for at least as much as it costs to purchase and prepare them. This practice has not yet been fully implemented in schools across the country, thus it is not reflected in the literature review or financial data obtained for this report.

Literature Review

The proportion of food service revenue generated from snack foods and beverages varies from district to district.[292-294] For example, in the 2004–2005 school year, across all school levels, SNDA III reported half of schools received only up to $100 in weekly revenue from a la carte foods.[295] In that same year, of the public high schools generating the most revenue from snack and a la carte food and beverage sales, nearly one-third reported earning more than $125,000.[296] A review of six large states' food service revenue from 1996 to 2001 found that sales of snack and a la carte foods and beverages accounted for more than 40 percent of total food service revenue, whereas state funding supplied only 3 percent of revenues (see Appendix 4).[297] However, a number of studies in this review suggest that schools and school districts can be financially stable and enforce strong nutrition standards.

A number of studies in this review suggest that schools and school districts can be financially stable and enforce strong nutrition standards.

In a 2009 evaluation of the West Virginia Healthy Lifestyles Act,[i] the authors report that 80 percent of West Virginia principals reported little or no change in revenues after implementing a state policy requiring schools to offer healthier beverages, such as milk and water, while at the same time restricting the sale of "junk foods" and soda.[298] Pilot projects on policies in Connecticut and Arizona convey similar trends of increased food sales, increased meal participation, and no significant change or losses in food service revenue.[299,300] French and colleagues describe similar results in their studies, which report no change in overall food service revenue in schools with more stringent snack food and beverage standards.[301-303] In a joint report by the CDC and USDA, 15 of the 16 schools and districts included reported an increase or no change in revenue after implementing strategies to improve the nutritional quality of foods sold on campus.[304]

[i] The policy included grade-specific restrictions of unhealthy beverages: no soft drinks in elementary or middle school during the day, as well as mandates for the inclusion of only healthy beverages (defined as water, 100 percent fruit and vegetable juice, low-fat milk, and juice beverages with at least 20 percent juice). Additionally, the policy included complementary mandates in physical education, fitness testing, the collection of BMI measurements, and health education instruction and assessment.

Several studies actually show an upswing in food service revenue after the implementation of more stringent snack and a la carte food and beverage policies. Brown and colleagues report an increase in sales of both water and 100 percent fruit juice after restricting the availability of other sugar-sweetened beverages in 18 schools in Mississippi.[305] Similarly, in a pilot study by Wojcicki and Heyman, the authors report that the implementation of more rigorous nutrition and beverage standards[ii] generated more revenue from food sales than a larger middle school in the same district that continued to sell sodas and fast food.[306] The authors also report an increase in school meal participation: Of the 40 middle and high schools in the sample, NSLP participation went up in 67.5 percent of schools.

Even when a la carte sales declined, many schools demonstrated an ability to maintain, or even increase, net revenues. A 2005 report from the Center for Weight and Health at the University of California, Berkeley states that 13 of 16 schools in the study reported an increase in gross revenue after implementing nutrition standards.[307] Of these 13 schools, 11 were able to maintain gross revenue in the face of initial declines in a la carte sales, which is attributed to growth in meal sales and the increased appeal and accessibility of meals. In this study, decreases in a la carte food sales were common, with 88 percent experiencing reduced a la carte revenues in the first year. Those interviewed in the study attributed this phenomenon to the limitations in finding items that met the nutritional standards. They report that, given time for vendors to adjust to new standards, a la carte sales could rebound.[308]

Differential pricing in which healthier options are priced lower than other, less healthy choices, has been a successful tool in offsetting initial snack and a la carte food and beverage policy standards.[309-311] In these studies, for example, food sales and revenue were maintained or increased when healthier options were priced 25 percent and 50 percent lower than less healthy food options. To this end, according to the most recent SNDA report, it is common practice among school food service administrators to mark up the cost of certain a la carte items on the reimbursable menu.[312]

State-by-State Policy Analysis

Results from the state-by-state policy analysis examining the impact of state nutrition policy on aggregated school district-related revenues were similar to findings from the literature. Table 4.3 provides a summary of results on the experiences of different states between 2003 and 2008 in implementing various strengths of policies for snack and a la carte foods and beverages and their effects on school district food service revenue. Food service revenue reported here is aggregated across all school districts in each state included in the analysis (see Chapter 2).

The policy analysis data suggest that snack food and beverage policies, and particularly those that meet or surpass the 2005 DGA, are associated with small to moderate increases in total food service revenue. Table 4.3 shows that states that moved from no policy to a policy with general restrictions not meeting the 2005 DGA (level 2) saw, on average, a statistically significant 6 percent increase in food service revenue.

[ii] The San Francisco Unified School District implemented a mix of general nutrition and beverage standards, including limitations on the types of juice and milk beverages offered, limitations on calories from fat per food item, requirements for all snack foods to meet USDA standards, limitations on portion size, availability of fruits and vegetables, and preferential purchase of products that are healthier. See Wojcicki and Heyman (2006) for a full explanation.

Those that moved from no policy to a policy that met or exceeded the 2005 DGA (level 3) experienced a statistically significant 4 percent increase in revenue, on average. Among states that moved from a policy with minor restrictions and no nutrient standards (level 1) to a policy with more nutrient standards approaching (level 2) or meeting (level 3) the 2005 DGA, this trend persisted.

TABLE 4.3 Impact of Policy Changes on Food Service Revenues

Change from / to	No policy Level 1	No policy Level 2	No policy Level 3	Level 1 Level 2	Level 1 Level 3	Level 2 Level 3
Change in total food service revenue	1.8%	6.0% *	4.0% *	4.2% *	2.3% *	-1.9%
Change in federal meal revenue	2.8%	5.6% *	5.2%	2.8%	2.4%	-0.5%
Change in local (student paid meal and a la carte)	1.0%	4.9% *	2.3%	3.9% *	1.2%	-2.7%

* Statistically significant ($p<.05$)
Level 1 = Policy restrictions do not have nutrient standards.
Level 2 = Policy restrictions have standards, do not meet the 2005 DGA.
Level 3 = Policy restrictions have standards that meet or exceed the 2005 DGA.

Policy levels based on CLASS scoring (see Chapter 2).

Though not statistically significant, when states moved from a policy with restrictions and nutrient standards not meeting the 2005 DGA (level 2) to a policy with restrictions and standards meeting or exceeding the 2005 DGA (level 3), revenue decreased by 1.9 percent on average. It is unclear why states moving from a policy without nutrient standards (level 1) to a policy with nutrient standards aligned to the 2005 DGA (level 3) would have a greater revenue increase than states moving from a policy with some nutrient standards (level 2) to a policy where those standards align with the 2005 DGA (level 3). The state-by-state analysis was not able to tease these differences apart.

School food services obtain revenue from a number of founts: the federal government (free and reduced-price meal participation), local or state governments, a la carte sales, and paid student meals. These sources reflect similar trends in the relationship between revenue and policy level. Specifically, total food service revenue increases, on the whole, appeared to primarily come from an increase in student participation in free and reduced-price meals, rather than from the sale of student paid meals and a la carte items.

Types of Revenue

Total food service revenue: the combination of federal and local revenue sources.

Federal meal revenue: reimbursements obtained from the federal government in exchange for serving meals that meet federal requirements for the NSLP and SBP.

Local revenue: funds received from the sale of full priced school meals and a la carte items.

4.3 Outcomes

Several outcomes of snack and a la carte food and beverage policies were examined for this HIA, including changes in food safety, school-supported physical activity, enrichment learning opportunities, and diet and nutrition health outcomes. Diet and nutrition are detailed in Chapter 5; the other outcomes are examined here.

Will a snack and a la carte food and beverage policy affect school meal quality or food safety through revenue?

This HIA proposed four tracks through which a national snack and a la carte food and beverage policy might reasonably influence meal quality.

1. Directly through improved access to healthier food options sold a la carte
2. Indirectly through financial constraints and possible price increases for healthier food options
3. Indirectly through changes in food service revenue that might impact the ability to purchase kitchen equipment
4. Indirectly through changes in both revenue and food preparation protocol that may influence food safety

Improved Access to Healthier Food Options

Snack and a la carte food and beverage policies have a direct effect on students' diet and nutrition quality by shifting what products are available to them during the school day. One report found, "While competitive foods may be earning schools needed revenue, the introduction of a la carte foods in middle school has been shown to significantly reduce the amount of fruits, vegetables, and milk that children consume at lunch while increasing consumption of sweetened drinks and high-fat vegetables. Additionally, students in schools with policies that restrict access to foods high in fat and sugar have lower rates of consumption of these foods."[313] National nutrition standards for these items are likely to reduce the amount of energy-dense, nutrient-poor foods and beverages available to students, while simultaneously increasing the availability of healthier options. This relationship is evaluated in greater detail in Chapter 5.

Financial Constraints

Changes in food service expenses and revenue were hypothesized to have the potential to influence meal quality. However, the literature review did not find any evidence to support this link. Labor and food purchases tend to be the principal food service outlays, comprising more than 80 percent of total food service expenses in the six states evaluated by the Government Accountability Office.[314]

The state-by-state policy analysis provides some insight into how a national policy may affect school food service expenses. Despite increases in meal participation, states experienced no, or very limited, apparent increases in total food service costs. The policy analysis found that total food service expenses generally increased when states moved from no policy to more restrictive policies, but the changes were not statistically significant (see Table 4.4, first row).

Food service employee expenditures generally increased at a slightly higher rate than overall costs in states that changed from no policy or only minor restrictions (level 1) to a level 2 or level 3 policy where restrictions approach or meet the 2005 DGA. Only states moving from a level 1 policy without nutrient standards to a level 2 or 3 policy experienced statistically significant increases in food service employee expenses on average of 4.2 percent and 3.0 percent, respectively (see Table 4.4, middle row). This suggests that employee expenditures may not change much with marginal differences in meal service.

TABLE 4.4 Impact of Policy Changes on Food Service Expenses

Change from / to	No Policy / Level 1	No Policy / Level 2	No Policy / Level 3	Level 1 / Level 2	Level 1 / Level 3	Level 2 / Level 3
Total food service expenses	0.0%	1.8%	1.2%	1.8%	1.2%	-0.6%
Food service employee expenses	-1.3%	3.0%	1.8%	4.2% *	3.0% *	-1.2%
Food-only expenses	0.1%	0.6%	0.4%	0.5%	0.3%	-0.2%

* Statistically significant ($p<.05$)
Level 1 = Policy restrictions do not have nutrient standards.
Level 2 = Policy restrictions have standards, do not meet the 2005 DGA.
Level 3 = Policy restrictions have standards that meet or exceed the 2005 DGA.

Policy levels based on CLASS scoring (see Chapter 2).

Increases in food expenses would be expected given the increases in meal participation, but these were not found. Food-only expenditures were virtually unchanged, with no policy effect greater than 1 percent and results were not statistically significant (bottom row of Table 4.4). Possible explanations for this finding are that any increases in food costs were mitigated by the greater use of free or subsidized federal food commodities or lower-cost foods, or the serving of smaller portions.

In summary, this report cannot infer that increases in expenses would lead to a compromise of meal quality.

Changes in Food Service Revenue as it Relates to Kitchen Equipment and Food Safety

A review of the literature did not find any substantial evidence on the connection between snack and a la carte food and beverage policies and either the purchase of kitchen equipment or the ability to meet food safety requirements. While one report noted that vending and advertising contracts may play a significant role in food service profits and the purchase of equipment,[315] there is conflicting evidence on whether they are actually as profitable as they might seem to be. Vending contracts typically give food and beverage companies selling rights in return for cash and non-cash benefits (e.g., school kitchen equipment, computers) to the school or district. Many existing vending contracts require schools to allow the marketing of products high in added fats and sugars; others provide incentives for schools to encourage their students to choose those products. However, several studies reviewed for this HIA indicated that schools only see a small percentage of profits from vending purchases, with a majority of the revenues going back to the vending company or product manufacturer.[316-318] Thus, it cannot be said with certainty how the possible loss of these contracts as a result of updated nutrition standards for snack foods and beverages may impact the ability of schools to ensure food safety or to purchase food service equipment.

Will a national snack and a la carte food and beverage policy affect educational and athletic programs through revenue?

Literature Review

There is not enough evidence in the literature on this topic to forecast the potential impact of specific snack and a la carte food and beverage policies on educational and athletic programming. Several studies, in addition to the interviews conducted as part of this HIA, suggest that schools and school districts use funds from a la carte sales, vending, and fund-raising to support educational and sports programming, as this is one of the only funding streams that is purely discretionary at the school level.[319,320] In several conversations, school district representatives reported that revenue is used to support clubs and activities such as athletic teams, the arts, and drama clubs.

A report focused on California school districts demonstrated that more than 85 percent of those surveyed used profits from a la carte and vending sales to support food service operations.[321] Some districts used part of this revenue as an alternative funding source for other things, including extracurricular activities, athletics, and educational programs. Moreover, 30 percent of respondents reported using a la carte sales to subsidize other food service costs in order to keep the department from operating in the red.[322] However, several studies, as reported in the previous section, also indicated that the profits schools saw from such sales were extremely low.

State-by-State Policy Analysis

The results from the state-by-state policy analysis suggest that states shifting from less restrictive (no policy or level 1 policy) to more restrictive snack food and beverage policies (level 1, 2, or 3) in some cases experienced nonsignificant decreases in school district aggregated enterprise revenue (Table 4.5).[323] Though the majority of findings in this category were not statistically significant, Table 4.5 demonstrates that there is a great deal of variation in enterprise revenues among the various policy level changes. Largely this could be due to the fact that there is a great deal of variation in enterprise revenue around the country, with some schools selling a large proportion of nonfood items (e.g., binders, backpacks, t-shirts) not affected by a food and beverage policy, others selling mostly food items, and some states or schools reporting no enterprise revenues at all. While an association between implementing a snack and a la carte food and beverage policy and a drop in enterprise revenue is possible, the true effect cannot be consistently or efficiently estimated within the study data.

In the bottom half of Table 4.5, when all revenue types (i.e., food service plus enterprise revenues) are evaluated together, the non-significant negative effects in enterprise revenue largely disappear. In contrast, the results become positive and even statistically significant, suggesting that the losses experienced in some states are counterbalanced by increases in overall food service returns.

TABLE 4.5 Impact of Policy Changes on Enterprise Revenue

Change from to	No policy Level 1	No policy Level 2	No policy Level 3	Level 1 Level 2	Level 1 Level 3	Level 2 Level 3
Enterprise revenue only[1]	6.2%	-6.1%	5.7%	-12.3%	-0.5%	11.8%
Enterprise revenue only[2]	3.3%	9.4%	8.4%	6.0%	5.1%	-1.0%
Total of both food service and enterprise revenue[1]	3.6% *	6.3% *	6.1%	2.7%	2.6%	-0.2%
Total of both food service and enterprise revenue[2]	3.9% *	9.2% *	7.5%	5.3% *	3.6%	-1.7%

* Statistically significant (p<.05)
Level 1 = Policy restrictions do not have nutrient standards.
Level 2 = Policy restrictions have standards, do not meet the 2005 DGA.
Level 3 = Policy restrictions have standards that meet or exceed the 2005 DGA.
[1] Includes all state and year observations.
[2] Excludes observations for four states (California, Louisiana, North Carolina, and Virginia) where recorded enterprise revenue is 0.

Policy levels based on CLASS scoring (see Chapter 2).

This table was updated in September 2012.

Overall, the extent of the changes observed in state aggregated school district enterprise revenue is highly variable and likely contingent on the type and level of specific activities that schools undertake to raise such funds, as well as their ability to adjust to new policy environments. One possible, though unsubstantiated, explanation for this variation is that these reductions occur at the onset of policy implementation or change, but decline over time as schools adjust to the new policy requirements. As this HIA policy analysis measures policy changes that range from one to five years, time variant effects on enterprise revenue could lead to inconsistent and inefficient estimates of policy effects on this measure. Based on the literature review, state policy analysis, and feedback from stakeholder interviews, this HIA determines that it is possible that a school district or a student activity group could experience either no change or a reduction in revenue from a national snack food and beverage policy.

While there is not a large amount of data presented in the literature, the state-by-state policy analysis and stakeholder interviews indicate that even if there is some enterprise revenue loss, it does not appear to be at a level that impacts programming, and it is unlikely that programming will suffer. Of the studies reviewed, none reported reductions in education and athletic programming due to changes in snack food and beverage policies.

4.4 Summary

Based on the stakeholder interviews, literature review, and state-by-state policy analysis presented in this chapter, this HIA predicts that it is possible for a national snack and a la carte food and beverage policy to have a small or moderate positive impact on school district food service revenues in those districts currently without a local or state policy in place, or with policies that do not currently align with the 2010 DGA as required by the HHFKA. This positive effect is largely a result of increased participation in school meal programs.

There was not enough data to fully forecast the potential impact of such a policy on enterprise revenues. While some declines in enterprise revenues were observed in the state policy analysis, none of the results were statistically significant. Additionally, when results from the policy analysis were combined for food service and enterprise revenues (observed in Table 4.5 as "Total of all revenue types") statistically

significant revenue increases were still observed, indicating that any potential lost revenues from placing some restrictions on the sale of snack and a la carte foods and beverages are not likely to impact educational or athletic programming. It is important to note that a national snack and a la carte food and beverage policy will likely not ban all sales of these foods. Rather, it will limit the types or amounts of snack foods and beverages that can be sold to students. Thus, alternative foods and beverages can be offered to meet new nutrition standards (e.g., selling water or juice instead of soda in vending machines), and if implemented well, will allow for maintenance of current revenues from these products. In theory, it is possible that since schools in low-income neighborhoods may sometimes face more severe budget shortfalls, a revenue reduction for these schools could have more serious consequences for programming. However, no data were available to analyze this concern. Additional data collection may be warranted to further evaluate this question.

The results of our examination of school services outcomes are further summarized in Table 4.6.

TABLE 4.6 Impact of a National Snack and a la Carte Foods and Beverages Rule on School Services

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Primary, direct outcomes resulting from the policy						
Food service net revenue	~	None, small or moderate	Variable	No change to decrease	Possible	***
School district or activity group vending net revenue	~	None, small or moderate	Variable	No change to decrease	Possible	**
School district fund-raising revenue	~	~	~	~	Insufficient evidence	~
Secondary, indirect outcomes related to the policy						
Food safety	~	~	~	~	Insufficient evidence	~
School physical activity programs	~	~	~	~	Insufficient evidence	~
School enrichment programming	~	~	~	~	Insufficient evidence	~

Possible: Logically plausible effect with limited or uncertain supporting evidence.
Insufficient evidence or **not evaluated**
~ Sufficient evidence not available to evaluate this outcome with confidence
** 5+ studies of weak and moderate quality with consistent or mixed results; 5+ studies of mixed quality with mixed results
*** 5–10 strong studies with consistent findings

CHAPTER 5

Potential Impact of a National Competitive Foods Policy on Diet and Nutrition

The previous chapter explored how a national snack and a la carte food and beverage policy will affect school services, which as a health determinant contributes to student meal participation, education, and physical activity opportunities. This chapter reviews how such a policy will affect access to healthy and unhealthy food options, acting as a determinant to children's school-based diet and nutrition and, by extension, long-term health outcomes. As discussed in Chapter 2, key research questions included:

- Will updated standards affect the availability of snacks and drinks sold in schools, student purchases of these items, and student consumption?
- Will changes in student consumption of snacks affect different chronic disease health outcomes?

The research team examined whether or not a national snack food and beverage policy will alter the school food environment and change children's access to both healthy and unhealthy foods and beverages (Figure 5.1). As of 2008, most elementary, middle, and high school children had access to snack foods and beverages at school through one or more venues, including vending machines and a la carte lines.[324-327] The research examined in this chapter indicates that a national snack and a la carte food and beverage policy will increase the availability of healthy food options for all children and reduce access to unhealthy options.

The research team hypothesized that changes in food access and availability will lead to changes in students' purchase and increased consumption of more healthy nutrient-dense items, and fewer high-calorie or energy-dense foods at schools.

As discussed in Chapter 3, poor diet quality is associated with childhood obesity, dental caries or cavities, type 2 diabetes, high cholesterol, and other chronic conditions.[328] As of 2007, nearly one in three children was overweight or obese, and an increasing number of children are being diagnosed with type 2 diabetes and high cholesterol.[329-332] Children from lower socioeconomic status, and black and Hispanic children are

at a higher risk of experiencing one or more of these illnesses.[333-337] Additionally, poor diets are associated with an increased risk of tooth decay, which also impacts students' health and learning outcomes. These conditions can exact a toll on student learning, including dental pain absenteeism, diabetes-related high school dropout rates, and reduced focus from depression.[338]

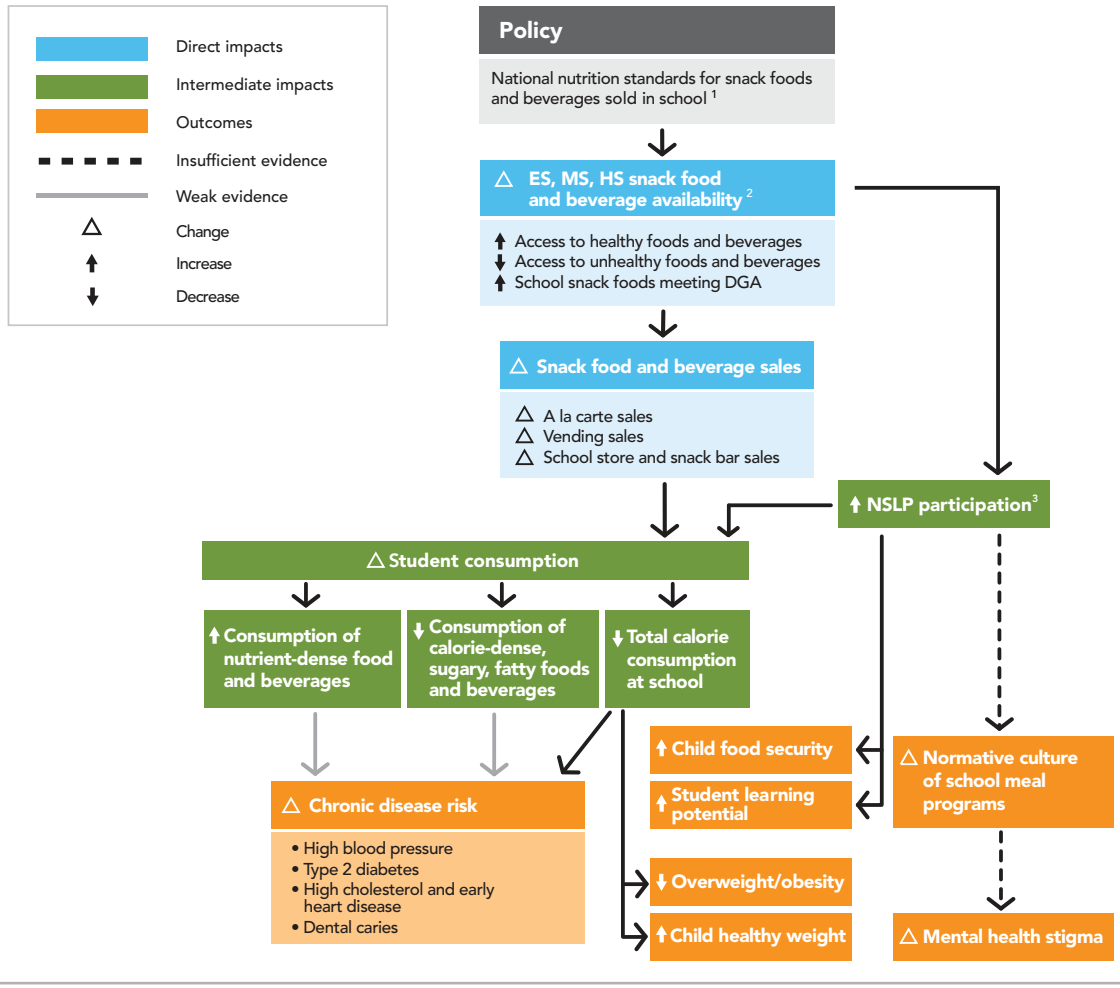
This HIA finds that a national snack and a la carte food and beverage policy will likely increase students' purchase and consumption of healthier items, while also reducing their purchase and consumption of unhealthy items at school. However, this HIA is unable to make a judgment on whether or not such a policy will impact a child's total dietary intake, as food consumption at school is only a fraction of total daily consumption—approximately 13 percent, according to SNDA III.[339] More research is needed to examine the effect of such a policy on overall daily consumption as it may remain unchanged if the student compensates by consuming larger amounts of less-healthy foods when out of school, or it may decrease or remain unchanged should a child not compensate when out of school. This chapter outlines how this conclusion was reached.

In reviewing the literature on this topic, several notable characteristics emerged:

- Having snack and a la carte food and beverage policies in place limits students' access to low-nutrient, calorie-dense foods and, in most cases, increases access to healthy foods.
- Reducing access to unhealthy foods in schools results in reduced consumption of these foods during the school day.
- Changing the school food environment is likely to affect children's calorie consumption during the school day.
- More research is needed to examine the effect of changing school foods on overall food and calorie intake beyond the school day.
- More research is needed to link school foods and dietary intake to health risks and other longer-term outcomes.
- Based on limited evidence, snack food and beverage policies may improve academic performance, particularly through increasing school meal participation.

This chapter further explores the direct and intermediate impacts, as well as outcomes of the diet and nutrition health determinant pathway (see Figure 5.1).

FIGURE 5.1 Diet and Nutrition Health Determinant Pathway



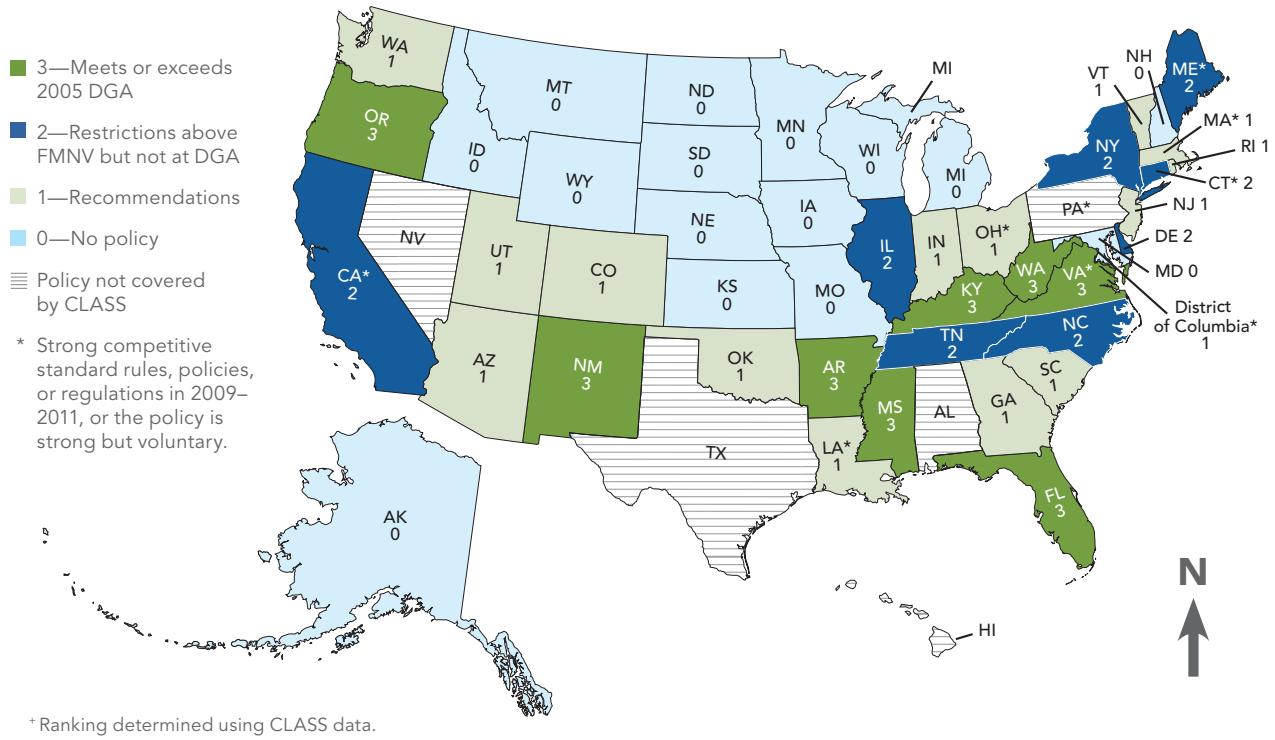
[1] Fund-raisers are not included.
[2] ES, MS, HS: Elementary school, middle school, high school
[3] NSLP: National School Lunch Program

5.1 Direct Impacts

Will a national snack and a la carte food and beverage policy affect school district policies? If so, how?

As required by the Healthy, Hunger-Free Kids Act, national nutrition standards for snack and a la carte foods and beverages must at a minimum meet the 2010 Dietary Guidelines for Americans. This will affect school districts that do not currently have nutrition standards in place or that have standards that do not meet or exceed the 2010 DGA. This includes most public schools in the United States. To date, school nutrition standards have been largely directed by district wellness policies or state-level policies. Although the current conditions research in Chapter 3 shows that states and districts have been moving to increase the strength of nutrition standards for snack foods and beverages sold in schools since the 2004 federal wellness policy requirement, a national snack and a la carte food and beverage policy will still affect most of the states and districts in the nation (see Figure 5.2).

FIGURE 5.2 Ranking of States by Competitive Food Nutrition Policy Strength[+]



[+] Ranking determined using CLASS data.

This HIA completed an analysis of state policies, measuring the strength of existing snack and a la carte food and beverage standards, and reviewed seven sources that examined the strength of state or district policies.[340-348] As demonstrated in Table 5.1, approximately 63 percent of elementary, 74 percent of middle, and 79 percent of high school students currently attend schools that have wellness policies in place with either no food restrictions or weak ones. Similarly, approximately 67 percent of elementary, 76 percent of middle, and 83 percent of high school students attend schools with no or weak beverage restrictions. Thus, USDA's updated snack food and beverage standards will require most school districts to make changes (see Appendix 3).

TABLE 5.1 Percentage of Students Nationwide in Districts with Either No Policy or a Weak Wellness Policy on Snack and a la Carte Foods and Beverages (2008–09 School Year)

Food content	ES %	MS %	HS %	Beverage content	ES %	MS %	HS %
Sugar content	55.3	65.0	72.3	Regular soda	39.5	42.5	60.8
Fat content	48.5	57.0	61.8	Other sugar-sweetened beverages	71.8	89.5	95.0
Trans fats	74.3	85.3	89.0	Sugar/calorie content of flavored milk	68.8	74.5	79.0
Sodium content	72.0	83.5	87.8	Fat content of milk	75.0	86.3	87.5
Calorie content	66.0	77.0	83.5	Serving size limit for beverages	77.5	88.3	93.8
Average of the five categories	63.2	73.6	78.9	Average of the five categories	66.5	76.2	83.2
Snack food or location ban	16.3	3.5	1.8	Beverage or location ban	14.5	2.5	1.3

All numbers rounded. Due to rounding, some percentages may not sum to exactly 100. Exact numbers are available at www.bridgingthegapresearch.org.

SOURCE: J. F. Chriqui et al., *School District Wellness Policies: Evaluating Progress and Potential for Improving Children's Health Three Years after the Federal Mandate: School Years 2006–07, 2007–08 and 2008–09, Vol. 2* (Chicago: Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, 2010), www.bridgingthegapresearch.org.

The adoption of a national snack and a la carte food and beverage policy aligned with the 2010 DGA, which would require all foods and beverages sold in schools to provide some nutritional value, would be expected to have a strong impact on existing school district and state policies (see Table 5.2). Districts that have been striving to make their snack standards meet the 2010 DGA may have to make only slight modifications to existing practices to meet the updated rule. Districts with policies meeting the IOM's or the Alliance for a Healthier Generation's competitive food guidelines will be affected by USDA's new standards only if they are more restrictive.

TABLE 5.2 Impact of a National Snack and a la Carte Food and Beverage Rule on District Policies

Impacts and outcomes	**Impacted and most vulnerable populations**	**Magnitude of impact**		**Direction of impact on outcome**	**Likelihood of impact**	**Quality of evidence**
		Strength of impact	**Number impacted**			
Primary, direct outcomes resulting from the policy						
District policies will require school foods sold meet DGA	Children in schools without strong snack food and beverage policies	Strong	Many+	Increase	Certain	***

Very likely/Certain: Adequate evidence for a causal and generalizable effect
\+ 60–75% of public school children
*** 5–10 strong studies with consistent findings

Will a national snack and a la carte food and beverage policy change the availability of healthy and unhealthy items for elementary, middle, and high school students?

It is likely that a national snack food and beverage policy will reduce the availability of unhealthy low-nutrient, energy-dense items while also increasing healthier options for all ages, impacting middle and high school students the most.

As discussed in Chapter 3, high school students with a higher socioeconomic status tend to have a greater variety of food options available at school, both healthy and unhealthy, than more vulnerable groups, such as low-income, black, and Hispanic children.[349-351] A 2007 study found that fewer black students had access to healthier options such as fruits and vegetables in vending machines.[352] Similarly, a 2008 study found that middle school Hispanic children had greater access to snack bars and food carts than others, demonstrating that some groups have less access to healthier options.[353] This finding is particularly important because these vulnerable populations already have a higher risk of diet-related chronic illnesses, which will be discussed in more detail later in this chapter.

Fifteen studies and two literature reviews examined for this HIA explored the impact of policies or interventions on snack and a la carte food and beverage availability.[354-372] The studies were fair to strong, and the policies and intervention types were diverse, with various population sizes, school levels, and study designs.

Key findings include:

- Twelve of 15 studies consistently found a reduction in the availability of or access to some, if not all, unhealthy snack and a la carte foods or beverages as a result of policies requiring changes to nutrients, portion sizes, or time of access.[373-385] For example, one study found that in a national sample of middle and high school students, district wellness policies implemented between 2004 and 2007 significantly reduced the availability of food items high in sugar and fat.[386]
- Six of the 15 studies found a general increase in the availability of healthier items as a result of policy implementation requiring nutrient standards.[387-393] For example, in Minnesota, a two-year randomized controlled trial found that intervention schools offered significantly more low-fat, healthy a la carte foods than control schools.[394] Another review concluded that four studies using nutrition guidelines increased fruit and vegetable availability ranging from 0.28 servings to 0.48 servings a day during lunchtime.[395-399]
- Seven of the 15 studies found inconsistent relationships or no impacts of policies on the availability of healthier food options.[400-406] For example, nationally between 2004 and 2007, secondary schools did not increase fruit and vegetable offerings as a result of district wellness policies.[407] This may be due to lack of implementation of the policies, or it may be that district policies only restricted unhealthy options, rather than also requiring healthy choices to be offered. For example, in Colorado, 40 school districts offered more fresh fruits and healthier options at school parties, but did not offer more vegetables or significantly change what was sold in vending machines after implementing district wellness policies.[408] An additional study found that significantly fewer students reported in-school access to sugary drinks in states with policies banning all SSBs, yet found no difference for policies only banning regular soda or allowing all SSBs.[409]

This HIA determined that a national snack food and beverage policy that meets the 2010 DGA is certain to decrease children's access to low-nutrient, high-calorie, high-fat foods and sugary beverages, and is likely to also increase children's access to healthy items at school (see Table 5.3). If the national policy requires schools to sell healthier items from the 2010 DGA's foods to encourage list, such as fruits, vegetables, low-fat dairy, whole grains, and water, in all venues, then this impact becomes more certain. The degree to which these changes in access will impact students' weight and health outcomes depends on the degree to which these foods are consumed by the students, as well as the extent that students do or do not replace these calories by consuming more energy-dense foods outside of school hours.

TABLE 5.3 Impact of a National Snack and a la Carte Food and Beverage Rule on the Types of Items Available in Schools

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Primary, direct outcomes resulting from the policy						
Access to healthy foods and beverages	All children; low-income, Hispanic, and black children	Small to moderate	Many+	Increase	Likely if policy only suggests access to healthier options, such as the DGA's foods to encourage; certain if access is required at all sites	***
Access to unhealthy foods and beverages	All children; low-income, Hispanic, and black children	Small to moderate	Many+	Decrease	Certain	****

Likely: Logically plausible effect with substantial and consistent supporting evidence and substantial uncertainties
Very likely/Certain: Adequate evidence for a causal and generalizable effect
+ 60–75% of public school children
*** 5–10 strong studies with consistent findings
**** 10+ strong studies with consistent findings

5.2 Intermediate Impacts

Will changes to snack and a la carte food and beverage availability affect what students purchase and consume?

It is likely that changes in snack food and beverage availability will translate to changes in student purchase and consumption behaviors at school. For example, a 2010 literature review concluded that with few exceptions, when unhealthy foods are restricted, students consume foods of higher nutritional quality while at school.[410] Conversely, children tend to purchase unhealthy items when they are available.[411]

This HIA examined one review and 25 studies evaluating the effects of nutrient policies on student purchases and consumption of snack foods and beverages based on access and availability.[412-438]

The studies were mostly fair to strong in quality; they varied by policy components and intervention types, study design, population size and age, and location. Key findings include:

- Sixteen of the 25 studies indicated that having nutrient standards or limited availability of unhealthy foods and drinks was associated with increased student purchases and consumption of healthier items and decreased consumption of unhealthy items.[439-454] For example, a Connecticut study found that, when a policy limited various nutrients and serving sizes, students in intervention middle schools drank significantly more healthy drinks and ate fewer salty snacks and chips than students in the control schools.[455] In a nationally representative sample, when middle schools offered more fruits and vegetables, the odds of children eating them increased. In high schools, offering more fruits and vegetables at lunch correlated with greater vegetable consumption.[456]
- However, three of the 25 studies found that nutrient-related interventions had no impact on student consumption of foods meeting standards.[457-459] For example, one intervention showed that a policy restricting nutrients and serving sizes had no impact on consumption of these new healthier foods by fourth- to sixth-grade students and middle school students.[460]
- Six of the 25 studies found that a change in snack and a la carte food or beverage policies resulted in students buying fewer unhealthy items, but student consumption results were inconsistent across the studies.[461-466] For example, when Boston public schools implemented a policy restricting the sale of SSBs, high school students drank significantly less soda (-0.16 servings) and other SSBs (-0.14 servings) per day between 2004 and 2006.[467] Other research has also concluded that children bought fewer SSBs when alternative beverages were available.[468] However, policies restricting all SSBs in schools have also been found to be potentially inconsequential on overall student consumption of sugary drinks because students have other non-school options to support the behavior.[469] For example, four national studies using similar data found that fifth and eighth graders with less access to sugary beverages due to policies restricting SSBs made fewer purchases and had lower school-based consumption, but did not drink less overall than those with access.[470-473]

Some critics suggest that, because many children do not like the taste of healthy foods, changing the food environment to include healthier options will not impact their consumption. Children's food and drink selection is based primarily on taste preferences more than convenience or price.[474,475] For example, focus group results from Minneapolis seventh and tenth graders found that children rated the appeal of school food (largely taste) as the most important factor in their purchasing, second only to "hunger and food cravings."[476] In other studies, students rated taste as the most important factor when selecting snacks from a school vending machine, and children with a taste preference for soft drinks were 4.5 times more likely to consume them five or more times per week.[477,478]

There is also evidence that increasing the availability of healthy foods, and thus increasing exposure, can affect students' preferences for these items. There is evidence that supports the use of repeated food exposure as a method for increasing taste preferences and consumption among children.[479] When limited in exposure, children tend to have a lower taste preference for fruit and vegetables.[480] However, with increased availability of fruits and vegetables, students in at least one study have shown increased intakes regardless of taste preferences.[481]

Based on most studies reviewed, this HIA determines that a national snack and a la carte food and beverage policy will likely decrease the number of unhealthy purchases children make in school, while also having a small to moderate positive impact on children's purchase and consumption of healthier items in school (see Table 5.4). However, if USDA does not require schools to offer high-nutrient, low-calorie items at all venues, students will not have the ability to make as many of these healthier choices, and the impact of such a rule will be less certain. If the USDA policy is similar to, or more restrictive than, IOM's 2007 guidelines, it is certain that students will consume fewer unhealthy and more healthy items at school, but this may not reduce their overall consumption of unhealthy items outside of school.

TABLE 5.4 Impact of a National Snack and a la Carte Food and Beverage Rule on Student Purchase and Consumption

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Primary, direct outcomes resulting from the policy						
Purchase or consume healthy foods and beverages in school	Secondary students	Small to moderate	Many	Increase	Likely if policy only suggests access to healthier options, such as the DGA's foods to encourage; certain if these options are required at all access sites	****
Purchase or consume unhealthy foods and beverages in school	Secondary students	Small to moderate	Many	Decrease	Likely	***

Likely: Logically plausible effect with substantial and consistent supporting evidence and substantial uncertainties
Very likely/Certain: Adequate evidence for a causal and generalizable effect
*** 5–10 strong studies with consistent findings
**** 10+ strong studies with consistent findings

Will a national snack and a la carte food and beverage policy affect children's school-based calorie consumption?

In addition to general changes in unhealthy food consumption, this HIA examined caloric consumption from snack foods and beverages specifically because children have been found to consume as much as one-half to one-third of daily energy needs while at school.[482,483] Additionally, studies indicate there is a relationship between excess energy intake and consumption of snack food and beverage items.[484-487] One review and 13 studies investigated the relationship between the availability of snack foods and beverages in schools and changes in calorie-dense, or energy-dense, item consumption. These studies ranged from strong to weak in quality and showed reductions in caloric consumption or no impact. Key findings include:

- One review and 10 of the 13 studies found that students consumed fewer energy-dense foods and beverages in school after nutrient standards for snack and a la carte foods and beverages were applied or venues were removed.[488-498] For example, limiting up to three snack food and beverage

practices (i.e., fund-raising, class incentives, venues available, etc.) in middle school was associated with reductions of in-school energy consumption from SSBs of between 16 and 90 calories.[499]

- Two of the 13 studies found that portion control of snack and a la carte foods and beverages had beneficial effects on reducing daily calorie consumption.[500,501] One study determined that reducing portion sizes of foods sold in snack bars to smaller, single-serving packages provided an average energy savings of 47 calories (between 13 and 75 calories) per student per day.[502]
- Five of the 13 studies found nutrient policy on foods and beverages sold in schools had an impact inconsistent with the other literature. One of these studies found that a policy did not change student intake of certain high-calorie foods; another found no change in student calorie consumption during the school day from a snack and beverage policy; and three found little to no change in total calorie intake over the day following implementation of nutrition standards for sugary beverages.[503-507]

One systematic review and 10 of 13 studies indicated that altering the snack and a la carte food and beverage environment can reduce the amount of excess calories consumed from energy-dense foods while children are at school (see Table 5.5). Consuming snack foods and beverages, which are commonly high in calories and low in nutrients, can be characteristic of poor diet quality, high energy intake, and excessive weight gain when energy intake exceeds energy expenditure.[508-511] Given these relationships, combined with the large percentage of calories children consume while at school and the research that demonstrates snack and a la carte food and beverage policies tend to decrease the amount of excess calories consumed at school, this HIA determines that a national policy to limit the calorie content of snack foods and beverages is likely to have a small to moderate impact on reducing student energy consumption from energy-dense foods and beverages sold at school.

TABLE 5.5 Impact of a National Snack and a la Carte Food and Beverage Rule on Student Caloric Consumption in School

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Primary, direct outcomes resulting from the policy						
School caloric consumption from energy-dense foods and beverages	All children	Small to moderate	Many	Decrease	Likely	***
Total daily school calorie consumption	All children	~	~	Uncertain	Uncertain	*

Likely: Logically plausible effect with substantial and consistent supporting evidence and substantial uncertainties
Uncertain: Effect is unclear
~ Sufficient evidence not available to evaluate this outcome with confidence
* < 5 studies, inconsistent results, and the claim is consistent with public health principles
*** 5–10 strong studies with consistent findings

Though two of the studies examined showed a positive effect of snack food and beverage policies on reducing daily calorie consumption at school, this HIA cannot make a determination on the magnitude or direction of impact in this area. While there is adequate research to determine that snack food and beverage policies tend to decrease the amount of excess calories consumed at school, this HIA did not examine overall caloric intake from all meals. Likewise, there is sufficient evidence (presented in the previous chapter) that such policies also increase participation in the NSLP. Daily energy consumption at school

could be increased for those students who are now eating a school lunch rather than snacks, or conversely could be decreased if they are no longer eating snacks in addition to meals. Daily energy consumption could also go unchanged depending on what items are served as part of the meal. For example, one national report found that secondary school students participating in the school lunch program consumed fewer calories than nonparticipants from sugary beverages, but more from meal items such as french fries.[512] Since the Healthy Hunger Free Kids Act also required extensive changes to school meal food offerings (which will go into effect in the 2012–2013 school year), this HIA cannot determine the direction of impact on total calories consumed from changes to snacks and beverages alone.

Additionally, it is important to note that snack and a la carte foods and beverages in schools represent only a portion of a child's daily intake. This review does not account for foods that children bring from home or consume before and after the school day.

5.3 Outcomes

While the most immediate impacts of a national snack and a la carte food and beverage rule will be on the types of foods sold in schools and student consumption of them, this HIA looks further downstream to the relationship between changes in the school food environment and children's health outcomes.

Will a national snack and a la carte food and beverage policy affect children's weight status, or BMI?

Weight status (i.e., BMI) is an important determinant of health and can be used as a biomarker for increased risk of certain chronic diseases, such as type 2 diabetes and hypertension. Since weight management is a balance between energy intake and energy expenditure, both sides of this equation should be considered when evaluating the impacts of school food policies. The most successful weight management interventions have been multifaceted and, in some cases, include improving the food environment as well as increasing physical activity.[513-515] However, this HIA examines only the "energy intake" part of the equation.

Dietary behaviors related to excessive weight gain include the consumption of large portion sizes, as well as of foods high in calories and dietary fat.[516-518] In 2004–2005, candy was the most commonly consumed snack food in schools, with baked goods (e.g., cookies, cakes, brownies) a close second.[519,520] These foods, in addition to refined carbohydrates and high-calorie sugary drinks and fruit juices, are associated with childhood weight gain yet remain common among snack and a la carte food and beverage offerings in schools.[521,522]

Based on the earlier conclusion that a national policy will reduce consumption of energy-dense foods at school and possibly increase consumption of healthier foods, there is the potential that this could also result in a reduction of students' weight. For example, research has found that replacing one 12-ounce can of a sugar-sweetened beverage with water in students' diets could reduce their energy gap, or difference between energy intake and expenditure, by 150 calories per day.[523] Assuming that the consumption of 3,500 calories leads to an average of a one-pound weight gain as fat, a daily reduction of as little as 110–165 calories could reduce weight gain in children.[524]

Twelve individual studies, two reviews, and one meta-analysis reviewed for this HIA investigated the relationship between snack food and beverage nutrition policies and student weight status or BMI.[525-540]

These studies, ranging from strong to weak quality, demonstrated mixed results; some reporting associations between snack foods and weight status, with others showing inconsistent results or no relationship. Their findings are as follows:

- Four studies report a relationship between snack food and beverage availability and weight status, demonstrating significant increases in BMI associated with each serving of SSB, each additional food practice in a school (i.e., fund-raising, class incentives), and each new school in a county that allowed students access to "junk food."[541-544]
- One study found a reduction in overweight incidence as a result of a snack and a la carte food and beverage intervention that limited exposure.[545]
- The two reviews and one meta-analysis reported small relationships between SSB consumption and weight gain.[546-548]
- Four studies demonstrated inconsistent impacts in which some age groups experienced changes in weight status and others did not, or there was a reduction in the incidence of overweight but no change in obesity rates.[549-552] For example, one study found that the rate of increase for overweight prevalence significantly diminished among fifth graders after a school district implemented nutrition standards for snack and a la carte foods and beverages; the same study revealed that after California implemented nutrition policies, fifth-grade boys and all seventh graders across the state experienced a lower rate of increase in overweight, though the fifth-grade girls did not.[553]
- Two studies showed a relationship between certain snack and a la carte food and beverage venues and weight outcomes in some age groups but not in others.[554,555] Researchers established that middle school children had a higher BMI z score[i] if they had access to low-nutrient, energy-dense foods in vending machines near the food service area, as well as in the a la carte line. No association was found between the school food environment and the BMIs of high school children.[556]
- One study analyzed data on the same age groups from the nationally representative Youth, Education, and Society (YES) study and the Monitoring the Future (MTF) study from 2004 to 2007. It showed that the availability of regular-sugar/fat food items in vending machines and other snack food outlets was associated with increased odds of obesity among middle school students. No significant association was indicated for high school student incidence of overweight or obesity.[557]
- Four studies conveyed no significant relationship between the availability of snack foods or SSBs and weight.[558-561] For example, a 2012 national study found that the introduction and duration of exposure to snack foods and beverages in middle schools was not associated with student weight gain between fifth and eighth grade. However, these results are limited as this study examined the impact of exposure to all snack foods and beverages, healthy and unhealthy alike, in school food environments where healthier items were more commonly available (e.g., bottled water, fruit juice, and low-fat salty snacks) than unhealthy items.[562]

[i] A BMI z score reflects the number of standard deviations a child's BMI is from the mean BMI of the CDC reference population for a given age and sex. A positive z score indicates a higher-than-average BMI compared to other children of the same age and sex, and a negative z score indicates a lower-than-average BMI. Results for the BMI z score outcome capture differences in body fatness associated with school food environments and practices across all students, regardless of weight status. Thus, if a specific characteristic of school food environments and practices was associated with higher mean weight, overall, an increase in mean BMI z score associated with that characteristic would be expected.

More than two-thirds of the literature (eight studies, two reviews, and one meta-analysis) reviewed indicates limits on snack foods and beverages can reduce childhood weight gain in some age groups.

There is an established relationship between excess energy intake and weight gain.[563] As discussed in the previous section, snack and a la carte foods and beverages sold in schools are typically high in calories and low in nutrients.[564-567] Additionally, the literature reviewed in the previous section shows that energy consumption from these sources declines in schools when snack and a la carte food and beverage policies and/or interventions are put in place. Thus, this HIA has determined that a national policy regulating the snack and a la carte foods and beverages sold in schools can have a small to moderate impact on reducing, for some students, the risk of gaining weight. However, because snacks and beverages are only one component of a student's total daily diet, this HIA judges these possible impacts as being small for those children who are already experiencing overweight or obesity.

Table 5.6 shows that it is possible for a national snack food and beverage policy to support students' maintaining a healthy weight, as well as reduced risk of overweight/obesity.

TABLE 5.6 Impact of a National Snack and a la Carte Food and Beverage Rule on Student Weight

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Secondary, indirect outcomes related to the policy						
Healthy weight	All children; low-income, black, Hispanic children	None to small or moderate	Many*	Maintain	Possible	*
Overweight	All children; low-income, black, Hispanic children	None to small	Many	Reduce risk	Possible	*
Obesity	Currently obese children; low-income, black, Hispanic children	None to small	Many	Reduce risk	Possible	*

Possible: Logically plausible effect with limited or uncertain supporting evidence
* <5 studies or inconsistent results, and the claim is consistent with public health principles

Will a national snack and a la carte food and beverage policy affect children's diet-related chronic disease risk?

Studies addressed previously in this chapter have shown that improving nutritional standards for snack and a la carte foods and beverages sold in schools leads to improved diet quality, reduced calorie intake, and a reduced incidence of students being overweight. Improving dietary intake is also likely to impact children's risk of chronic diseases. Studies have shown that consumption of energy-dense foods, saturated fats, and foods high in carbohydrate and sugar content is associated with insulin resistance independent of obesity, insulin sensitivity, type 2 diabetes, and metabolic syndrome.[568-570] Therefore, reducing consumption of these foods at schools is likely to reduce children's risk of these chronic diseases.

Dietary intake is also associated with the risk of chronic illness because of its impact on childhood overweight and obesity. Obesity commonly precedes insulin resistance in children, and children who are overweight have increased risks of insulin resistance, high blood pressure, certain types of cancer, and high blood cholesterol as they age into young adulthood.[571-574] Such conditions put children at increased risk of type 2 diabetes and cardiovascular disease in childhood and contribute to the risk of chronic illness in adulthood.[575-577] In adults, insulin resistance is also associated with other risk factors for type 2 diabetes and cardiovascular disease, including abdominal obesity, high blood pressure, and elevated levels of cholesterol and triglycerides.[578-581] Chapter 3 examines the higher risk of specific subgroups to develop chronic illness. For example, more non-Hispanic white children ages 0–9 and black and non-Hispanic children ages 10–19 had type 2 diabetes in 2001.[582] In 2002, more non-Hispanic black and Mexican American males ages 8–17 had high blood pressure compared to their peers.[583] From 1999 to 2006, more obese, overweight and non-Hispanic white children had the abnormal lipid measures that contribute to high cholesterol.[584]

Insulin Resistance and the Risks of Disease

Insulin resistance is a condition by which the body produces insulin; however, it cannot be used effectively to control the amount of sugar in the blood. As a result, blood sugar and fat levels rise, setting the stage for type 2 diabetes and heart disease. Many people with insulin resistance also typically have other risk factors present for developing type 2 diabetes and cardiovascular disease, including abdominal obesity, high blood pressure, and elevated levels of cholesterol and triglycerides. Having several of these risk factors, in combination with insulin resistance, is called metabolic syndrome.[ii]

SOURCE: Pub Med Health, A.D.A.M. Medical Encyclopedia, "Metabolic Syndrome; Insulin Resistance Syndrome; Syndrome X," last modified June 28, 2011, www.ncbi.nlm.nih.gov/pubmedhealth/PMH0004546/.

There is a strong data link between diet and the risk for these chronic diseases. Given the relationship between childhood obesity, calorie consumption, and the development of chronic disease risk factors at a young age, this report proposes that a national snack and a la carte food and beverage policy could alter childhood and future chronic disease risk factors by reducing access to energy-dense snack foods in schools (see Table 5.7). To the extent that the national policy results in increases in students' total dietary intake of healthy foods and reductions in the intake of low-nutrient, energy-dense snack foods, it is likely to have a beneficial effect on the risk of these diseases. However, the magnitude of this effect would be proportional to the degree of change in students' total dietary intake, and this factor is uncertain.

TABLE 5.7 Impact of a National Snack and a la Carte Food and Beverage Rule on Student Risk of Chronic Disease Outcomes

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Secondary, indirect outcomes related to the policy						
Chronic illness: Type 2 diabetes, high blood pressure, high cholesterol	All children; type 2 diabetes—black, Hispanic, low-income; high blood pressure—black and Hispanic; high cholesterol—low-income, non-Hispanic white; overweight and obese children	None to small	Many	Reduce risk	Possible	*

Possible: Logically plausible effect with limited or uncertain supporting evidence
* <5 studies, studies have inconsistent results, and the claim is consistent with public health principles

Will a national snack and a la carte food and beverage policy and the resulting changes in food items in schools affect the risk of getting cavities?

It is possible that changes in snack foods and beverages sold in schools could lower the risk of children's development of cavities, also known as dental caries or tooth decay. Those with tooth decay as children might be more likely to have dental problems and a range of chronic diseases and adverse health outcomes as adults. Several studies show an association between poor oral health and coronary heart disease, and between periodontal disease and chronic kidney disease or diabetes.[585-593] Furthermore, many experts think that cavities increase systemic inflammation, leading to an increase in chronic disease risk.[594-597]

Evidence shows a link between diet and the development of cavities. According to the World Health Organization, "the strength of the evidence linking dietary sugars to dental caries risk is in the multiplicity of the studies rather than the power of any individual study."[598,599] The presence of sugar in the diet, both the frequency and the quantity consumed, increases the risk of tooth decay development.[600,601] Some studies suggest that the type of sugar (i.e., sticky foods), as well as the amount of time sugar remains in the mouth, affects the risk of cavity development.[602,603]

This HIA examined 13 studies and one review examining the associations between dietary habits and cavities. Most studies investigate the interaction between SSBs and cavities, with a majority indicating that soda consumption increases cavities risk.[604-610] Three studies (one strong, one fair, and one weak quality) showed that the more soda children consumed, the higher the number of cavities they developed.[611-613] However, two weaker studies with methodological concerns did not find this interaction.[614,615] Finally, an association was found between lower cavity risk and milk and water consumption.[616,617] Given such results, it is reasonable to expect that replacing soda consumption with water and milk would decrease the risk of cavity development.

Access to snack foods may also impact cavity development. At least two studies show that most children consume more sugar than recommended, with the largest amount of added sugar coming from soda consumption, followed by sweets, and then sweetened grains.[618,619] One very small study showed a significant correlation between dental decay and children's access to vending machines at school.[620] Only a few studies looked at food consumption, of which three found that eating starchy foods, such as chips, increased the risk of developing cavities.[621-623] One review published prior to these three studies did not find this interaction.[624]

Based on the available data, limiting consumption of sweets and SSBs is likely to reduce the risk of cavities (see Table 5.8). This HIA determines that it is possible the updated snack and a la carte food and beverage rule would successfully limit students' consumption of these foods while at school and, therefore, potentially decrease the risk of cavities. Similar to the prior discussion, the magnitude of this effect would be proportional to the degree of change in students' total dietary intake, which is uncertain.

TABLE 5.8 Impact of a National Snack and a la Carte Food and Beverage Rule on Student Cavities

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Secondary, indirect outcomes related to the policy						
Dental cavities	All children; low-income children	Small	Few or many**	Reduce risk	Possible	**

Possible: Logically plausible effect with limited or uncertain supporting evidence
** 5+ studies of weak and moderate quality with consistent and mixed results; 5+ studies of mixed quality with mixed results

Will a national snack and a la carte food and beverage policy affect child food security?

School meal programs provide a primary meal source for food-insecure, hungry children. Studies indicate that food-insecure children receive a higher percentage of their daily caloric and nutrient intake from school meals. On average, children from insecure and marginally secure households obtained 26 percent and 24 percent of their daily calories from school meals respectively, while children from highly secure households obtained only 16 percent.[625,626] Additionally, the National School Lunch Program and School Breakfast Program benefits supplement household food expenditures.[627,628]

School meal participation in both the breakfast and lunch programs improves the diet and nutrition of food-insecure, hungry children. In Chapter 4, the policy analysis found that those states that moved from a less restrictive to a more restrictive snack food and beverage policy increased school meal participation. For nutritionally vulnerable students, having access to more and healthier foods through the school meals program, particularly school breakfast, might improve learning outcomes. At the very least, participation in the School Breakfast Program is likely to improve attendance, reduce tardiness, and ensure that students are present at school and ready to learn (see Chapter 3).[629]

What is the link between child eligibility for and participation in free and reduced-price school meals and stigma?

There is little to no research that directly assesses students' perceptions of or experiences with stigma related to their participation in federally funded school meal programs. Children are influenced by their peers, including when it comes to food selection. Research indicates social modeling occurs during school meals and that children base their food selection on what others around them are eating.[630-633] Although the NSLP legislatively prohibits any intentional stigmatizing of children who participate in the program, many factors, including the presence of snack foods and beverages in the school environment, might unintentionally stigmatize students because they do not have the means to purchase foods sold outside of the school meal.

The research team hypothesized that nutrition standards for snack foods and beverages could reduce stigma associated with participating in school meal programs as a result of increased participation as well as by more closely aligning alternative offerings, specifically a la carte items, with components of the school meal. While this HIA was unable to evaluate this hypothesis formally, interviewed stakeholders suggested that increased participation would reduce the stigma around eating school meals. To achieve this end, school administrators and food service directors can make changes, such as creating universal school breakfast, having only one "point of service" for purchasing all foods, and directly certifying children who are eligible for school meals—tactics that have all been shown to increase the number of students who take part in school meal programs.[634-638] Eliminating different lines in the cafeteria for a la carte items and school lunches, for example, might improve school meal participation.[639] Additionally, students will be more likely to partake in, and consume food from, the school meals program if the overall quality and taste of the school meal improves. Finally, it is important to engage students and others in the school community to change attitudes and social norms around eating "healthy" foods. Research also suggests that school leaders need to ensure all students have equal access to school food programs.

If the national snack and a la carte food and beverage policy results in more eligible students eating school meals, as indicated in Chapter 4, it could have a small to moderate impact on reducing child food insecurity and hunger. Increasing school meal participation, overall, can have a reduction on stigmatizing students who are eligible for free or reduced-price lunches; however, this HIA does not have enough information to assess the full impact of a national snack food and beverage policy on child stigma (see Table 5.9).

TABLE 5.9 Impact of a National Snack and a la Carte Food and Beverage Rule on Child Food Security and Stigma

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Tertiary, indirect outcomes related to the policy						
Child food security	Students eligible for free/ reduced-price meals	Moderate	Moderate	Increase	Possible if NSLP participation increases	**
Stigma	Students eligible for free/ reduced-priced meals	~	~	~	Insufficient evidence	~

Possible: Logically plausible effect with limited or uncertain supporting evidence
~ Sufficient evidence not available to evaluate this outcome with confidence
** 5+ studies of weak and moderate quality with consistent or mixed results; 5+ studies of mixed quality with mixed results

Will a national snack and a la carte food and beverage policy affect students' learning potential?

Student learning potential—the ability to focus, attend class, and learn—is affected by a variety of health outcomes associated with snack and a la carte food and beverage intake. In this section, the HIA briefly examines how a child's learning potential can be affected by hunger, dental decay, other chronic illnesses, and the relationship between these issues and the foods and beverages sold in schools.

It is reasonable to expect that some students may be able to focus better in school when they are eating fewer snack foods and beverages since this practice contributes to better nutrition, dental health, and reduced risk of chronic illness. Though the evidence is limited, research suggests that children's cognition, behavior, and learning are impacted by nutritional status or feelings and perceptions of hunger, and that participation in school meals—school breakfast in particular—is associated with better academic outcomes. Five studies suggest that eating breakfast has positive outcomes related to learning, such as improved cognition, math skills, memory, or English scores.[640-644] Other studies found a positive correlation between school breakfast programs, attendance, and/or tardiness.[645-647] One strong study found that the NSLP has a significant impact on educational achievement and outcomes.[648] Especially for food-insecure children, greater participation in school meals contributes to making them healthier, more focused students.[649]

Research suggests that children's cognition, behavior, and learning are impacted by nutritional status or feelings and perceptions of hunger, and that participation in school meals—school breakfast in particular—is associated with better academic outcomes.

Though the evidence is mixed, research suggests that food-insecure children and those at higher risk for being food insecure do not do as well academically as their food-secure peers and are more likely to be late to school, have poor attendance, and do worse academically.[650-657] Overall, studies suggest that students who are malnourished, particularly those who are severely malnourished, seem to be at greater risk for learning problems than those with better nutritional status.[658-662] Likewise, this group's performance seems to improve most when provided with additional meals, such as through school meal programs.[663-665]

Dental decay and oral health problems also place children at increased risk of poor learning outcomes and, if untreated, can lead to other chronic illnesses. Low-income children are disproportionately affected by tooth decay, particularly untreated cavities.[666] Studies show that children with tooth decay are absent from school more than their peers and, when present, are often in pain and unable to focus.[667-670] Dental decay can exacerbate problems for children who may already be at educational risk, contributing to difficulty learning.[671,672]

Other chronic illnesses can affect learning potential. Children with diabetes have more absences than their siblings and are more likely to drop out of high school.[673,674] Childhood obesity can reduce children's focus through poor body image or depression, or as a result of bullying.[675-677]

Based on the findings that nutrition standards for snack foods and beverages can increase school meal participation, improve diet quality, and improve health outcomes, this HIA concludes that it is possible for changes in snack foods and beverages to contribute to small or moderate increases in children's learning potential (see Table 5.10).

TABLE 5.10 Impact of a National Snack and a la Carte Food and Beverage Rule on Children's Learning Potential

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Tertiary, indirect outcomes related to the policy						
Learning potential	All children; low-income, overweight, obese, black and Hispanic children	Small to moderate	Moderate	Increase	Possible	**

Possible: Logically plausible effect with limited or uncertain supporting evidence
** 5+ studies of weak and moderate quality with consistent and mixed results; 5+ studies of mixed quality with mixed results

5.4 Summary

The literature included in this review indicates that schools have been selling students of all ages high-calorie, low-nutrient snack and a la carte foods and beverages and that these items often take the place of healthier foods and beverages at school. The associations found are largely consistent across a number of studies. The school food environment contributes to students' overall intake of calories because when schools offer high-calorie, low-nutrient items, children purchase and consume them. A national snack food and beverage policy that meets the 2010 DGA will decrease access to unhealthy foods and is likely to improve students' access to healthy foods and beverages while at school, subsequently affecting student purchase and consumption.

While this HIA indicates a national snack food and beverage policy will likely help reduce children's intake of calories at school, it is uncertain whether changes to the school food environment will be enough to substantially reduce children's overall consumption of high-calorie foods and beverages throughout the day. Thus, only limited conclusions about the policy's impacts on overall diet and nutrition, and rates of obesity and chronic illnesses can be made; rather, in most instances, the focus is on risk of these outcomes.

Even small changes to students' school-based diet resulting from the USDA rule may make it possible to reduce children's risk of experiencing tooth decay, becoming overweight, or developing a chronic illness. Because low-income, black, and Hispanic children are at a greater risk for health problems related to a poor diet, the policy may have a particularly strong effect on reducing the risks for these vulnerable children. The possibility of not having enough to eat may also decrease for children who are eligible for free and reduced-price meals, given the data that suggest snack food and beverage policies tend to increase participation in school meal programs. Finally, since children from these subgroups tend to also be at higher risk for poor academic outcomes, and good nutrition and eating a healthy breakfast improve cognition and school performance, USDA's rule may also reduce the chance of these problems.

CHAPTER 6

Discussion and Conclusions

Overall, the literature indicates that by changing snack food and beverage policies, states, school districts, and researchers have affected student food choices and consumption at school. And ultimately, the resulting new behaviors have the potential to lead to reduced short- and long-term risks of chronic diseases, such as diabetes and obesity. The assessment in Chapters 4 and 5 demonstrate that the national policy, if aligned with the 2010 Dietary Guidelines for Americans, is likely to have small to moderate positive effects on most of the health outcomes examined in this HIA. This chapter discusses the implications of the main findings from the assessment, the HIA limitations, inconsistencies in the literature, and areas for further research. This chapter also provides the rationale for different snack and a la carte food and beverage standards based on the HIA findings.

6.1 Implications of Changes to Snack and a la Carte Food and Beverage Revenue on School Services

Snack food and beverage policies have influenced both school food services and enterprise revenues as a result of changes to what items are offered and purchased by students. These changes have impacted multiple stakeholders from student groups to school districts; however, much of the evidence on the degree of impact is mixed.

The findings in Chapter 4 indicate that a policy requiring snack food and beverage offerings to meet minimum nutrition criteria neutrally affects food service finances in the worst case and, at best, is likely to increase net food service revenue. This is largely a result of increased participation in school meal programs. The revenue analysis conducted in this HIA illustrates that when snack foods and beverages are limited, meal participation increases, with the largest growth among students in the free and reduced-price categories. Additionally, snack foods and beverages often serve as substitutes for school meals among students, thus, snack and a la carte food and beverage sales, even if revenue enhancing, effectively "rob" some of the revenue they generate from potential sales of school meals.

For sales from vending machines, school stores, and other venues, characterized as enterprise revenue, the assessment found that such a policy at worst can result in nonsignificant declines in returns and at best have a neutral effect. However, the financial impact on school groups and programs that rely heavily on these revenue sources varies. Both the literature reviewed for this HIA and the stakeholder interviews suggest that many schools and school districts use funds from school stores, vending, and fund-raising to support educational and sports programming, as this revenue is one of the only funding streams that is purely discretionary at the school level. The degree to which a school may see a negative effect in this area varies with how much it relies on such income. In general, those schools that do not rely heavily on enterprise revenues from food and beverage sales are not likely to experience significant negative financial consequences of a national snack food and beverage policy.

In general, those schools that do not rely heavily on enterprise revenues from food and beverage sales are not likely to experience significant negative financial consequences of a national snack food and beverage policy.

Several stakeholders and advisory committee members noted the potential for school food service to initially see a decline in revenue when changes to offerings are implemented. Some stakeholders stated that their own school districts saw a decline for about a year or so before their revenue recovered. Although a decrease in revenue is possible, it is not inevitable. Stakeholder interviews and advisory committee members suggested that, with careful planning, a graduated transition, and support for effective implementation, schools can avoid this potential challenge.[678] As noted in the recommendations (see Chapter 7), USDA can increase the likelihood for successful implementation through enhanced technical assistance to schools and districts.

Inconsistent Findings: Enterprise Revenue and Snack Foods and Beverages

The policy analysis results on enterprise revenue impacts are irregular and must be interpreted with caution. Enterprise funds come from a variety of sources, including nonfood items, and thus will fluctuate due to conditions beyond a snack and a la carte food and beverage policy. The literature is equally mixed and contingent upon a number of factors, such as vending contracts, the ability to substitute healthier food options for less healthy options, and the products offered at various points of sale.

Analyses suggest that a decline in enterprise revenue associated with more rigorous snack food and beverage policies is possible, though the results were not statistically significant. Conversely, there was a statistically significant increase in overall revenue, suggesting that gains in other categories, such as from increased NSLP participation, will counter any potential losses to enterprise revenues. Because of the wide variation in the makeup of enterprise revenue across the country—i.e., food versus nonfood sources—it is challenging to assess the degree to which schools will be impacted.

Anecdotally, in an interview, an industry representative noted vending machine revenue declines when snack food and beverage policies are implemented in school districts. Other studies reviewed in Chapter 4, however, demonstrated that vending sales can remain financially buoyant in the presence of snack food and beverage policies. In cases where a school or district relies heavily on enterprise revenue, identifying and sharing best practices to adjust activities to the new policy environment is likely the best means to

mitigate any negative financial policy effects. For example, the same industry representative stated in the interview, "we have tried it all from cut fruits to veggies … and if the machines are all on and not competing with the cafeteria, school store, or donut sales, [we] can make it work."

Gaps in the Literature: Revenue and School Services

No data exist on the impact of snack food and beverage policies on fund-raising revenue for school groups and the potential effect of revenue shifts on the provision of school services such as physical activity, enrichment programming (clubs, student government, theater programs, etc.), or the ability to purchase food services equipment. In regard to future research, regionally or nationally representative studies at the school and district policy level could provide much clearer, more detailed, and more externally valid information on the financial impacts of snack food and beverage policies. In particular, studies could provide information on the impact at the school level specifically examining the effect on various student demographics and the ability to provide student services.

This HIA was not able to evaluate how other elements of the HHFKA that will affect school district and school food service revenue would interact with a national snack and a la carte food and beverage rule, as they are not yet in place nationwide. These include Section 206, which requires all items sold as part of the a la carte line be revenue neutral, and Section 201, which provides an additional $0.06 in federal funding for school districts that demonstrate they are successfully implementing the recently revised school meal requirements. Both of these sections are intended to financially benefit school districts.

Table 6.1 summarizes school service outcomes, discussed in detail in Chapter 4, resulting from a national snack and a la carte food and beverage policy. The table outlines expected impacts on revenue as well as the resulting effects of revenue changes on student enrichment activities, physical activity, and the ability to meet food safety requirements.

TABLE 6.1 School Service Outcomes Resulting from a National Snack and a la Carte Food and Beverage Rule

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Direct outcomes resulting from the policy						
Food service net revenue	~	Small or moderate impact/variable	None	No change to increase	Possible	***
School district or activity group vending net revenue	~	Small or moderate impact/variable	None	No change to decrease	Possible	**
School district fund-raising revenue	~	~	~	~	Insufficient evidence	~
Intermediate outcomes related to the policy						
School physical activity programs	~	~	~	~	Insufficient evidence	~
School enrichment programming	~	~	~	~	Insufficient evidence	~
Food safety	~	~	~	~	Insufficient evidence	~

Possible: Logically plausible effect with limited or uncertain supporting evidence
~ Sufficient evidence not available to evaluate this outcome with confidence
** 5+ studies of weak and moderate quality with consistent or mixed results; 5+ studies of mixed quality with mixed results
*** 5–10 strong studies with consistent findings

6.2 Implications of USDA Snack and a la Carte Food and Beverage Rule for Diet and Nutrition Health Outcomes

Through the use of nutrient standards, snack food and beverage policies and interventions have changed the types of foods available to students, leading to changes in student purchase and consumption patterns at school. This HIA determined that a national policy will have similar results, likely limiting the availability of unhealthy foods and beverages at schools while increasing the availability of healthier food items, such as fruits, vegetables, and whole grains. This impact becomes more certain if the policy requires that foods to encourage from the DGA are required at all points of sale. Again, because food choices made at school represent only a portion of total daily consumption, limited conclusions can be drawn about the impact of this policy on the incidence of diet and nutrition health outcomes. However, there is enough evidence and available scientific knowledge to determine how changes to the snack food and beverage environment might affect the risk of becoming obese and/or developing chronic diseases.

This HIA determines that a national snack and a la carte food and beverage rule has the potential to:

- reduce the amount of calories and potentially sugar and fat consumed by students;
- increase the amount of nutrient-dense items children consume;
- decrease the risk of dental decay, obesity, and long-term diet-related chronic diseases; and
- improve learning potential for students eligible to participate in school meals.

Snack and a la carte food and beverage policies can structure the school food environment so healthy foods are available and low-nutrient, high-calorie foods are not. Policies can require that schools sell healthy options such as fruits and vegetables at all venues, and standards can improve the nutrient content of items, for example, by limiting the total calories, fat, and sugar.

A national snack and a la carte food an beverage policy limiting portion sizes, sugar, and fat has the potential to reduce calories consumed by students at school, thus reducing the risk of student weight gain and diminishing the risk of diet-related chronic illnesses.

Children currently do not consume enough fruits and vegetables, a trend that has the potential to change if fresh fruits and vegetables are offered to children more frequently and in more venues. However, the literature on nutrient policies in Chapter 5 indicated that policies with no requirement for schools to offer healthy items may not increase children's consumption of them.[679,680] For example, in Washington State, school district personnel implemented nutrient standards in the form of a ban on snack foods and beverages but did not make healthier items available to students.[681] The policy was successfully implemented, but children did not increase their consumption of fruits and vegetables, which may be due in part to the fact that offering healthier alternatives was not part of this policy. Evidence suggests that to succeed in changing eating habits, competitive food policies need to be specific about not only limiting snack foods and beverages, but also requiring healthy items, such as fruits, vegetables, and non-sugary beverages to be offered at all venues. This is reflected in the policy recommendations presented in Chapter 7.

A national snack and a la carte food and beverage policy will most greatly affect middle and high school students. Current conditions in Chapter 3 demonstrate that existing policies are weakest in secondary schools. Further, research shows that after the age of 11, children are not achieving the recommended level of physical activity, with only 8 percent of middle schools and 2 percent of high schools providing daily physical education or its equivalent.[682] Thus, these students have fewer discretionary calories available per day for consuming "extras," such as snack foods and beverages. Given the current high-calorie, low-nutrient composition of snack and a la carte foods and beverages, a national rule will help reduce student energy intake that contributes to the risk for obesity. This is especially important as research demonstrates that adolescence is a critical period for the development of obesity, and weight status during this developmental period is the single best predictor of adult obesity.[683,684]

A national snack and a la carte food and beverage policy limiting portion sizes, sugar, and fat has the potential to reduce calories consumed by students at school, thus reducing the risk of student weight gain and diminishing the risk of diet-related chronic illnesses, such as dental decay, high blood pressure, and diabetes. The literature reviewed in Chapter 5 indicates that nutrient standards and portion size limits can help reduce students' overconsumption of high-calorie, low-nutrient snack foods.[685-691] These types of foods are associated with poor diets, high energy intake, and increased weight gain, particularly without

adequate physical activity to offset high calorie intake.[692-695] Given these relationships, this HIA concludes that a national snack food and beverage rule is likely to reduce student energy consumption through the setting of nutrient levels that limit total calories, calories from sugar, and calories from saturated fat among snack food and beverage offerings at school. The relationship between excess energy density and weight gain and the typically high-calorie, low-nutrient value of snack foods means the school environment should be structured to reinforce nutrient rich, low energy-dense diets, with portions that reflect an appropriate number of calories, as reflected in the recommendations presented in the next chapter.[696,697]

This report also found that reductions of sugar in the diets of youth, particularly by limiting SSBs, can reduce the risk of tooth decay. In the short term, dental decay can impact student learning and academic achievement; children with tooth decay are more likely to be absent from school or in pain and unfocused when present. In the longer-term, poor oral health and periodontal disease are associated with increased risk of chronic diseases. While the relationship between SSBs and tooth decay is clear, very few studies examined the impact of snack foods on the development or prevention of dental decay (see Chapter 5).

Hunger and poor nutrition can also negatively impact children's learning and academic achievement. For students who are already at academic risk, hunger increases the odds that they will not succeed academically. Participation in the NSLP, which is likely to increase as a result of more stringent snack and a la carte food and beverage policies, can mitigate child hunger and improve dietary intake. Additionally, as reported in Chapter 5, one study showed that students who participated in the NSLP had better academic outcomes; however, there is more existing evidence to support the link between participation in the School Breakfast Program and academic achievement. Participation in a school breakfast program can decrease tardiness and increase attendance, both factors that increase the odds of students remaining engaged in school.

Regardless of the snack and a la carte food and beverage policy enacted and implemented, social norms around school meal participation and healthy foods will be important to consider. Although there is no research showing a direct correlation between stigma and consumption of snack food and beverages or dietary outcomes, qualitative research suggests that students' dietary habits are somewhat influenced by their peers. This provides an excellent opportunity for schools to work aggressively to consider student participation in strategies that would help make the healthy choice the "cool" choice.

Diet and Nutrition Gaps in Literature and Inconsistent Findings

When evaluating this literature, it is important to discern that snack and a la carte foods and beverages represent just one component of a child's total dietary environment. While the literature examines the effect of modifying snack foods and beverages on energy consumption at school, this review does not account for foods that children consume at home or bring with them to school. In order to ascertain the complete effect of competitive foods on total dietary intake, future research may need to target and evaluate the complete food environment.

Little research exists that looks into the potential for students to reserve consumption of unhealthy foods for time outside of school after the implementation of a snack food and beverage policy. One study

examined for this HIA found that students brought items from home after policies were in place, and three national studies indicate that students continue to consume SSBs outside of school regardless of sugar-sweetened beverage policy restrictions in school.[698-701] In places where healthy and unhealthy items were sold, one study found that students bought proportionately more unhealthy items than healthy items, even though their overall diet improved. These studies indicate that more research is needed to better understand the relationship between food environments and dietary behaviors.[702]

More studies are needed on the role snack and a la carte foods and beverages play in contributing to risk of obesity and other chronic illnesses. In Chapter 5, the HIA determined that the linkage between snack foods and beverages and student weight status is probable, however, in some cases results were inconsistent where one location was associated with higher student BMI and another was associated with lower student BMI. The literature may mirror similar inconsistencies in clinical practice where various interventions do not work for some populations, but do for others.[703]

The research on learning outcomes related to diet and dietary quality was highly varied, with different research designs, populations, and outcomes assessed. Additional studies are needed to explore the relationships between diet-related chronic illness and lost learning potential.

The literature was also limited on the impact of a snack and a la carte food and beverage policy at the district and school level. Many articles described the effects of implementing state policies, and changes in wellness policies from the 2004 Child Nutrition Act; however more research is needed on the local school and district barriers for implementation and adherence.

Although portion size was examined as a mechanism to significantly reduce the energy density of snack and a la carte foods and beverages that children consumed, there was an insufficient literature base regarding the use of this method alone to limit energy consumption from these foods.[704,705] In Chapter 5 this HIA noted that there were few studies exploring the relationship between student BMI and weight status over time based on changes to the school food environment. By extension, there were few studies examining how snack food and beverage intake contributes to students' overall risk of diet-related illnesses, such as diabetes mellitus, high blood pressure, and cardiovascular disease.

One common difficulty throughout these studies was the collection of consumption data from children. Several studies collected consumption data from students via self-reported intake.[706-712] Although this type of data collected immediately after school meals has been found to maximize the accuracy of these reports, self-reports are limited by memory and subject to recall and response bias, which can lead to reporting errors that can alter study outcomes.[713]

Additional concerns regarding consumption data included consumption measured through observation, which may be flawed as foods, specifically SSBs, consumed at school may have come from home or convenience stores.[714] Among studies measuring the effect of limiting access to SSBs in schools reviewed in Chapter 5, one was associated with significant reductions in sweetened beverage consumption, and

another concluded that a ban on SSBs would have negligible impact on consumption.[715,716] In addition, the absence of consumption data from locations other than school makes conclusions regarding overall consumption of calories and other nutrients difficult to assert.

Table 6.2 (page 85) summarizes diet and nutrition outcomes, discussed in detail in Chapter 5, resulting from a national snack and a la carte food and beverage policy. The table outlines expected impacts on access to, purchase of, and consumption of both healthy and unhealthy foods and beverages, as well as the resulting effects on calorie consumption, weight, and risk of various chronic diseases. Additionally, judgments are made regarding the potential impact of such a policy on child food security, stigma, and student learning potential.

6.3 Linking the HIA Research Findings to Policy Recommendations

In Chapters 4 and 5, the HIA evaluated and weighed evidence in order to make judgments about the potential impacts a national snack and a la carte food and beverage rule could have on various outcomes. The research team developed the policy and implementation recommendations presented in Chapter 7 to increase potential positive health outcomes and minimize potential negative health outcomes. This at times involves compromises in order to balance conflicting findings. For example, the research team chose not to recommend that USDA develop a full snack food and beverage ban or to heavily restrict the beverages available in high schools because (1) making such a large-scale change would be impractical for most school districts; (2) the national rule is intended to set a baseline in which school districts have the discretion to implement more restrictions if they choose; and (3) the uncertainties surrounding school district and student group revenue findings indicate high school students may benefit from these sales in other ways, such as through enrichment programming.

Instead, the policy recommendations in this report set reasonable calorie, portion, and nutrient limits that allow for a variety of options to be offered while limiting the total calories a high school student could obtain from purchasing both a snack and a beverage to a maximum of 280 calories—10 percent of a moderately active high school student's total dietary needs. The research team acknowledges this would be too many calories for a sedentary student to consume daily and encourages schools and districts to use other elements, such as nutrition education and promotion of healthier items to help the student make healthy choices. Such a combination of policy and education will help provide students with the skills they need to make healthy choices both in and outside of the school environment.

This HIA did not develop impact assessments on different potential levels of nutrition standards because the current evidence base did not make that feasible. Where literature on impacts of nutrition policy was lacking, the research team looked to the 2010 DGA, the IOM reports, medical literature, existing state and district policies, and other organizations' snack food and beverage guidelines. This is the process the team used to develop a nutrient limit on sodium and total fat. It also gathered feedback from stakeholder interviews and the advisory committee in several revisions of the recommendations.

TABLE 6.2 Diet and Nutrition Outcomes Resulting from a National Snack and a la Carte Food and Beverage Rule

Impacts and outcomes	Impacted and most vulnerable populations	Magnitude of impact		Direction of impact on outcome	Likelihood of impact	Quality of evidence
		Strength of impact	Number impacted			
Direct outcomes resulting from the policy						
District policies will require school foods sold meet DGA	Children in schools without strong snack and a la carte food and beverage policies	Strong Impact	Many+	Increase	Certain	***
Access to healthy foods and beverages	All children; low-income, Hispanic, and black children	Small to moderate impact	Many+	Increase	Likely if policy only suggests access to healthier options, such as the DGA's foods to encourage; certain if these options are required at all access sites	***
Access to unhealthy foods and beverages	All children; low-income, Hispanic, and black children	Small to moderate impact	Many+	Decrease	Certain	****
Purchase or consume healthy foods and beverages in school	Secondary students	Small to moderate impact	Many	Increase	Likely if policy only suggests access to healthier options, such as the DGA's foods to encourage; certain if these options are required at all access sites	****
Purchase or consume unhealthy foods and beverages in school	Secondary students	Small to moderate impact	Many	Decrease	Likely	***
School caloric consumption	All children	Small to moderate impact	Many	Decrease	Likely	***
Intermediate outcomes related to the policy						
Chronic illness: Type 2 diabetes, high blood pressure, high cholesterol	All children; type 2 diabetes—black, Hispanic, low-income; high blood pressure—black and Hispanic; high cholesterol—low-income, non-Hispanic white; overweight and obese children	None to small impact	Many	Reduce risk	Possible	*
Healthy weight	All children; low-income, black, Hispanic children	None to small or moderate impact	Many	Maintain	Possible	*
Overweight	All children; low-income, black, Hispanic children	None to small impact	Many	Reduce risk	Possible	*
Obesity	Currently obese children; low-income, black, Hispanic children	None to small impact	Many	Reduce risk	Possible	*
Outcomes related to the policy						
Child food security	Students eligible for free/ reduced meals	Small to moderate impact	Moderate	Increase	Possible if NSLP participation increases	*
Stigma	Students eligible for free/ reduced meals	~		~	Insufficient evidence	~
Learning potential	All children; low-income, overweight, obese, black, and Hispanic children	Small to moderate impact	Moderate	Increase	Possible	**

Unlikely: Logically implausible effect; substantial evidence against mechanism of effect
Possible: Logically plausible effect with limited or uncertain supporting evidence
Likely: Logically plausible effect with substantial and consistent supporting evidence and substantial uncertainties
Very likely/Certain: Adequate evidence for a causal and generalizable effect

\+ 60–75% of public school children
~ Sufficient evidence not available to evaluate this outcome with confidence
* <5 studies, inconsistent results, and the claim is consistent with public health principles
** 5+ studies of weak and moderate quality with consistent or mixed results; 5+ studies of mixed quality with mixed results
*** 5–10 strong studies with consistent findings
**** 10+ strong studies with consistent findings

6.4 Effective Implementation of Snack Food and Beverage Policies

Regardless of the specifics of USDA policy, those responsible for implementation might be challenged by a range of issues. As previously mentioned, technical assistance will help improve the likelihood that the policies will be effectively implemented and mitigate any possible negative consequences. Two studies indicate the need for technical assistance to accompany policy implementation. One examined the impact of district practices after the implementation of a state nutrition policy in Washington, finding that although more schools restricted access to snack foods and beverages based on the time of day, schools also offered fewer healthy food options in these venues.[717] As a result, implementation of the policy effectively acted as a ban rather than limiting unhealthy options and increasing healthy options. The second study found that after implementing a Texas nutrition policy three middle schools altered beverage contracts and snack machine inventories and offered more fruits and vegetables in a la carte options; however, the snack bar then provided more unhealthy items, and children brought more sugary drinks, desserts, candy, and snack chips from home.[718] These findings serve as a reminder that the school food environment is only one access point to unhealthy items for students.

Technical assistance will help improve the likelihood that the policies will be effectively implemented and mitigate any possible negative consequences.

Advisory committee members and interviewed stakeholders also emphasized the need for technical assistance and support for effective implementation. This includes not only having solid ideas for implementation, such as those contained in this report's Promising Practices section in the next chapter, but also having a strong planning process that includes constant quality monitoring, assessment, and a mechanism for revising and updating plans if implementation does not go as planned.

Fortunately, many states and districts have already successfully implemented robust snack and a la carte food and beverage policies and can serve as examples to others. Many have published toolkits or guides, or have other materials publicly available for reference. Additionally, many nongovernmental partners provide critical funding, support, and technical assistance to schools in their efforts to improve the nutrition environment. Federal agencies, such as the CDC and USDA's Food and Nutrition Service, are also funding similar or complementary efforts in both the school and community settings. These additional funding streams can provide resources, staff, and expertise to assist in the effective implementation of new regulations.

6.5 HIA Limitations

This report's findings relate only to changes to snack and a la carte foods and beverages in schools. These foods are only one part of the entire school food and nutrition environment. Studies indicate that comprehensive changes related to food and physical activity—including changes to foods offered, policies about fund-raisers, nutrition education, and increased physical education or opportunities to be physically active—are needed to change social norms and behaviors among schools and students.[719-727]

Schools have the potential to play a powerful role in promoting good health among students and adults who spend many hours there every day, including a beneficial nutrition environment, for the sake of school and student well-being. Many educators, policy makers, parents, and others feel it is a school's responsibility to provide as positive and healthy an environment for students as possible. Students learn as much or more from social and environmental cues as from lessons in a classroom. When students see unhealthy foods in the school setting, such as in the school cafeteria or vending machines, it can undermine any messages about healthy eating students might hear at home or in health education or other venues.[728-731]

Students learn as much or more from social and environmental cues as from lessons in a classroom.

The school environment is still only one of many social and physical environments where youth spend their days, albeit many hours of the day. Home dietary practices; general social norms, such as peer and parent behaviors around food; and neighborhood eating venues also influence students' eating choices.[732,733] The highest mean amount of energy consumed from low-nutrient, energy-dense foods comes from those eaten at home.[734] Neighborhood structure is powerful; studies have found that children are more likely to be overweight if they live in close proximity to fast-food establishments.[735-744] For example, one study found that children who lived within one-tenth or one-quarter of a mile from a fast-food restaurant had significantly higher BMI measures, while another found that students were at an increased risk of being overweight or obese if they attended school within a half-mile of a fast-food restaurant.[745,746] A national snack food and beverage policy will not address these food environments; however, it will help ensure schools are a healthy influence on children's dietary choices.

This HIA also did not examine specific nutrition elements that might have an effect on child health and long-term health outcomes, such as caffeine, artificial sweeteners, water flavoring, carbonation, or food supplementation. The research team followed guidance from Section 208 of the HHFKA on elements to include in the analysis. Presumably, these elements could have an additional impact on child health and nutrition.

Another goal of this HIA was to examine potential health disparities and inequities resulting from a national snack and a la carte food and beverage rule. The HIA was unable to tease these nested disparities apart completely given the limitations of the available data. The existing conditions indicate differences among age, socio-economic status, race and ethnicity, and region of the country in terms of access to and consumption of snack foods and beverages. Data was limited for certain population subgroups, such as Native American. The information needs to be revisited in order to better understand various health disparities and health equity by population and health outcomes.

For example, current conditions in Chapter 3 indicate that students from a higher socio-economic status have more access to both healthy and unhealthy food items at all ages.[747-749] However, studies indicate that low-income and black children are more likely to purchase and consume snack foods and beverages such as soft drinks.[750-752] Hispanic and black students have more access to specific types of venues, such as school stores and snack bars in secondary schools.[753-755] For example, a 2005 study that surveyed children who were non-Hispanic black, Hispanic, or biracial showed an increased likelihood of purchasing from a

vending machine at least once a week when compared to their non-Hispanic white peers.[756] Two studies also indicate regional differences across the country, with children in the South significantly more likely to consume soft drinks at school, based on availability.[757,758]

There are inconsistencies related to healthy eating behaviors. For example, research shows that non-Hispanic black children and adolescents consumed significantly more dark-green vegetables and fewer deep-yellow vegetables than Hispanic, specifically Mexican-American, and non-Hispanic white children and adolescents.[759] This same study found that boys, adolescents, and lower-income children at risk of overweight or obese are most at risk for higher intakes of higher-calorie fruits and vegetables, such as juices and fried foods.[760]

A future study is needed to clarify these important distinctions because certain demographic groups are at greater risk of dietary and health challenges. For example, more than twice as many black and Hispanic children are food insecure or experiencing very low food security compared to white non-Hispanic children.[761] Low-income children, black non-Hispanic children, and Mexican children have higher rates of untreated dental caries than their white, non-Hispanic counterparts.[762] Black and Hispanic low-income males and male youth were more likely to have a BMI at or above the 85th percentile between 1988 and 2003.[763] There are also inconsistencies in measures of risk. For example, from 1999 to 2006, the CDC found that more non-Hispanic whites had at least one abnormal lipid measure associated with cardiovascular disease and obesity than non-Hispanic black youths.[764]

Finally, this HIA considered only scenarios that USDA might propose and ultimately implement. As noted in Chapter 3, current snack and a la carte food and beverage policies at the state and local level differ widely. In some cases, the existing policy will have more restrictions or will consider elements that USDA does not include. National regulations, as promulgated by USDA, are meant to offer a minimum level of guidance. States and districts can go further, depending on the needs and context of the state or district. The research team found that the stronger or more restrictive the guidelines, the greater the potential for health impacts. States currently with a weak or no policy will be most affected with the implementation of USDA's nutrition standards for snack food and beverages in the schools.

CHAPTER 7

Policy Recommendations

7.1 Introduction

This chapter outlines a set of administrative and operational recommendations to address potential health and financial impacts of developing and implementing nutrition standards for snack foods and beverages sold in schools. Specifically, the research team and advisory committee developed these recommendations to maximize the positive impact that strong policies can have on the health of children, and to minimize the possible negative impact on revenue generated from the sale of snack foods and beverages.

In crafting recommendations, the research team considered the HIA findings, the principles of the 2010 Dietary Guidelines for Americans, the nutrition standards for foods sold in schools recommended by the Institute of Medicine and the Alliance for a Healthier Generation, and existing state policy and standards used in individual school district wellness policies. Recommendations draw on the available scientific literature, well-accepted principles of public health and nutrition, and the knowledge and judgment of the advisory committee.

Outline of Recommendations

Recommendation 1: USDA Nutrition Standards for Foods

- Foods to encourage
- Age-appropriate calorie limits
- Maximum limit for sugar
- Maximum limits for fats
- Incremental reductions in sodium

Recommendation 2: USDA Nutrition Standards for Beverages

- Beverages in elementary and middle schools
- Sugar-sweetened beverages in high schools

Recommendation 3: Implementation

- Training and technical assistance
- Clear guidance to address terms
- Updating nutrition standards
- Monitoring implementation

7.2 Administrative Recommendations

This section consists of recommendations for USDA to consider in developing competitive food and beverage regulations and implementation strategies. There are three primary recommendations addressing nutrition standards for foods, nutrition standards for beverages, and implementation.

Recommendation 1: USDA should establish nutrition standards for all foods sold regularly on school grounds outside of the school meal programs. These standards should include:

- a requirement that schools sell items from the Dietary Guidelines for Americans list of "foods to encourage;"
- age-appropriate calorie limits for items sold individually (snacks: 100 calories for elementary, 140 calories for middle, and 180 calories for high school students; entrée items: 300 calories for elementary and middle and 400 calories for high school students);
- a maximum of 35 percent of total calories from sugar;
- maximum limits for fats (no more than 35 percent of calories from total fat, 10 percent of calories from saturated fat, and less than or equal to 0.5 gram of trans fat per serving); and
- incremental reductions in sodium, with a target timeframe of 10 years, to achieve full alignment with the Dietary Guidelines for Americans.

Recommendation 2: USDA should establish nutrition standards for all beverages sold on school grounds. At a minimum, these standards should:

- limit beverages sold in elementary and middle schools to only water, low-fat and fat-free milk, and 100 percent fruit juice in appropriate portions; and
- establish calorie and serving size restrictions for all beverages sold in high schools so as to ensure calories obtained from sugar-sweetened beverages during the school day are minimal.

Recommendation 3: USDA should adopt policies and practices that ensure effective implementation of the standards. At a minimum, USDA should:

- provide technical assistance and training to schools and districts;
- provide clear guidance that addresses the terms *infrequent, school day,* and *school campus* as included in the Healthy, Hunger-Free Kids Act;
- ensure that nutrition standards are kept up to date with future iterations of the Dietary Guidelines for Americans; and
- collaborate with states and non-governmental organizations to monitor the implementation of the standards.

7.3 Discussion of Recommendations

Recommendation 1: USDA Nutrition Standards for Foods

With children in the United States struggling nationally to meet basic dietary recommendations as set forth in the 2010 Dietary Guidelines for Americans, it is important that USDA set nutrition standards for all foods sold in schools outside of the school meal programs. These standards should aim to increase access to healthy foods and beverages, while also decreasing access to unhealthy items.

Foods to encourage

It is important that USDA require all venues, including school stores, vending machines, and a la carte lines, to sell items from the 2010 Dietary Guidelines for Americans list of foods to encourage, such as fruits, vegetables, low-fat dairy, and whole grains. Fruits and vegetables should be allowed in all forms—fresh, frozen, canned, and dried—as all provide essential vitamins and minerals. All of these items, including combination products such as granola bars or trail mix, which may contain whole grains and some fruit, should meet additional nutrient standards as outlined in Recommendation 1.

While fortification was outside of the scope of this HIA, USDA should recognize that this could be an issue with nutrients of concern, especially in combination products as described in the previous paragraph.

Precedent exists for requiring all venues where food is served to provide items from the Dietary Guidelines for Americans foods to encourage category. As of 2010, 34 states have policies in place partially meeting the IOM's recommendation that only Tier 1 foods, which include foods to encourage from the 2010 Dietary Guidelines for Americans, be allowed during the school day.

Age-appropriate calorie limits

With one in three children in the United States currently overweight or obese, it is important for USDA to set calorie limits for snack and a la carte foods and beverages using ranges that are determined based on age/grade levels and estimating current physical activity, rather than applying one maximum calorie level across all age groups.

For non-entrée items, this limit should be within 10 percent of the range of daily estimated energy needs by age for children with low physical activity (PA), as suggested in the 2010 Dietary Guidelines for Americans' dietary pattern.[765]

- Elementary school = 1000 (low PA)—1600 (moderate PA) calories/day;
  10 percent low = **100** calories/item
- Middle school = 1400 (low PA)—2000 (moderate PA) calories/day;
  10 percent low = **140** calories/item
- High school = 1800 (low PA)—2800 (moderate PA) calories/day;
  10 percent low = **180** calories/item

Foods sold individually as entrées (i.e., a la carte) should meet a total calorie limit consistent with the comparable National School Lunch Program entrée items they replace, with a maximum of 400 calories for entrées served in high school, and 300 calories for entrées served in elementary and middle schools.

The calorie ranges included in this recommendation are broken down for elementary, middle, and high school age levels and include low and moderate activity levels. They are indicated for weight maintenance and do not take overweight or obesity into account.

Research discussed in Chapters 5 and 6 indicates that the increase in child weight observed between 1988 and 2002 may have been prevented by an average reduction of 110–165 calories per day.[766] This is the difference of providing an elementary student a 150-calorie snack rather than a 250-calorie snack, as indicated by the child's daily energy needs. Combined with a recent study conducted by the National Institutes of Health National Cancer Institute demonstrating that physical activity levels are not high enough in children to compensate for excess calorie consumption, these trends indicate that USDA should stick to the lower end of the indicated calorie range.[767] Such research also indicates the need for calorie caps on a la carte entrée items.

While implementation of varying calorie levels may be challenging at the school level, schools participating in the Alliance for a Healthier Generation's Healthy Schools Program have shown it can be done. The Alliance's Competitive Foods Guidelines use calorie limits based on age and grade levels—150 calories for elementary, 180 calories for middle, and 200 calories for high school—that are currently being applied in more than 14,000 schools across the country. Similarly, state policies in Massachusetts, Oregon, and California use different calorie limits for age and grade levels. Iowa, Oregon, and California also set maximum calorie limits for a la carte entrées.

Maximum limit for sugar

It is common for a limit on sugar content of foods to be included in nutrition recommendations. The 2010 Dietary Guidelines for Americans suggests that most Americans should obtain no more than 15 percent of calories from added sugar; however, this recommendation is difficult to put into practice at this time because manufacturers are currently not required to list added sugars as part of the nutrition facts panel.[768] Most existing state and local policies are primarily based on the 2007 IOM recommendations for competitive foods—a maximum of 35 percent of calories from total sugars per portion in snack foods and beverages. As several of the Dietary Guidelines for Americans foods to encourage have naturally occurring sugars, exceptions should be allowed for:

- 100 percent fruits and fruit juices in all forms without added sugars;
- 100 percent vegetables and vegetable juices without added sugars; and
- unflavored nonfat and low-fat milk and yogurt.

However, it is important to note that IOM intended for this 35 percent ceiling to be an interim recommendation until added-sugars information is more readily available to school food service operators. When this information does become available, USDA should consider updating the standard to a maximum of 25 percent of total

calories from added sugars. This change will be important given the research presented in Chapter 5 that shows that increased sugar consumption is linked to a variety of negative health impacts, including dental caries, which are a leading cause of school absences, and by extension can be linked to adverse learning outcomes.

Of the 19 state policies with nutrient standard restrictions that partially or fully meet the 2005 Dietary Guidelines for Americans examined in detail for this HIA, 15 include limits on total sugar that are in line with IOM (see Appendix 7). However, this does not include states with voluntary recommendations.

Several states also have sugar limits based on a percentage of the total weight of the product. While there is no research to determine what type of sugar limit is more effective (i.e., one based on a percentage of total calories from sugar versus one based on a percentage of total weight of the product), the HIA policy analysis determined that a standard based on calories would allow for a greater variety of products in schools. The IOM committee on school foods found similar results in its analysis.

USDA's recently revised nutrition standards for school meals do not contain a total sugar limit because USDA determined that sugar would be limited by a cap on total calories. While this approach is logical for school meals that include multiple components, limits on total sugars are important for individual food and beverage items. Consider fruit-type snacks—a 120-calorie product can contain more than 50 percent of its total calories from sugar. This is the case for many types of snack products, especially those that are energy-dense.

Maximum limits for fats

While some amount of fat is important in every diet, research indicates that consumption of too much fat, especially too much saturated and trans fats, is associated with negative health outcomes, such as increased risk for overweight, obesity, and chronic diseases. More specifically, overconsumption of saturated fat is linked to increased risk for coronary heart disease and type 2 diabetes; overconsumption of trans fat can increase "bad" cholesterol while simultaneously decreasing "good" cholesterol. Strong evidence supports the need for USDA to set limits in these areas, especially as children are increasingly being diagnosed with these chronic conditions, as outlined in Chapter 5.

The above recommendations for total, saturated, and trans fats are consistent across the 2010 Dietary Guidelines for Americans, the IOM, the Alliance for a Healthier Generation, and many state and local policies.

Incremental reductions in sodium

Research suggests that modest population-wide reductions in dietary salt could substantially reduce cardiovascular events and medical costs.[769] More specifically, a recent study suggests that reducing dietary salt in adolescents could yield substantial health benefits by decreasing the number of teenagers with hypertension and the rates of cardiovascular disease and death as these teenagers reach young- and middle-age adulthood.[770]

The 2010 Dietary Guidelines for Americans suggests that people should reduce their intake of foods with added sodium, but changes will need to be made gradually in order for taste preferences to adjust, as Americans have become accustomed to salty foods. With few district-level policies meeting the 2007 IOM recommendations for sodium in snack foods (maximum of 200 mg per portion for snack foods and maximum of 480 mg for a la carte entrée items), the most commonly used is the Alliance for a Healthier Generation standard, which ranges from 230 mg to 480 mg.

Reducing sodium in foods sold outside of the school meal programs is possible, but it will need to be done gradually as recommended in the recent changes to nutrition standards for school meals. In this case, IOM recommended a gradual but significant reduction in sodium over time and suggested that USDA establish intermediate targets to help schools progress to the final sodium standards for each age and grade group. This type of gradual reduction over a 10-year period is consistent with public health initiatives aiming to reduce sodium in the nation's food supply. USDA should adopt a similar procedure for reducing sodium in foods sold outside of the school meal programs.

Recommendation 2: USDA Nutrition Standards for Beverages

Beverages in elementary and middle schools

All beverages for sale to elementary and middle school students outside of the school meal programs should be limited to water, nonfat or low-fat (1 percent or less) milk or USDA-approved milk alternatives, and 100 percent fruit juice (or 100 percent juice diluted with water) with no added sugars. As discussed in Chapters 5 and 6, research shows that when beverages are limited to only water, milk, and 100 percent juice, children consume more healthy drinks.

While low-fat milk (or USDA-approved milk alternatives) and many 100 percent juices provide essential vitamins and minerals, it is important that consumption still be limited given calorie, fat and sugar levels. As such, USDA should set maximum portion sizes for these beverages. The IOM recommends limiting milk (or USDA-approved milk alternatives) to eight-ounce servings across all grades, while the Alliance limits milk and USDA-approved alternatives to eight-ounce servings in elementary, 10-ounce servings in middle, and 12-ounce servings in high schools. For juice, the Alliance applies the same portion limits as for milk, while the IOM recommends four-ounce servings in elementary and middle schools, and eight-ounce servings in high schools.

This report does not recommend that USDA apply a maximum serving size to water; however, it suggests that the term *water* be clearly defined. With the plethora of new water products in the market place that feature added flavorings, essences, carbonation, etc., it is important for USDA to clearly define what is or is not allowed. Massachusetts is an example of a state policy that has addressed this issue.

Sugar-sweetened beverages in high schools

In high school settings, USDA should similarly require water, milk, and juice to be sold at all venues. Additionally, the sale of other beverages meeting calorie and portion size requirements should be permitted.

As presented in Chapter 5, studies reviewed for this HIA suggest that total energy intake can be significantly reduced by replacing higher calorie beverages with lower-calorie alternatives, indicating that a calorie limit on beverages is necessary. While many state policies have set limits on sugar-sweetened beverages, very few meet the IOM recommendation of eliminating them entirely from all schools.

Recent research demonstrates that calories consumed from beverages do not contribute to feelings of fullness, and thus often do not replace calories from food. This evidence, combined with the fact that students often have the ability to purchase both a snack food and drink while at school, suggests that USDA should set calorie limits for beverages that are as close to zero as possible.

The Alliance for a Healthier Generation, in collaboration with industry, has established limits on portion sizes and calories for beverages sold in schools as follows:

- no- or low-calorie beverages with up to 10 calories per eight ounces are allowed in any size; and
- other drinks allowed in up to a 12-ounce portion with a maximum of 99 calories (66 calories per eight ounces)

While these standards have been widely accepted and implemented in schools participating in the Alliance's initiative, research indicates that USDA should set stricter limits in order to have an impact on total calorie intake.

Recommendation 3: Implementation

Training and technical assistance

USDA should provide technical assistance (TA) to local education agencies to assist schools and districts as they implement these updated standards. This TA should be geared toward multiple stakeholders in the school environment, including school personnel (e.g., food service staff, teachers, athletic directors, coaches, administrators, etc.), student groups, and parent groups such as the Parent Teacher Association. USDA should consider partnering with other entities, such as the Department of Education, the CDC, and nongovernmental organizations, to provide this TA.

Many types of TA have proven useful at the state and local levels, including:

- lessons learned from districts that have successfully made the transition to offering healthier foods;
- suggestions for addressing common implementation issues, such as education, promotion of new items, purchasing and/or vendor issues, and student acceptance;
- ideas for nonfood items that have successfully been used by student groups and school districts to generate revenue; and
- recommendations for schools and districts to develop alternative revenue streams during the transition to healthier products.

At a minimum, USDA should provide TA on the revenue issue. As presented in Chapter 4, research shows that some schools and districts may face initial financial fluctuations upon making changes in snack food and beverage offerings. Typically in these situations, schools report a decrease in vending machine profits; however, school meal participation and, by extension, proceeds from this program, tend to increase. Therefore, USDA should place an emphasis on increasing enrollment and participation in the National School Lunch and Breakfast Programs. Additionally, USDA should offer TA on preferential pricing strategies--setting healthier food prices 25 to 50 percent lower than less healthy snacks results in an increase in their purchase. Such pricing strategies, in combination with promotion of healthy food, can result in a positive or neutral effect on the overall school food budget.

Furthermore, because other areas besides food services may benefit from vending machines and school store sales, USDA should provide ideas for schools and districts to assist in developing alternative revenue streams during this transition period.

Clear guidance to address terms

As required by the Healthy, Hunger-Free Kids Act, USDA should provide guidance to schools on how to address the terms *infrequent*, *school day*, and *school campus.* USDA does not currently have such definitions in place.

While the literature does not provide enough evidence for this HIA to recommend optimal definitions for *infrequent* or *school campus*, several variations of the term *school day* are used in practice. USDA should consider these existing definitions in crafting possible recommendations. Definitions should be created in such a way that third parties, such as outside companies, are required to be in compliance with these nutrition standards if soliciting sales on school grounds.

Updating nutrition standards

Section 208 of the Healthy, Hunger-Free Kids Act requires that USDA review the nutrition standards for foods sold outside of the school meal programs with the release of a new edition of the Dietary Guidelines for Americans. If USDA and HHS determine that a new set of DGA will be released in 2015, it will be important to determine if the changes warrant modifications to any of the standards established for foods sold outside of school meals.

Monitoring implementation

USDA should collaborate with states, nongovernmental organizations, and other stakeholders to monitor implementation of nutrition standards for foods sold outside of the school meal programs in order to increase accountability.

Stakeholders interviewed for this HIA emphasized that the implementation of a national snack food and beverage rule should include monitoring systems and accountability to ensure optimal implementation of updated standards. Under Section 244 of the Healthy, Hunger-Free Kids Act, a research, demonstration, and technical assistance program was established, a component of which involves determining what implementation barriers exist and then helping districts with technical assistance to address them. While this has not yet been funded by Congress, executing this research study and applying the findings will be critical to supporting districts with implementation. It may be beneficial for USDA to set aside such funding in its budget for monitoring and enforcement of these rules.

USDA should clarify specific indicators that will be monitored, who will do the monitoring and how often, and how the results will be reported. Many organizations such as Bridging the Gap are already engaged in monitoring school food environments. USDA should consider collaborating with non-governmental organizations to assess progress and identify additional needs for technical assistance. States should also be encouraged to monitor implementation and increase accountability. States could also require districts, through local wellness policies or by other means, to report on their progress toward implementation or publicly disclose all products sold in schools in order to increase transparency.

7.4 Promising Practices in Support of Implementation

This section of the report discusses promising practices for school districts and states to consider that are complementary to national snack food and beverage nutrient standards. Implementation of any new policy is challenging; however, numerous food service and district personnel have successfully implemented many of these policy changes to date. These recommendations draw from those successful experiences, as well as stakeholder interviews, research, and existing toolkits, and are intended to improve children's health while also mitigating financial risk. While many of them have not been formally evaluated, additional research could be done in each of these areas. Where possible, these promising practices are cited back to a data source.

These promising practices are divided into six categories: integration, communication, and outreach; overarching implementation suggestions; school food environment; food service implementation; vendor relationships; and fund-raising.

Integration, communication, and outreach

When implementing updated nutrient standards for snack foods and beverages, it is important to consider other assets to enhance or amplify the effects of these standards at the school or district level. For example, it may prove useful to integrate these new regulations and strategies for achieving them into the local school wellness policy. The amount and type of resources needed for this transition to healthier items will vary from school to school. As such, it may be necessary to explore available complementary funding, expertise from institutions of higher education, and lessons learned from similar districts that have successfully made the transition to healthier products.

Experience has shown that including communication—whether to students, school personnel, the school board, or the broader community—about the reasons for policy changes is an important part of implementation, which leads to greater buy-in. Most stakeholders interviewed for this HIA mentioned that education was an important component of changing the school food environment. Involving students in food selection and educating them about reasons for new nutritious items, for example, can lead to improved student acceptance of menu changes and consumption of healthier food items.

Research and stakeholder interviews demonstrate that, when possible, students should be involved in the selection of the healthier food portfolio. One stakeholder interviewed for this HIA indicated that Utah and Indiana conducted surveys, focus groups, and taste tests with students to identify their food preferences. Another approach is to gather feedback from students around new menu items, which can help address the scaling challenges that accompany translating taste-test results to ongoing food preparation.[771,772] This method is also similar to seasonal menu-planning used by districts engaging in farm to school activities.[773] The National Education Association has many resources available to assist in developing and disseminating educational campaigns geared toward school and food service personnel. Similarly, it may be beneficial to ensure that the local school board and school governance representatives are involved in a meaningful and sustained way during the development of guidance, regulations, and policy at every stage of development and implementation.

Overarching implementation suggestions

While the nutrition standards for snack foods and beverages set by USDA will apply only to foods sold on campus to students, several stakeholders, including some education groups, interviewed for this HIA expressed the need for these standards to apply to *all* foods and beverages sold on campus regardless of student access (i.e., staff or teacher lounges). The most common reasoning provided was that it is important for teachers and school staff to send a consistent message to students.

Additionally, several stakeholders recommended closing campuses so that students may not leave during the day to purchase lunch elsewhere. Currently, 90 percent of schools across the United States operate under a closed campus policy; however, 30 percent of high schools still have an open campus policy that allows students to leave during the lunch hour.[774] While some schools have this policy in place due to a lack of space for serving school meals on campus, those schools where it is administratively feasible may want to consider this option.

School food environment

As discussed in Chapter 1, the school food environment plays an important role in shaping students' eating behavior at school. The food and beverages available at schools can affect food choices and thus consumption patterns among students. In order to ensure successful implementation of a healthier school food environment, schools and districts must look beyond snack foods and beverages to other policies that also affect student food access. For example, a local school or district may choose to set standards for foods that are not for sale, and thus outside the scope of the Healthy, Hunger-Free Kids Act, but are widely available in schools, such as those provided for classroom parties, treats, and student rewards.

Similarly, altering the physical environment to make the healthy choice the easy choice is more likely to result in increased purchase and consumption of healthier foods. For example, streamlining the a la carte and school meal purchase lines will likely result in a higher percentage of students purchasing a reimbursable school meal.[775] Schools may also consider making the cafeteria space more comfortable and less chaotic or noisy by adjusting schedules to give students more time to eat a meal, and possibly placing recess before lunch. While this is not an option in all schools, those that have adequate space to do so may consider making these changes.

Finally, USDA, states and local governments, and departments of education and agriculture can work to ensure that there is adequate kitchen equipment, space, training for staff, and other necessary infrastructure for implementation. It is likely that, with serving a larger quantity of fresh, healthy food items, staff will need more training, storage, refrigeration, and equipment for proper food preparation. Specifically, it will be important to provide technical assistance to food service staff on cafeteria configuration techniques, for instance to highlight healthier items such as fruit by displaying them at eye level. Additional promising practices to consider when altering the physical environment include preferential pricing, enhanced visual appearance, marketing and promotion, and repeated exposures to healthy food.

Food service implementation

Information uncovered in the stakeholder interviews and literature review indicate that additional training and technical assistance should be provided to food service staff upon making the transition to serving healthier foods in schools. Several promising practices were uncovered, including:

- offering multiple vegetable and fruit options simultaneously and ensuring that when fresh produce is available, it is appealing (for example, free of blemishes) to encourage student selection;
- placing healthier foods such as the salad bar and fruit bar at the beginning of the lunch line where feasible;
- planning menus strategically and redistributing labor so that items requiring hands-on work (like preparing apple or orange slices) are paired with lower-maintenance sides such as frozen broccoli or whole fruits;
- purchasing ready-cut fresh fruits and vegetables when they are affordable (or partnering with the school garden for herbs like basil); and
- participating in farm-to-school programs and/or partnering with local growers to increase the availability of fruits and vegetables.

References to farm-to-school programs were often found in the literature as a promising practice for increasing consumption of healthier items without significantly increasing costs.[776] For example, in Kentucky, schools that purchase Kentucky-grown products receive a rebate between 14 and 16 percent of the total cost of the food. This incentive has encouraged the Montgomery County school district to develop more relationships with local growers.[777] Other states may want to consider offering similar rebates to districts and counties purchasing healthy in-state products.

Although not examined in this HIA, advertising and marketing of unhealthy products in the food environment also shapes dietary behavior; adolescents are exposed to a high volume of these messages.[778-781] While a national snack food and beverage policy will support schools in promoting healthier food options in the school food environment, more research may be needed on best practices for marketing these healthier items.[782,783]

Vendor relationships

When implementing snack food and beverage standards, it will be important for schools and districts to communicate these standards to vendors and work collaboratively to identify options that are in compliance with the updated guidelines. Stakeholders interviewed for this HIA recommend that schools should aggressively promote and market these healthier food options to students and may even consider offering the healthier items at a reduced price in venues where this is feasible such as the a la carte line.

The school does have the authority to set prices in the a la carte line; however, the school is often not the entity setting the prices in vending machines. Additionally, vendors often have contracts with companies to advertise unhealthy foods and beverages on the outside of vending machines placed in schools. When possible, schools may choose to prohibit the advertising on vending machines of foods that do not meet nutrition standards. Some vendors already have policies in place that require their vending machine fronts to match the products for sale in the machines. Product pricing and marketing may serve as important negotiating points when renewing contracts with vendors.

Non-governmental organizations might consider providing technical assistance to schools and districts around vendor contracts, such as sample letters to vending companies about providing healthier options, and when applicable, changing the images on vending machines to include only those that meet the standards.

Fund-raising

While USDA will set a standard around fund-raisers, likely addressing the frequency of those that are food related, it will be important for schools to also take a proactive stance on the topic. Food-related fund-raisers can be healthy. Consider selling boxes of seasonal fruits and vegetables, specialty foods, and gift baskets, etc. For example, farm-raisers have been a big hit across the country, selling items such as locally produced salsas and jams. Additionally, there are many options for nonfood-related fund-raisers. Examples include selling lotions, soaps, or other bath products; kitchenware; jewelry; candles; raffle tickets for items such as gift certificates, electronics, and events; and movement related activities, such as walk-a-thons or dance-a-thons. The National Alliance for Nutrition and Activity[i] and the Alliance for a Healthier Generation[ii] both have multiple resources available for healthy fund-raising ideas.

[i] National Alliance for Nutrition and Activity alternative fund-raiser information can be found at www.cspinet.org/nutritionpolicy/priority_nutritionprogram.html.
[ii] Alliance for a Healthier Generation alternative fund-raiser information can be found at schools.healthiergeneration.org/.

7.5 Summary

Setting national nutrition standards for competitive foods in schools will encourage the increased consumption of foods children need while discouraging the excess consumption of calories, unhealthy fats, sodium, and sugar. Such a change has the potential to shift children's diets enough to impact their overall health, a critical outcome given the current trends toward increasing overweight, obesity, and chronic illness among young people.

Implementation of these standards may not be simple, but the promising practices discussed in this HIA and developed by school districts already embracing healthy standards, offer a credible way forward. If implemented effectively at the district and school level, these changes can be made with little to no negative financial impact and may even result in improved financial outcomes for schools and districts. Thus, USDA should promulgate scientifically sound nutrition standards and adopt practices—as recommended by this HIA—that are most likely to maximize positive health impacts while assisting schools in effectively implementing new standards.

Acronyms and Abbreviations

Alliance—The Alliance for a Healthier Generation

BMI—Body mass index

CCD—Common Core of Data

CDC—Centers for Disease Control and Prevention

CLASS—Classification of Laws Associated with School Students

DGA—Dietary Guidelines for Americans

ES—Elementary school

FMNV—Foods of minimal nutritional value

HHFKA—Healthy, Hunger-Free Kids Act

HHS—United States Department of Health and Human Services

HIA—Health impact assessment

HS—High school

IOM—Institute of Medicine

LEA—Local Education Agency

MS—Middle school

MTF—Monitoring the Future study

MVPA—Moderate-to-vigorous physical activity

NHANES—National Health and Nutrition Examination Survey

NSLP—National School Lunch Program

PA—Physical activity

RDA—Recommended Daily Allowance

RIA—Risk impact assessment

SES—Socioeconomic status

SFA—School Food Authority

SNDA III—School Nutrition Dietary Assessment III

SNESPCS—School Nutrition-Environment State Policy Classification System

SSB—Sugar-sweetened beverage

TA—Technical assistance

USDA—United States Department of Agriculture

SBP—School Breakfast Program

YES—Youth, Education, and Society study

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Appendices

Appendix 1: Reference Elements

TABLE A1.1 Principles of the 2010 Dietary Guidelines for Americans

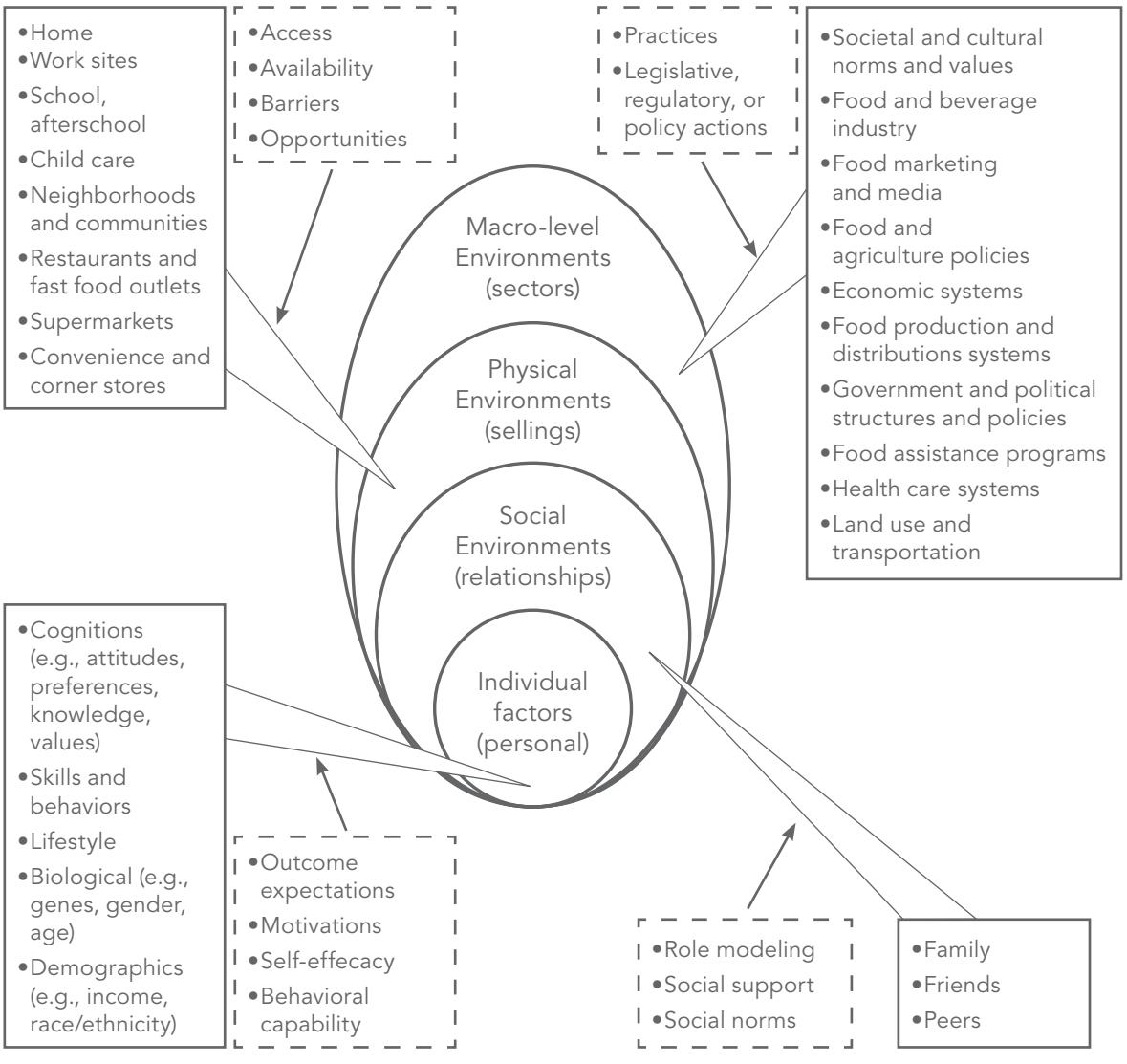
Differences by grade level	Age-level differences in food guide calorie levels for meal patterns, sodium suggestions by age
Calories	Reduce empty calorie intake from solid fats and added sugars; USDA food pattern calorie limits for sedentary and moderately active children are: • Elementary school (ES) = 1,000–1,600; 10% = 100–160 • Middle school (MS) =1,400–2,000; 10%= 140–200 • High school (HS) = 1,800–2,800; 10% = 180–280
Sugar	Reduce intake of foods with added sugar; most people should get a maximum of 15% calories from added sugar
Saturated and trans fats	Trans fat: <0.5 g per serving Saturated fat: <10% calories per serving <300 mg per day of dietary cholesterol
Total fat	Eat less saturated fat, more healthy fats from seeds, nuts, and fish; removed 35% calories from fat from main 2005 DGA recommendations; however, still recommend overall reduction.
Sodium	Reduce intake of foods with added sodium. Adequate Intake for individuals: • ages 9–50: 1,500 mg/day; 10% is 150 • ages 4–9: 1,200 mg/day, 10% is 120
Foods to Encourage • **Fruits and vegetables** • **Fiber and whole grains** • **Low-fat dairy**	Nutrients of concern for children (potassium, dietary fiber, calcium, and vitamin D) • Eat more fruits, vegetables: a 2,000 calorie diet needs 4–5 servings of fruits and 4–5 servings of vegetables • Reduce intake of refined grains; <50% whole grains • Increase intake of fat-free or low-fat milk and other dairy products • Eat a variety of protein such as seafood, lean meat, poultry; eggs, beans and peas, soy products, and unsalted nuts and seeds • Replace high–solid fat protein foods with foods lower in solid fats and calories and/or those that are sources of oils • Replace solid fats with oils

SOURCE: U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans, 2010*, 7th ed. (Washington, DC: U.S. Government Printing Office, 2010), www.dietaryguidelines.gov.

Dietary Behavior Socioecological Model

This HIA used a socioecological framework developed by Mary Story (see Figure A1.1). This framework describes the multiple social and environmental factors that influence healthy eating behavior. This HIA focuses on the potential impact that macro-level environments, such as legislative policy, and physical environment features, such as school food access, may have on healthy eating behavior among school-aged children.

FIGURE A1.1 Socioecological Model of Dietary Behavior



SOURCE: Mary Story et al., "Creating healthy food and eating environments: policy and environmental approaches," *Annual Review of Public Health 29* (2008): 253–72.

TABLE A1.2 Alliance for a Healthier Generation Institute of Medicine Competitive Foods Standards

	Alliance for a Healthier Generation	Institute of Medicine
Grade levels	Calorie level differences for fruit packed in own juice • ES = <150 • MS = <180 • HS = <200	Applies to all age groups
Other provisions	All other foods must meet only *one* of the following requirements:	A la carte entrée items meet fat and sugar limits as listed below and have a sodium content of 480 mg or less; 200 calorie limit does not apply; items cannot exceed calorie content of comparable NSLP entrée items
Calories	≤100 <150 calories for vegetables with sauce and soup that also meets two more nutrient requirements; Meet two of the following: <150 cal ES, <180 cal MS, <200 cal HS *and* either >2 g fiber, >5 g protein; 10 percent DV of Vitamin A,C,E, folate, calcium, magnesium, potassium, or iron; *or* one-half serving of fruit and vegetables	Tier 1 foods are fruits, vegetables, whole grains, and related combination products* and nonfat and low-fat dairy that are limited to 200 calories or less per portion as packaged and meet the limits listed below.
Sugar	35 % total sugars by weight; dry fruit exempt	35% calories from total sugars per portion/package • Except: 100% fruits/vegetables/juices without added sugars • Unflavored nonfat/low-fat milks • Yogurt <22 g sugars per 8 oz serving • Flavored milk: <30 g sugars per 8 oz serving
Fats	0 g trans fat	Less than 10% calories from saturated fat Zero trans fat (0.5 g per serving)
Total fat	35% total calories from fat, nuts, butters, one egg with no added fat exempt	35% calories from fat
Sodium	<230 mg sodium per portion as packaged; <480 mg sodium if the item meets the following criteria: Low-fat and fat-free dairy, and vegetables with sauce and soups must also contain 1 or more of: 2 g fiber; or 5 g protein; or 10 percent DV of Vitamin A, C, E, folate, calcium, magnesium, potassium, or iron; or 1/2 serving (1/4 cup) of fruit or vegetables.	Sodium content of 200 mg or less per portion as packaged
Fruits and vegetables **Fiber and whole grains** **Low-fat dairy**	Incorporated into sodium and calorie requirements	Included in the "Calorie" row above

* Combination products must contain a total of one or more servings as packaged of fruit, vegetables, or whole grain products per portion.

SOURCES:
1. National Academy of Sciences, Institute of Medicine, *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth Executive Summary* (2007).
2. Committee on Nutrition Standards for Foods in Schools, Virginia A. Stallings and Ann L. Yaktine, eds., *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth*. (Washington, DC: The National Academies Press, 2007).
3. *Competitive Foods Guidelines for K-12 Schools* (New York: Alliance for a Healthier Generation, 2011), www.healthiergeneration.org/companies.aspx?id=5691.

TABLE A1.3 Competitive Beverages Standards

Alliance for a Healthier Generation	Institute of Medicine
For all ages, the following are permitted: • Water, • 100% juice • Low-fat or nonfat dairy or soy-based beverages in all schools Portion sizes for juice: • ES: ≤ 8 oz • MS: 10 oz • HS: 12 oz There is a calorie limit for juices of <120 calories per eight ounces and a requirement for at least 10% of recommended daily value of three or more nutrients. Portion sizes for milk: • ES: 8 oz • MS: 10 oz • HS: 12 oz calorie cap of <150 per eight oz HS: Other beverages are allowed, including calorie-free or low-calorie beverages and other beverages as long as they do not exceed 12 oz and have <66 calories per 8 oz portion.	Tier 1 (during school day): For all ages, the following are permitted: • Water, • 100% juice • Low-fat or nonfat dairy or soy-based beverages in all schools throughout the school day Portion sizes for juice: • ES: 4 oz • MS/HS: < 8 oz Portion sizes for milk: 8 oz any age, total sugar not to exceed 22 g

SOURCES:
1. Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth Executive Summary. National Academy of Sciences, Institute of Medicine; 2007.
2. Committee on Nutrition Standards for Foods in Schools, Virginia A. Stallings and Ann L. Yaktine, eds., *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth*. (Washington, DC: The National Academies Press, 2007).
3. *Competitive Beverage Guidelines* (New York: Alliance for a Healthier Generation, 2011), www.healthiergeneration.org/companies.aspx?id=5691.

Appendix 2: HIA Process and Assessment Methods

The National Research Council defines an HIA as a "systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. A Health Impact Assessment provides recommendations of those effects within the population and provides recommendations on monitoring and managing those effects."* HIAs use a variety of methods, including collaboration with stakeholders, to develop recommendations to improve positive health benefits for a proposal.

A2.1 Policy Scenarios

As Section 208 of the HHFKA was interpreted by the research team, the proposed USDA snack food and beverage nutrition standards will set a national baseline, ensuring that all school districts will have to meet some minimum guideline, while states and districts that want something more comprehensive are still able to do so. The research team followed the direction from Section 208 of the HHFKA, which states that standards must apply to the entire school day (to be defined by USDA), with after-school programming being optional; meet/be aligned with the 2010 Dietary Guidelines for Americans; and take into account existing science, other recommended standards, and district and state policies.

Because the USDA had yet to propose any nutrition standards at the time of this HIA, the research team developed two plausible policy scenarios: a baseline "A" level that meets a loose interpretation of the 2010 DGA, and a higher "C" level that follows or surpasses the IOM standard. The two levels are both in the realm of possibility for the USDA guidelines and were too similar to create an intermediate policy level.

The research team used these scenarios to hypothesize how various outcomes would be affected. For simplification, policy scenario "A" food standards were applied equally to elementary, middle, and high schools. After completing literature reviews and interpreting the 2010 DGA based on recommended daily caloric intake for appropriate age and physical activity levels, the research team determined that scenario A was not specific enough. Thus, the research team could use the lessons learned about what products could be sold to children only as guidance for developing policy recommendations.

* *Improving Health in the United States: The Role of Health Impact Assessment* (Washington, DC: National Research Council of the National Academies, 2011).

TABLE A2.1a Draft Policy Scenarios for Foods for Analysis Only

Policy Scenario A: Meets Principles of 2010 DGA for Snack Foods (less restrictive)	Policy Scenario C: Meets 2007 IOM + Alliance for a Healthier Generation (more restrictive)
Offer foods to encourage: Fruits, vegetables, whole grains, nuts, low-fat dairy such as yogurt or low-fat cheese, and combination products **Other snack foods sold are limited to:** **Fat:** snacks meet dietary fat criteria per portion as packaged: • Trans fat: ≤0.5 g per serving • Saturated fat: calories <10% per serving **Portion size, calories:** snack items portion and package are ≤250 (CA) calories and a la carte entrée items do not exceed calorie limits on similar National School Lunch Program items.* **Sodium:** ≤480 mg sodium per non-entrée snacks ≤600 mg per a la carte entrée (Healthier US School Challenge) **Sugar:** total sugar in snacks, foods, and beverages per portion as packaged <40% sugar by weight (WV)*	**Snack foods for sale:** only Tier 1 foods (i.e., fruits, vegetables, whole grains, nuts, low-fat dairy, and related combination products) **All items must still meet the following limits:** **Fat:** snacks meet dietary fat criteria per portion as packaged: • Calories from total fat: <35% per serving • Trans fat: <0.5 g per serving • Saturated fat: calories <10% per serving **Portion size, calories:** ≤200 (HS), ≤180 MS,≤150 ES (the Alliance) and a la carte entrée items do not exceed calorie limits on similar National School Lunch Program items. **Sodium:** ≤200 mg per non-entrée snacks ≤480 mg or less per a la carte entrée (Healthier US School Challenge Gold w/Distinction) **Sugar:** total sugar in snacks, foods, and beverages per portion as packaged must be ≤35% sugar by weight or <15 g

* These interpretations of the principles of the 2010 Dietary Guidelines for Americans were deemed too loose when considering age and physical activity levels. Sugar and calorie levels should be specific to age groups (i.e., ES, MS, HS) for the best possible health outcome.

SOURCES:

1. U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans, 2010*, 7th ed. (Washington, DC: U.S. Government Printing Office, 2010), www.dietaryguidelines.gov.
2. *Competitive Foods Guidelines for K-12 Schools* (New York: Alliance for a Healthier Generation, 2011), www.healthiergeneration.org/companies.aspx?id=5691.
3. Committee on Nutrition Standards for Foods in Schools, Virginia A. Stallings and Ann L. Yaktine, eds., *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth.* (Washington, DC: The National Academies Press, 2007).

TABLE A2.1b Draft Policy Scenarios for Beverages for Analysis

Policy Scenario A: Meets Principles of 2010 DGA for Beverages (less restrictive)	Policy Scenario C: Meets 2007 IOM + Alliance for a Healthier Generation (more restrictive)

Elementary school:
• Water (no sugar added)
• 50–100% fruit or vegetable juice—8 oz, maximum of 15 calories per ounce or 120 calories total*
• Milk or dairy alternative—10 oz, maximum of 15 calories per ounce or 150 calories total
 	
Middle and high school:
• Water (no sugar added)
• 50–100% fruit or vegetable juice—12 oz, no added sweeteners, maximum of 15 calories per ounce or 180 calories total*
• Milk or dairy alternative—12 oz, maximum of 15 calories per ounce if flavored or 180 calories total
• No-calorie or low-calorie beverage—12 oz, maximum of 10 calories per ounce
• Any other beverage that is not more than 12 oz and contains no more than 8 calories per oz (maximum of 96 total calories); sports drinks allowed
	For all ages:
	• Water, no flavoring, additives, or carbonation
	• Milk—low-fat (1% or less) and fat-free (skim), flavored (maximum of 22 g total sugars per 8 oz or 150 calories) or unflavored fluid milk, and/or USDA approved alternative dairy beverages (lactose-free, soy); maximum of 8 fluid oz
	• 100% full strength fruit and vegetable juices with no sweeteners (nutritive or non-nutritive)
	  • ES/MS: 4 oz portion
	  • HS: 8 oz portion
	• Caffeine-free
	• Sports drinks not available except for sports activities more than one hour in duration

+ Adapted from Oregon, similar to the Alliance

* Oregon policy is for 100% juice; in speaking with the policy's authors, the standard was found to be overly restrictive because it did not allow for higher-nutrient, lower-sugar beverages that were only 75% juice, for example.

SOURCES:

1. U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans, 2010*, 7th ed. (Washington, DC: U.S. Government Printing Office, 2010), www.dietaryguidelines.gov.
2. Committee on Nutrition Standards for Foods in Schools, Virginia A. Stallings and Ann L. Yaktine, eds., *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth*. (Washington, DC: The National Academies Press, 2007).
3. *Competitive Beverage Guidelines* (New York: Alliance for a Healthier Generation, 2011), www.healthiergeneration.org/companies.aspx?id=5691.

In addition to the 2010 DGA, existing nutrition standards, and state and local nutrition policies, the research team also reviewed award programs such as USDA's Healthier U.S. School Challenge, nutrition policy classification systems, and generic product ingredient lists. Table A2.1c indicates what items schools would be able to sell in both the A and C levels.

TABLE A2.1c Application of Policy Scenarios A and C to the Snack Foods Allowed to Be Sold in Schools

Policy scenario A	Policy scenario C
Example foods—not allowed in A • Name brand peanut chocolate bar—total calories 271; calories from fat 45% • Name brand pretzels: total calories—110; calories from fat 8%; sodium 580 mg • Coconut almond bar—total calories 220; total fat 13 g (20%); sat fat 8 g (40%); sodium 50 mg; sugars 20 g (44% weight) • Peanut bar—total calories 240; calories from fat 120; total fat 13 g (20%); sat fat 2.5 g (13%); sugars 21 g (40% weight); sodium 120 mg	**Example foods—not allowed in C** • Potato chips (regular)—total calories 155; calories from fat 61% • Trail mix and chocolate—total calories 180; calories from fat 55% • Peanut butter chocolate wafers—total calories 52; calories from fat 44% • Pretzels: total calories—110; calories from fat 8%; sodium 580 mg • Mixed grain chips—total calories 210; calories from fat 38%; sodium 180 mg • Onion rings (1 oz portion)—140 calories; total fat 7 g (11%); sodium 240 mg; sugars less than 1 g
Example foods—allowed under A • Name brand puffed corn kernels—calories from fat 72; total calories 220; calories from fat 33%; sodium 280 mg • Regular potato chips—total calories 155; calories from fat 61% • Trail mix and chocolate—total calories 180; calories from fat 55% • Peanut butter chocolate wafers—total calories 52; calories from fat 44% • Mixed grain chip—total calorie 210; calories from fat 38%; sodium 180 mg • Chocolate chip granola bar—total calories 124; total fat 4.6 g; sat fat 3.2 g; sodium 97.5 mg; dietary fiber 1.2 g	**Example foods—allowed under C** • Baked potato chips—total calories 130; calories from fat 10%; sodium: 170 mg • Fruit roll up—total calories: 104; calories from fat 8%; sodium 89 mg; sugars 10.8 g • Granola bars (peanut butter)—calories 190; calories from fat 60; total fat 7 g (10%); sodium 180 mg; sugars 11 g • MS/HS—Corn scoop chips (1 oz portion if use whole corn): calories 160; total fat 10 g; sodium 110 mg; sugars 0 g

A2.2 Literature Reviews

The research team conducted literature reviews based on health outcomes and the school services and diet and nutrition health determinants. The team met several times to discuss and refine the use of grading criteria for evaluating the quality and strength of the evidence. The tools and process used are listed below.

Literature Review Tools

Scope health determinant pathways: Pathway diagrams helped develop research questions, health outcomes, and indicators.

Scope spreadsheet: The team tracked research questions (current conditions, impact questions), indicators, data sources, priority, and research approach).

Research log: The team tracked literature search results, including search terms, database used, and articles retained.

TABLE A2.2 Search Terms for the Diet and Nutrition and the School Services Health Determinant Pathways

Outcomes	Databases	Search Terms
Diet and Nutrition Pathway		
Access and availability	EBSCO Academic Search Complete, Medline: Pubmed, Medline: EBSCO, Academic Search Complete	Soda, SSBs, children's health, chronic conditions, competitive foods policy, school food environment, competitive foods standards, impact, nutrition, schools, snacks, calories, children, snack bar, vending, a la carte, dietary intake, overweight, obesity, food preferences, environment, school, food environment, policy, snacks, calories, obesity, children
Purchase and consumption; calorie and energy dense food consumption		
Taste preferences	Medline: Pubmed	Taste, schools, school, food, preference, high density foods, competitive foods, eating, availability, children, taste preference, physical environment, food preference, competitive food, policy, food availability, adolescent behavior
Type 2 diabetes	Medline: Pubmed, CINAHL (EBSCO) JAMA	Competitive foods, school, children, food, obesity, BMI, blood pressure, systolic, diastolic, diabetes, insulin resistance, waist circumference, blood glucose, cholesterol, HDL, LDL, chronic disease, overweight, body mass index, health policy, United States, food habits, obesity/etiology, students, Child Nutritional Physiological Phenomena, students, health policy, food, child, adolescent, nutrition policy, cholesterol, USA, dietary, lipoproteins, MH, vending machines, food dispensers, automatic, insulin resistance, diet, obesity prevention and control, school health services, child behavior, health behavior, health status, obesity/epidemiology, food services/standards, intervention studies
Healthy weight		
Overweight, obesity		
Blood pressure		
Cardiovascular disease		
Mental health		
Dental caries	Medline: Pubmed, Scopus, CINAHL (EBSCO)	Dental caries, snack food, children, sweets, sugar-sweetened beverages, soda, cavities, schools, carbonated, oral health, relationship, primary dentition, permanent dentition, prediction of caries in primary dentition
Stigma	ERIC, Medline: Ovid	School meal eligibility, stigma, free and reduced lunch, free lunch, participation, school meals, mental stress, school lunches, stress
Student learning	ERIC, Medline: Ovid	Nutrition, educational outcomes, academic outcomes, academic achievement, school performance, nutritional status, school breakfast, school lunch, school meals, competitive foods, school performance, nutritional status
Food security	ERIC, Medline: Ovid	Food security, school meals, children, hunger, schools, breakfast, lunch
School Services Pathway		
School food services revenue	Medline: Pubmed, SCOPUS, Psychinfo, Cochrane, Medline Plus, Health Reference Center Academic, Science.gov, Google	USDA meal program revenue, competitive foods, revenue, schools, school district, vending
Vending, other revenue		

Process

- Search term list: The team developed search terms relevant to research questions, health outcome, indicators, and health determinants.
- Search databases: The team used relevant databases, at least three for each search.
- Title, abstract, and content review: The team reviewed the title, abstract, and content search to determine if literature fit with research question.
- Used reference lists of existing literature.
- Used related authors and related articles in databases.

TABLE A2.3 Weight of evidence criteria

From the team's previous HIA experience	From research
Quality: Effect estimates (i.e., dose response, association)	**Quality:** the aggregate of quality ratings for individual studies, predicated on the extent to which bias was minimized
Quantity	**Quantity:** number of studies, sample size or power, and magnitude of effect
Consistency	**Consistency:** for any given topic the extent to which similar findings are reported using similar and different study designs

SOURCES:
1. A. D. Oxman, "Grading quality of evidence and strength of recommendations," *British Medical Journal* 328 (2004): 1490–94.
2. AHRQ, *Rating the Strength of Scientific Research Findings* (Rockville, MD: Agency for Healthcare Research and Quality, 2002).

The research team calculated the initial quality score for each article based on study design (see Table A2.4). It then increased or decreased grades of a paper based on how well the paper addressed threats to validity and the strength or limitations of the evidence. For each article, the team determined a final score that takes into account the initial score with modifications. In practice, some of the modifications were difficult to apply, as some literature did not always reference things in the methods section. Most often, article scores did not change beyond the quality of study design. The team used these as rough estimates or indicators of quality where "strong" (3 or above), "fair" (2), or "weak" (1 or lower) studies could then be evaluated together. In the impact characterization table, the team developed a "quality of evidence" of all articles for each prediction research question based on (1) quality of articles, (2) quantity, and (3) consistency of all articles.

TABLE A2.4 Method for determining article quality scores

Empirical studies	Literature reviews
Quantitative: • Experimental (e.g., randomized, with control) = 3 • Observational study (cohort, case control, cross-sectional, pre-post) = 2 • Other evidence (convenience samples, grey literature, qualitative papers, non-experimental designs) = 1	Each literature review should be given a score of 2 and then adjusted based upon the following criteria (a 2 assumes that the following are answered, but if more than two of these are missing, downgrade to a 1): • How well the authors state their inclusion/exclusion criteria • Time period of search—is it indicated? • Whether or not search terms or topics are listed • Use of multiple databases • Whether a certain method of literature review was used and if it was followed (e.g., systematic vs. integrative) • Can the literature support conclusions made by the authors of the lit review?

Increase/decrease grade for how well the following are addressed:

- Threats to validity (deduct, for serious (-1) or very serious (-2) limitation to study quality)
- Bias
- Sufficient sample size (+1)
- All plausible confounders have been considered (or discussed if data were unavailable to measure them)
- Flaws in study design such as insufficient sample size or sampling methodology
- Strong evidence of association or statistically significant measures of association

Note: Deduct 1 or 2 points based on the cumulative weakness of the article (a subjective assessment).

A2.3 Stakeholder Interviews

All interviews were confidential and lasted between 30 minutes and one hour, depending on the stage of the HIA and the individual (see Table A2.5 for list of interviewees). For each interview, participants received materials ahead of time and had an opportunity to ask clarifying questions about the content before providing their feedback. For some interviews, especially with students or school district staff and administrators, the research team held a group interview of two or three individuals in order to broaden the discussion with multiple perspectives. The interviewer took notes during the discussion and provided the participants with a copy of these notes for review. The team asked for permission to attribute people in the final report and quote people directly.

The research team can provide interview scripts and questions upon request by emailing the contacts at the beginning of this report. Here is a sample set of interview questions for a research scope interview:

1. Looking at the list of "impact questions" for diet and nutrition, do you see anything missing?
2. Which of these questions would you say is most important for us to answer to add value to USDA's discussion?
3. Looking at the list of impacted groups, including those who may be more vulnerable, are we missing any group?
4. Can you tell us about the different types of competitive foods options you have (e.g., vending machines, student stores, fund-raisers, a la carte lines)?
5. How does your school/district use sales revenue from each of these options?
6. What programs are affected by changes in revenue from competitive foods policy (e.g., school nutrition services, physical activity programming, after-school enrichment, arts programming)? How are they affected?
7. How do changes affect school meal participation? School nutrition service revenue?
8. Do you have concerns about how competitive foods may impact children's diet and nutrition that are not encompassed by these research topics?
9. Looking at the list of "impact questions" for school services, do you see anything missing?
10. Which of these questions would you say is most important for us to answer to add value to USDA's discussion?
11. Looking at the list of impacted groups, including those who may be more vulnerable, are we missing any group?
12. Do you have concerns about how competitive foods may impact school services that are not encompassed by these research topics?
13. Do you have general concerns about competitive foods or this research project you'd like to share?

TABLE A2.5 Interviewees

Name	Organization	Perspective	State
Roberta R. Friedman, Sc.M. Director of Public Policy	Rudd Center for Food Policy and Obesity	Policy	CT
Kathryn Henderson, Ph.D. Director of School and Community Initiatives			
Anne Travis, CEO	The Bower Foundation	Policy	MS
Lucy Gettman, M.A., M.S.W. Director, Federal Programs	National School Boards Association	Policy	VA
Margo G. Wootan, D.Sc. Director, Nutrition Policy	Center for Science in the Public Interest	Policy	DC
Nora Howley, Manager of Programs	NEA Health Information Network	Policy	DC
Lisa L. Creighton, M.P.H., M.B.A. Senior Program Coordinator, Nutrition, Hunger and Physical Activity			
Guido Dominguez	Youth Advisory Board Alliance for a Healthier Generation	Student	FL
Mataio Swain			WV
High School Student from Arkansas			AR
Penny Parham Administrative Director Department of Food and Nutrition Susan Rothstein Wellness Coordinator Carol Chong Food and Menu Director	Miami-Dade County Public Schools	School and District	FL
John Skretta, Ed.D. Superintendent Linda Truscott Food Service Director MaryJo Rupert Middle School Principal Jane Hansmeyer Family and Consumer Science and Wellness Coordinator	Norris School District	School and District	NE
M. Caitlin Westfall, M.S., M.P.H. Wellness Policy and Promotions Manager Shamil Mohammed Interim Director, Food and Nutrition Services	Boston Public Schools	School and District	MA
Jill Carter Executive Director, Health and Wellness			
Danny D. Seymour Dean of Education Cathy Schuchart Vice President for Policy	School Nutrition Association	School Food Services	MD
Jon Fox District Athletic Director	Duval County Public Schools	Small School	FL
Tracey Leslie Parent and school volunteer	Centennial School District	School	OR
Consultant	American Beverage Association	Industry	DC

Researchers also interviewed several industry representatives and a parent who are not listed individually.

Process Interviews on HIA Scope and Recommendations

The research team used these interviews to gather input on the draft scope developed jointly with the advisory committee. Participants gave feedback to modify the scope of research questions, health determinants, health outcomes, and elements of a health determinant pathway. Stakeholders who were willing were also interviewed in a follow-up call to (1) inform participants of preliminary findings; (2) explain policy or operations recommendations based on those findings; (3) gather modifications to draft recommendations based on participant expertise; and (4) prioritize operations recommendations. The team sent a draft set of recommendations and criteria for prioritization to participants ahead of time, answered questions in an interview, and gave them a time span to make tracked changes to the draft recommendations document. This created a record of their input in addition to the interviewers' notes.

Key Informant Interviews

These interviews helped the research team better understand the nuances related to snack food and beverage policy implementation, challenges, and impacts—such as how it affected school meal quality, access to food, school meal revenue, and school service offerings (i.e., education, athletics, fund-raisers). Subjects were queried about how the policy affected school meal quality and other impacts that may not have originally been considered by the research team. They also were asked how different changes were implemented (e.g., with additional funding).

Key informants included school district representatives or industry representatives that were not reached in the HIA process interviews. The team interviewed one group of students to find out their interpretation of the research scope and impacts of snack food and beverage policies on school meal quality and access to food.

Interviewer Synthesis

The interviewer summarized feedback from participants at each stage, provided copies of interview notes, and shared copies of participant feedback to the participants and to members of the advisory committee and research team. The interviewers guided the research team and advisory committee based on what they learned from stakeholders.

Interview Feedback on Scope

This section lists general themes that emerged from the stakeholder interviews on the research scope, based on the HIA's assessment research questions.

A. Diet and Nutrition

General feedback on diet and nutrition scope

- A policy expert and a school district representative mentioned the impact of snack food and beverage policies on school faculty and staff and suggested it might be important to include adults in the food policy recommendations so as not to set a double standard.

- A policy expert said that if kids lose weight and feel better, they may be more likely to participate in physical activities, which will lead to further improvements in their health.
- A policy expert said that both the short- and long-term effects of the guidelines on changing kids' food preferences should be considered (how changes might impact what kids actually choose to eat), as well as what changes to preferences might mean for kids that do not have healthy foods available to them at home or in their broader communities.
- Three policy experts and two school districts talked about the impacts of guidelines on students' families and the community broadly, or "spillover effects."
- One policy expert said that federal guidelines could include policies restricting vending machines from advertising unhealthy foods, and requiring the promotion of healthier foods and physical activity. An industry representative mentioned that healthy vending machines generally do not perform as well and quite often go out of business, particularly when there are other choices present.
- A few respondents (school district and industry representatives and students) highlighted the need for other changes within schools to support the changes to healthier foods, such as nutrition education and training for school food service personnel. They felt that these components would make the consumption of healthy foods and healthy choices more practical and easier for schools and students.
- One research expert did not think looking further into the impact on chronic illness would be helpful, as the literature would be too thin.

Impact on vulnerable groups

- Several respondents (two school district representatives, two policy experts, and an industry representative) said that it is important to change the overall norm and help all kids be healthier.
- Two policy experts and students pointed out that significant regional and geographic differences may come into play when considering the impact of a national snack food and beverage rule. One HIA and one policy expert noted that it is also important to look at kids who are low-income, on the Supplemental Nutrition Assistance Program (formerly known as food stamps), or generally food insecure. However, a policy expert and school district representative mentioned that some higher-income students might be impacted more because of the greater presence of snack foods and beverages in higher-income areas.
- One research expert noted that food security was missing from the scope, and hungry children are likely to be affected if they participate in more school meals as a result of a national policy.
- Two policy experts thought it important to differentiate risks by school level (elementary, middle, and high), as the presence of snack foods and beverages is different at each level.
- One policy expert said these polices may have greater impact on kids who have diabetes. Kids who are pre-diabetic may also see large impacts if onset of diabetes can be prevented.

B. School Services

General feedback on school services scope

- There was much discussion among various interviewees regarding the impact on school meal participation, and one respondent wanted to make sure that the HIA looked at impacts on the breakfast and lunch programs.
- Interviewees from one school district wondered whether the new regulations will address the practice of using food as part of a reward system.
- A policy expert and personnel from two school districts talked about the time of day at which guidelines are in effect; for example, whether or not they would apply to after-school care programs.
- One school staff member said that these types of policies generally help push the wellness agenda forward and encourage other healthy activities in schools.
- Representatives from three school districts and an industry representative brought up the issue of open campuses and competing food venues, including non-school-sponsored fund-raisers.
- A school district representative and policy expert mentioned the need for accountability and monitoring mechanisms for policy requirements. The former mentioned that it is hard to enforce rules within a school when some of the biggest offenders are individual teachers or boosters who buy food to sell for fund-raisers within a school.

Impact on vulnerable groups

- One policy expert said that if schools lose funding for extracurricular activities such as athletic programming, they may need to start charging students who participate. This would be a greater hardship for students from low-income families and could lead to less participation by those students in the enrichment activities.

Interview Feedback on Assessment

Experiences with snack food and beverage policies

- Experiences are wide-ranging.
- Although anecdotally the research team heard that kids "wait it out" until they get home to eat junk food or else they bring it from home to school, another interviewed researcher did not find this to be true in her study.
- Multiple interviewees discussed the importance of transition time to adapt to healthier items and the ultimate recovery of sales revenues.
- Industry representatives generally welcome national guidelines from USDA as a way to streamline the current variety of state and district guidelines.

Snack food and beverage options

- Students are able to purchase unhealthy foods (including fried foods) via a la carte lines, vending machines, and fund-raisers.

- Representatives from one school mentioned that there is a "healthy" vending machine on campus.
- The adults—parents, teachers, school staff—rather than the students are sometimes the obstacle to creating a healthy food environment.

Revenue from snack food and beverage sales (comments primarily from school district representatives)

- Though widely variable, revenue is generally used to support clubs and activities, including athletics, the arts, and drama.
- Overall, funding declined when the a la carte or vending options were changed to include more healthy options, but then recovered somewhat over time.
- Non-food fund-raisers generally do not seem to raise as much money as food-related fund-raisers.
- Several interviewees mentioned concerns about revenue related to the implementation of the new regulations, including the impact on extracurricular activities and the potential timeline needed to find alternative revenue streams.

Impact on school meal participation

- One school district representative reported lagging participation after changing food options, but there were also other factors in play; since then, participation has gone back up.
- One national group representative observed that it would help to have alignment between nutrition standards for school meals and foods sold individually, which could potentially make implementation easier and less costly.

Other observations

- Two district officials and two students remarked on the need for improved training for food service workers to
    - Improve the quality and taste of foods sold a la carte.
    - Increase their understanding of the food being served and the rationale for selling healthier foods so that they can communicate this information to the students with whom they are in day-to-day contact ("they need to explain to students why the meals are healthier and good and not a punishment").

Interview Feedback on Policy Recommendations

The stakeholders involved in the key informant interviews were appreciative of the opportunity to review the draft policy recommendations. They had mostly positive comments about the policy recommendations and the HIA process in general. The interviewers collected feedback on the draft set of policy recommendations that were incorporated into subsequent drafts. Feedback was mostly related to clarifications and a desire for things to be more or less restrictive, based upon stakeholder perspective.

Appendix 3: Policy Classification Results

This HIA used the Classification of Laws Associated with School Students (CLASS) system as the basis for identifying competitive foods polices at the state level. CLASS, developed by the National Cancer Institute, uses two policy classification systems to score state-level codified laws for physical education (PE) and nutrition in schools. Specifically, it used the school nutrition portion of CLASS known as the School Nutrition-Environment State Policy Classification System (SNESPCS).[1,2] Within the SNESPCS, this report focuses on measures specific to school competitive foods policies as described in more detail below.

The research team converted the CLASS scale measurements to simplify and align them to the 2005 Dietary Guidelines for Americans. To obtain an overall state score in each year, each of the seven variables was rescaled and then averaged (or summed) across the three grade levels. To get a score above 1.5, the majority of the policies on the different variables had to on average partially meet or exceed the 2005 Dietary Guidelines for Americans. These policy indicators are the main variables of interest in identifying whether any policy has a revenue effect and whether effects vary by policy level. In general, these variables are measured on a 0–6 scale (a la carte entrées are an exception at 0–5). To simplify this scale and better anchor it around the 2005 DGA, the research team converted each variable to a 0–3 scale (see Table A3.1).

- Original scores of 0 (no policy) or 1 (recommendations only) are recoded to 0, or effectively a "no policy" level. As state policies set a floor for school districts, this report does not differentiate recommendations, which require no action, from no policy at all.
- Original scores of 2 make recommendations representing policies with specific requirements that do not meet the 2005 DGA, and are recoded to 1. This represents a "low" policy level that is characterized as "not meeting the 2005 DGA."
- Original scores of 4, 5, or 6 are combined, representing policies with one or multiple specific requirements that meet or exceed the 2005 DGA and approach the IOM standard. These are recoded as a 3. This represents a policy level "meeting or exceeding the 2005 DGA."

TABLE A3.1 State Policy Scores from CLASS

Original CLASS score	Raw score ranges	Converted policy level for analysis
6 – Close to or meets IOM	2.5 – 4	Level 3 Meets or exceeds 2005 DGA
5 – Restricts more than one element		
4 – Meets 2005 DGA through restricting at least one element		
3 – Restrictions above FMNV, does not meet 2005 DGA	1.5–2.4	Level 2
2 – Recommendations for setting restrictions	0.1–1.4	Level 1
1 – General recommendations, no restrictions	0	Level 0
0 – No policy		

The SNESPCS also includes binary variables related to each of the 21 competitive foods variables, as applicable, that indicate whether any of the measured competitive foods restrictions allow for some portion of "junk" food or whether they apply for less than the whole school day. These conditions, where present, would suggest a "downgrading" of the total score. There is no clear way to incorporate them as simple binary variables (yes/no) directly in the total score. They are not generally common among states with any policy. "Some junk food" provisions tend to be present among otherwise lower scoring states. The "less than full day provisions" are most common among the highest scoring states.

TABLE A3.2 CLASS Competitive Food and Beverage Scores by Venue and by Policy Level for State Policies in Effect as of December 31, 2008

State	Overall policy level	Avg raw†	A la carte	Vending	Other vending	State	Overall policy level	Avg raw†	A la carte	Vending	Other vending	
Standards meet or surpass 2005 DGA						**Standards do not meet 2005 DGA**						**No policy**
AR	3	4	4	4	4	**AZ**	1	1.3	1.3	1.3	1.3	AK
FL	3	4	4	4	4	**CA***	1	1.7	2.0	1.5	1.5	IA
KY	3	3.4	3.3	3.5	3.5	**CO**	1	0.9	0.7	1	1	ID
MS	3	3.4	3.3	3.5	3.5	**CT**	2	1.9	1.7	1	2	KS
NM	3	2.6	3	3.2	1.5	**DE**	2	1.6	1.7	1	2	MD
OR	3	3.4	2.7	4	4	**GA**	1	0.6	0.4	0.7	0.7	MI
VA*	3	3.8	4	3.3	4	**IL**	2	1.5	0.9	2	2	MN
WV	3	3.2	3.3	3.2	3.2	**IN**	1	0.4	0	1.3	0	MO
						LA*	1	1	1	1	1	MT
						ME*	2	2.1	2.3	2	2	ND
						MA*	1	1	1	1	1	NE
						NJ	1	1	1	1	1	NH
						NY	2	1.7	1.3	2	2	SD
						NC	2	1.8	2	1.7	1.7	WI
						OH*	1	0.9	1	0.5	1	WY
						OK	1	1.1	0.9	1.3	1.3	DC*
						RI	1	0.9	0.7	1	1	Policy not in CLASS
						SC	1	0.9	0.8	1	1	AL**
						TN	2	2	2	2	2	HI**
						UT	1	1	1	1	1	NV**
						VT	1	1	1	1	1	PA**
						WA	1	1	1	1	1	TX**

Policy-level values reflect total scores averaged to a 0–3 scale for competitive foods variables for each grade level and across all venues.

- 2.5–4: Meets/exceeds 2005 DGA
- 1.5–2.4: Restrictions do not meet DGA
- 0.1–1.4: Recommendations or minor restrictions
- 0: No policy restrictions

This analysis includes seven variables from the CLASS competitive foods domain:

1. A la carte snacks
2. A la carte beverages
3. A la carte entrées
4. Vending food
5. Vending beverages
6. Other venues' food
7. Other venues' beverages

† Original CLASS 0–6 scale was converted to a 0–4 scale (0,1=0; 2=1; 3=2; 4,5=3; 6=4). The sum of all variables (maximum for all age levels is 21, 7 is the total for each grade level) was averaged to an overall 0–3 policy level for clarity.
* Passed new competitive nutrition standard rules, regulations, or policies in 2009, 2010, or 2011, as determined by the Trust for America's Health, *F as in Fat: How Obesity Threatens America's Future* (2011 and 2010).
** State agency has requirements for school districts that aren't codified into a statute, regulatory, or administrative code (e.g., a state school board requirement) and thus are not scored by CLASS.

SOURCES:
1. J. Levi, L. M. Segal, and D. Kohn, *F as in Fat: How Obesity Threatens America's Future 2011* (Washington, DC: Trust for America's Health, Robert Wood Johnson Foundation, 2011), www.healthyamericans.org/reports/obesity2010/.
2. J. Levi et al., *F as in Fat: How Obesity Threatens America's Future* (Washington, DC: Trust for America's Health, 2010).

TABLE A3.3 CLASS Competitive Foods and Beverage Scores by Age Level for State Policies in Effect as of December 31, 2008

State	Overall policy level	ES	MS	HS	State	Overall policy level	ES	MS	HS	
Standards meet or surpass 2005 DGA					Standards do not meet 2005 DGA					No policy
AR	3	4	4	4	**AZ**	1	2	2	0	AK
FL	3	4	4	4	**CA***	1	1.7	1.7	1.7	IA
KY	3	3.4	3.4	3.4	**CO**	1	0.9	0.9	0.9	ID
MS	3	3.4	3.4	3.4	**CT**	2	1.9	1.9	1.9	KS
NM	3	2.7	2.6	2.6	**DE**	2	1.6	1.6	1.6	MD
OR	3	3.4	3.4	3.4	**GA**	1	1.7	0	0	MI
VA*	3	4	4	3.4	**IL**	2	2.4	2.1	0	MN
WV	3	3.7	3.4	2.6	**IN**	1	1.1	0	0	MO
					LA*	1	3	0	0	MT
					ME*	2	2.1	2.1	2.1	ND
					MA*	1	1	1	1	NE
					NJ	1	3	0	0	NH
					NY	2	1.7	1.7	1.7	SD
					NC	2	3.1	1.4	0.9	WI
					OH*	1	0.9	0.9	0.9	WY
					OK	1	1.7	1.7	0	DC*
					RI	1	2.6	0	0	Policy not in CLASS
					SC	1	2.7	0	0	AL**
					TN	2	3	3	0	HI**
					UT	1	1	1	1	NV**
					VT	1	1	1	1	PA**
					WA	1	1	1	1	TX**

All values reflect total scores averaged to 0–3 scale for competitive foods variables for each grade level and across all venues.

- 2.5–4 = Meets/exceeds 2005 DGA
- 1.5–2.4 = Restrictions do not meet DGA
- 0.1–1.4 = Recommendations or minor restrictions
- 0 = No policy restrictions

This analysis includes seven variables from the CLASS competitive foods domain:

1. A la carte snacks
2. A la carte beverages
3. A la carte entrées
4. Vending food
5. Vending beverages
6. Other venues' food
7. Other venues' beverages

* Passed new competitive nutrition standard rules, regulations, or policies in 2009, 2010 or 2011, as determined by the Trust for America's Health, *F as in Fat: How Obesity Threatens America's Future* (2011 and 2010).
** State agency has requirements for school districts that aren't codified into a statute, regulatory, or administrative code (e.g., a state school board requirement) and thus are not scored by CLASS.

References for Appendix 3

[1] U.S. National Institutes of Health, National Cancer Institute, "Classification of Laws Associated with School Students (CLASS Data)," (2011), class.cancer.gov/download.aspx.
[2] L. C. Masse et al., "Development of a School Nutrition–Environment State Policy Classification System (SNESPCS)," *American Journal of Preventive Medicine* 33, no. 4S (2007): S277–S291.

Appendix 4: Current Policy and Outcome Conditions—Additional Tables and Figures

TABLE A4.1 National School Lunch Program Participation (2010 and 2011)

State/Territory	FY 2010	FY 2011	State/Territory	FY 2010	FY 2011
Alabama	579,210	571,297	Montana	87,476	87,612
Alaska	54,723	54,476	Nebraska	246,266	249,572
Arizona	669,279	661,584	Nevada	188,017	212,484
Arkansas	353,472	344,049	New Hampshire	109,991	109,036
California	3,240,289	3,275,512	New Jersey	721,587	727,457
Colorado	400,180	399,566	New Mexico	227,526	228,426
Connecticut	303,647	301,259	New York	1,826,027	1,811,558
Delaware	303,647	94,727	North Carolina	955,810	948,250
District of Columbia	46,367	46,651	North Dakota	82,443	83,450
Florida	1,609,077	1,646,690	Ohio	1,136,350	1,133,478
Georgia	1,303,254	1,300,662	Oklahoma	449,207	452,411
Guam	17,611	17,024	Oregon	315,224	312,109
Hawaii	117,353	115,695	Pennsylvania	1,159,852	1,152,824
Idaho	170,081	171,184	Puerto Rico	352,447	340,315
Illinois	1,167,580	1,158,949	Rhode Island	78,531	78,622
Indiana	807,786	805,318	South Carolina	501,965	497,604
Iowa	397,681	394,306	South Dakota	108,050	107,576
Kansas	360,637	358,737	Tennessee	699,875	696,554
Kentucky	556,263	555,346	Texas	3,352,741	3,390,094
Louisiana	595,935	593,315	Utah	339,326	350,478
Maine	110,693	109,203	Vermont	55,144	54,542
Maryland	433,614	435,109	Virginia	757,862	755,431
Massachusetts	544,130	536,655	Virgin Islands	14,176	14,340
Michigan	920,104	910,412	Washington	543,940	546,063
Minnesota	630,764	618,142	West Virginia	212,390	206,190
Mississippi	405,577	400,483	Wisconsin	602,502	606,765
Missouri	649,539	646,215	Wyoming	56,540	57,398
Totals for all states				**31,746,525**	**31,759,353**

Data as of December 1, 2011. Participation data are nine-month averages with summer months (June–August) excluded. Participation is based on average daily meals divided by an attendance factor of 0.927.

SOURCE: U.S. Department of Agriculture Food and Nutrition Service, "Program Data Child Nutrition Tables," last modified April 26, 2012, www.fns.usda.gov/pd/cnpmain.htm.

TABLE A4.2 Trends in Snack Food and Beverage Access and Availability in U.S. Public Schools†

Study	Sample	Method	Years	ES	MS	HS
School Nutrition Association Survey	National	Survey SNA members	2011		91% ALC	
Bridging the Gap*	National	Food service, admin, teacher, staff or principal mail-back survey	Reporting 2007–08 of 3 years here	62% any	69% any	83% any
School Health Profiles (CDC)**	36 states, 13 largest urban school districts		2004, 2006		61.9%–94.0% (med: 83.3%) across states 31.5%–88.6% (med: 79.2%) across urban SDs	
SHPPS***	National	Survey or interview	2006	33% any	71% any	89% any
SNDA III****	National	Principal, food service manager surveys and direct observation	2004–05	17%–27% V 71% ALC	82%–87% V 92% ALC	97–98% V 93% ALC
Youth Education & Society and Monitoring the Future*****	National, secondary schools		2004–05		87% ALC	92% ALC

ALC = a la carte, V= vending, SD = large school district

† Can purchase from at least one vending machine, school store or snack bar, or a la carte line

* L. Turner et al., *School Policies and Practices to Improve Health and Prevent Obesity: National Elementary School Survey Results: School Years 2006–07 and 2007–08, Vol. 1* (Chicago: University of Illinois at Chicago, 2010), www.bridgingthegapresearch.org.

L. D. Johnston et al. *School Policies and Practices to Improve Health and Prevent Obesity: National Secondary School Survey Results, School Years 2006–07 and 2007–08, Vol. 1* (Ann Arbor, MI: Institute for Social Research, 2011), www.bridgingthegapresearch.org/research/secondary_school_survey.

L. Turner and F. J. Chaloupka, "Wide Availability of High-Calorie Beverages in US Elementary Schools," Arch PediatrAdolesc Med. 2010;165(3):223–228.

** N. Brener et al., "Competitive Foods and Beverages Available for Purchase in Secondary Schools—Selected Sites, United States, 2006," *Morbidity and Mortality Weekly Report* 57, no. 34 (2008): 935–38.

*** T. P. O'Toole et al., "Nutrition services and foods and beverages available at school: results from the School Health Policies and Programs Study 2006," *Journal of School Health* 77, no. 8 (2007): 500–21.

**** *School Nutrition Dietary Assessment Study—III: Vol. I: School Foodservice, School Food Environment, and Meals Offered and Served* (Washington, DC: U.S. Department of Agriculture, Food and Nutrition Service, 2007).

M. K. Crepinsek, A. Wilson, and R. Briefel, "A national study of school food environments and policies: School food policies affect fruit and vegetable consumption at school, especially in elementary schools," *Journal of the American Dietetic Association* 108, no. 3 (2008): A10.

***** J. Delva, P. M. O'Malley, and L. D. Johnston. "Availability of more-healthy and less-healthy food choices in American schools: A national study of grade, racial/ethnic, and socioeconomic differences," *American Journal of Preventive Medicine* 33, no. 4S (2007): S226–S239.

SOURCES:

1. L. Turner et al., *School Policies and Practices to Improve Health and Prevent Obesity: National Elementary School Survey Results: School Years 2006–07 and 2007–08, Vol. 1* (Chicago: University of Illinois at Chicago, 2010), www.bridgingthegapresearch.org.
2. L. D. Johnston et al., *School Policies and Practices to Improve Health and Prevent Obesity: National Secondary School Survey Results: School Years 2006–07 and 2007–08, Vol. 1* (Ann Arbor, MI: Institute for Social Research, 2011) www.bridgingthegapresearch.org/research/secondary_school_survey.
3. L. Turner and F. J. Chaloupka, "Wide Availability of High-Calorie Beverages in US Elementary Schools," *Archives of Pediatrics & Adolescent Medicine* 165, no. 3 (2010): 223–28.

TABLE A4.3 Percentage of Students Nationwide in Districts with Wellness Policies Addressing Snack Food and Beverage Content Restrictions by Grade Level* (2008–2009 SY)

Food content restrictions	ES % (K–5)	MS % (6–8)	HS % (9–12)
Complete snack food or location ban	16.3	3.5	1.8
Sugar content			
Weak or no policy	55.3	65.0	72.3
Strong policy. Did not meet IOM	9.5	10.5	10.0
Strong policy. Met IOM (<35% of total calories/total weight from sugar)	19.5	21.3	15.8
Any strong policy (total of above two rows)	29.0	31.8	25.8
Fat content			
Weak or no policy	48.5	57.0	61.8
Strong policy. Did not meet IOM	15.5	24.0	26.0
Strong policy. Met IOM (<35% of total calories from fat)	20.5	15.5	10.3
Any strong policy (total of above two rows)	35.5	39.5	36.3
Trans fats			
Weak or no policy	74.3	85.3	89.0
Strong policy. Did not meet IOM	8.0	9.8	8.8
Strong policy. Met IOM (no more than 0.5 g)	1.3	1.6	1.0
Any strong policy (total of above two rows)	9.3	11.3	9.8
Sodium content			
Weak or no policy	72.0	83.5	87.8
Strong policy. Did not meet IOM	10.8	12.8	10.3
Strong policy. Met IOM (<200 mg sodium/portion)	0.0	0.0	0.0
Any strong policy (total of above two rows)	10.8	12.8	10.3
Calorie content			
Weak or no policy	66.0	77.0	83.5
Strong policy. Did not meet IOM	4.0	15.0	13.0
Strong policy. Met IOM (<200 calories/serving)	13.8	4.3	1.8
Any strong policy (total of above two rows)	17.8	19.3	14.8

* At vending machines, school stores, a la carte meals, and fund-raisers

All numbers rounded. Due to rounding, some percentages may not sum to exactly 100. Exact numbers are available at www.bridgingthegapresearch.org.

SOURCE: J. F. Chriqui et al., *School District Wellness Policies: Evaluating Progress and Potential for Improving Children's Health Three Years after the Federal Mandate: School Years 2006–07, 2007–08 and 2008–09, Vol. 2* (Chicago: Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, 2010), www.bridgingthegapresearch.org.

TABLE A4.4 Percentage of Students Nationwide in Districts with Wellness Policies Addressing Beverage Content Restrictions by Grade Level* (2008–2009 SY)

Beverage content restrictions	ES % (K–5)	MS % (6–8)	HS % (9–12)
Complete beverage or location ban	14.5	2.5	1.3
Regular soda			
Weak or no policy	39.5	42.5	60.8
Strong policy. Did not meet IOM (bans regular soda, not all SSBs)	32.8	48.3	34.5
Strong policy. Met IOM (beverages w/added caloric sweeteners prohibited)	13.5	8.5	3.5
Any strong policy (total of above two rows)	46.3	56.8	38.0
Other sugar-sweetened beverages (SSBs)**			
Weak or no policy	71.8	89.5	95.0
Strong policy. Did not meet IOM (bans regular soda but not all SSBs)	-	-	-
Strong policy. Met IOM (beverages with added caloric sweeteners prohibited)	13.5	8.3	3.5
Any strong policy (total of above two rows)	13.5	8.3	3.5
Sugar/calorie content of flavored milk			
Weak or no policy	68.8	74.5	79.0
Strong policy. Did not meet IOM	15.0	20.8	17.8
Strong policy. Met IOM (<200 calories/serving)	2.0	2.0	2.0
Any strong policy (total of above two rows)	17.0	22.8	19.8
Fat contents of milk**			
Weak or no policy	75.0	86.3	87.5
Strong policy. Met IOM standards (only low-fat (1%) or non-fat/skim allowed)	10.5	11.5	11.3
Serving size limit for beverages			
Weak or no policy	77.5	88.3	93.8
Strong policy. Did not meet IOM	8.0	9.3	4.8
Strong policy. Met IOM (milk: 8 oz, 100% juice, 4 oz)	0.0	0.0	0.0
Any strong policy (total of above two rows)	8.0	9.3	4.8

* At vending machines, school stores, a la carte meals, and fund-raisers
** For other sugar-sweetened beverages and fat content of milk, the only strong policy category was the IOM standard.

All numbers rounded. Due to rounding, some percentages may not sum to exactly 100. Exact numbers are available at www.bridgingthegapresearch.org.

SOURCE: J. F. Chriqui et al., *School District Wellness Policies: Evaluating Progress and Potential for Improving Children's Health Three Years after the Federal Mandate: School Years 2006–07, 2007–08 and 2008–09, Vol. 2* (Chicago: Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, 2010), www.bridgingthegapresearch.org.

TABLE A4.5 A la Carte Revenue during Target Week by School Type (Percentage of Schools)

Weekly revenue	ES	MS	HS	All schools
None	21.6	10.5	15.4	18.3
$1 - <$100	63.9	24.7	32.0	50.0
$100 - $400	13.8	47.3	24.9	22.3
$400 - <$1,000	0.1	16.2	17.9	7.2
$1,000 or more	0.0	1.3	9.8	2.3
Mean (dollars per week)	45	250	351	146
Number of schools	143	127	125	395

Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the NSLP.
SOURCE: School Nutrition Assessment-III, Daily Meal Count Form, School Year 2004–05.

TABLE A4.6a Revenues Received from School Stores by Enrollment and School Type (Percentage of Schools)

	ES	MS	HS	All schools
Has school stores for students*	—	—	24.8	11.0
Who receives income from school stores?**				
School	—	—	37.0	58.7
Student council, activities/clubs	—	—	21.5	21.2
Business/marketing class or club (includes DECA, Inc., an association of marketing students)	—	—	27.5	11.0
School food service only	—	—	3.3	5.7
Athletic department	—	—	1.8	5.1
School food service with others	—	—	5.5	2.2
Other	—	—	9.7	5.3
Number of schools	**143**	**127**	**125**	**395**

* n=80
** Multiple answers allowed
— Indicates sample sizes are too small for reliable estimates

Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the NSLP.

SOURCES:
1. School Nutrition Dietary Assessment-III, Principal Survey, School Year 2004–05.
2. School Dietary Assessment III, Foodservice Manager Survey and Principal Survey, School Year 2004–05.

TABLE A4.6b Revenues Received from Vending Machines, by Enrollment and School Type (Percentage of Schools)

	ES	MS	HS	All schools
Has vending machines for students*	17.2	81.7	96.7	44.4
Who receives income from vending machines?**				
School	—	51.3	52.0	57.2
School food service	—	24.0	16.0	19.8
Other school district department or fund	—	18.7	15.3	17.8
Athletic department	—	7.6	32.8	17.2
Student council, activities/clubs	—	16.3	28.4	17.2
Other	—	0.0	0.8	0.4
Number of schools reporting (vending)	**29**	**104**	**122**	**255**
Number of schools	**143**	**127**	**125**	**395**

* n=255 as reported by principals
** Multiple answers allowed
— Indicates sample sizes are too small for reliable estimates

Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the NSLP.

SOURCES:
1. School Nutrition Dietary Assessment-III, Principal Survey, School Year 2004–05.
2. School Dietary Assessment III, Foodservice Manager Survey and Principal Survey, School Year 2004–05.

TABLE A4.7 Prevalence of Obesity among U.S. Children and Adolescents Ages 2–19 for Selected Years 1963–1965 through 2007–2008

Age (in years)[1]	NHES 1963–1965, 1966–19702	NHANES 1971–1974	NHANES 1976–1980	NHANES 1988–1994	NHANES 1999–2000	NHANES 2001–2002	NHANES 2003–2004	NHANES 2005–2006	NHANES 2007–2008	NHANES 2009–2010
Total	—	5.0	5.5	10.0	13.9	15.4	17.1	15.5	16.9	16.9
2–5	—	5.0	5.0	7.2	10.3	10.6	13.9	11.0	10.4	12.1
6–11	4.2	4.0	6.5	11.3	15.1	16.3	18.8	15.1	19.6	18.0
12–19	4.6	6.1	5.0	10.5	14.8	16.7	17.4	17.8	18.1	18.4

Obesity is defined as a body mass index (BMI) greater than or equal to gender- and age-specific 95th percentile from the 2000 CDC Growth Charts.

SOURCE: C. Ogden and M. Carroll, *Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963–1965 Through 2007–2008* (Atlanta, GA: Centers for Disease Control and Prevention, 2010), www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.pd.

TABLE A4.8 National and Across-State Trends in Prevalence of Childhood Overweight and Obesity and Disparities among U.S. Children Ages 10–17, 2003 and 2007

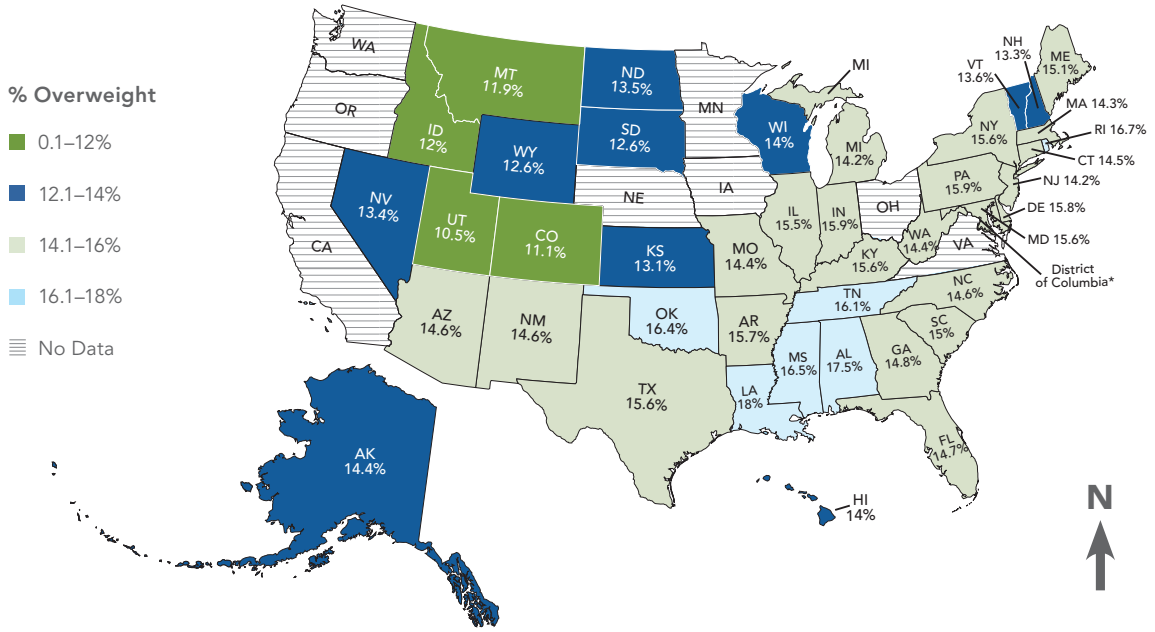
	National prevalence (range in prevalence across states)*		**Prevalence disparity ratio between lower and higher socioeconomic groups (range in ratios across states)***	
Groups	2003	2007	2003	2007
Obesity only, all children	14.8%	16.4%	—	—
Overweight and obesity combined, all children	30.6%	31.6%	—	—
Among subgroups				
Family income below poverty level	39.8%	44.8%**	1.48	1.58
Family income more than 400% of poverty level	22.9%	22.2%	—	—
Non-Hispanic black	41.2%	41.1%	1.55	1.53
Non-Hispanic white	26.6%	26.8%	—	—
Hispanic	37.7%	41.0%	1.28	1.39
Non-Hispanic	29.5%	29.6%	—	—

* A ratio of 1.00 indicates equal prevalence between two groups; above 1.00 indicates higher prevalence for the lower socioeconomic group. Data include only states with at least twenty-five cases of overweight/obesity data whose rate had a relative standard error of less than 30 percent. Each state's specific rate and rank for 2003 and 2007 are available on request from the authors.

** 2003 versus 2007 rates are significantly different (P<0.05).

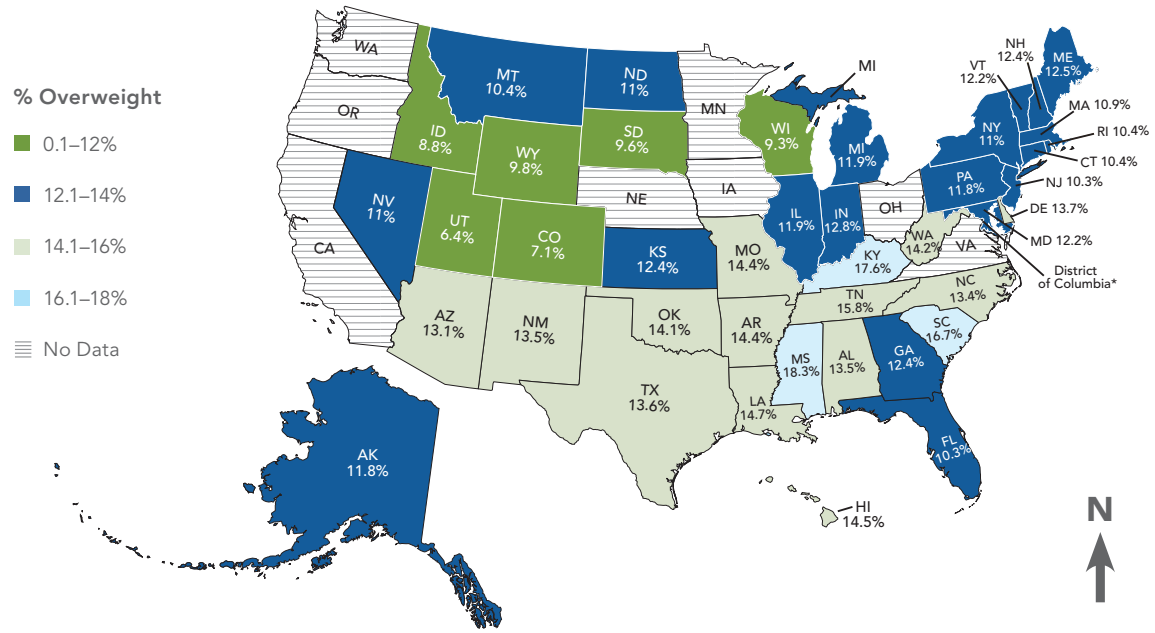
SOURCE: C. Bethell et al., "National, State, And Local Disparities In Childhood Obesity," *Health Affairs* 29, no. 3 (2010): 347–56.

FIGURE A4.1 Percentage of High School Students Considered Overweight in 2009



SOURCE: MMWR Youth Risk Behavior Surveillance, United States 2009. Table 91. Percentage of high school students who were obese and who were overweight by gender at selected U.S sites.

FIGURE A4.2 Percentage of High School Students Considered Obese in 2009



SOURCE: MMWR Youth Risk Behavior Surveillance, United States 2009. Table 91. Percentage of high school students who were obese and who were overweight by gender at selected U.S sites.

TABLE A4.9 Estimated Number of Cases of Diabetes Mellitus among Youth in the United States in 2001 According to Age and Race/Ethnicity

	SEARCH prevalence, cases per 1,000 youth	U.S. population	Estimated number of cases
Age 0–9 years			
NHW	1.06	23,810,026	25,156
Black	0.61	6,184,407	3779
Hispanic	0.45	7,542,892	3363
API	0.29	1,632,604	467
AI	0.24	401,750	95
All groups	0.83	39,571,679	32,860
Age 10–19 years			
NHW	3.19	26,227,882	83,644
Black	3.23	6,281,586	20,261
Hispanic	2.18	6,543,747	14,275
API	1.36	1,671,206	2268
AI	2.32	457,331	1061
All groups	2.95	41,181,752	121,509
Totals	1.91	80,753,431	154,369

SOURCE: SEARCH for Diabetes in Youth Study Group, "The Burden of Diabetes Mellitus Among US Youth: Prevalence Estimates From the SEARCH for Diabetes in Youth Study," *Pediatrics* 118, no. 4 (2006): 1510–18, pediatrics.aappublications.org/content/118/4/1510.abstract.

TABLE A4.10 Age-Adjusted and Age-Specific Prevalence of High Blood Pressure among Children Ages 8–17 by Gender and Race/Ethnicity Over Time

	1963–1970*	1971–1975**	1976–1980**	1982–1984***	1988–1994**	1999–2002**
All	37.2%	16.9%	11.1%	4.7%	2.7%	3.7%
Non-Hispanic black	34.7%	17.8%	10.5%	—	3.7%	4.2%
Non-Hispanic white	37.5%	16.7%	11.2%	—	2.5%	3.3%
Mexican-Americans	—	—	—	4.8%	2.5%	4.6%
Male						
Non-Hispanic black	32.7%	12.7%	9.3%	—	4.1%	5.5%
Non-Hispanic white	35.4%	15.8%	10.4%	—	3.6%	3.5%
Mexican-Americans	—	—	—	6.1%	3.1%	5.3%
Female						
Non-Hispanic black	36.7%	22.9%	11.7%	—	3.2%	3.0%
Non-Hispanic white	39.7%	17.7%	12.0%	—	1.3%	3.2%
Mexican-Americans	—	—	—	3.5%	1.9%	3.9%

* Data obtained from the CDC, National Health Examination Survey II and III
** Data obtained from the CDC, National Health and Nutrition Examination Survey
*** Data obtained from the CDC, Hispanic Health and Nutrition Examination Survey

SOURCE: Adapted from R. Din-Dzietham et al., "High Blood Pressure Trends in Children and Adolescents in National Surveys, 1963 to 2002," *Circulation* 116, no. 13 (2007): 1488–96.

TABLE A4.11 Estimated Prevalence for Lipid Abnormalities among Youth Ages 12–19

	High LDL-C*	Low HDL-C*	High triglycerides*	≥ Lipid abnormality**
Total % of children	7.63%	7.6%	10.2%	20.3%
Gender				
Boys	8.4%	11.0%	11.4%	24.3%
Girls	6.8%	4.0%	8.8%	15.9%
Age				
12–13	7.3%	4.7%	9.5%	18.2%
14–15	6.9%	8.7%	8.1%	18.4%
16–17	5.2%	7.2%	7.0%	16.5%
18–19	11.4%	10.4%	16.4%	28.8%
Race				
Non-Hispanic white	7.7%	8.5%	12.1%	22.4%
Non-Hispanic black	8.9%	4.7%	3.7%	14.6%
Hispanic	5.4%	7.9%	9.3%	18.6%
BMI				
Normal weight	5.8%	4.3%	5.9%	14.2%
Overweight	8.4%	8.3%	13.8%	22.3%
Obese	14.2%	20.5%	24.1%	42.9%

n=3,125

* Low-density lipoprotein (high=LDL-C ≥ 130 mg/dL); high-density lipoprotein (low=HDL-C ≥ 35 mg/dL); high triglycerides (≥ 150 mg/dL) levels.

** Defined as having high LDL-C, low HDL-C, and/or high triglyceride levels.

SOURCES:

1. National Health and Nutrition Examination Survey 1999–2006.
2. Adapted from Centers for Disease Control and Prevention, "Prevalence of Abnormal Lipid Levels Among Youths—United States, 1999–2006," *Morbidity and Mortality Weekly Report* 59, no. 2 (2010): 29–33, www.cdc.gov/mmwr/preview/mmwrhtml/mm5902a1.htm.

Appendix 5: Meeting HIA Practice Standards

This appendix reviews how the research team used and met guidelines from the North American HIA Practice Standards Version 2 to develop each stage of the HIA.[1] The partners are interested in furthering HIA practice while creating an assessment of the federal rulemaking process on snack foods and beverages sold in schools. This report and its appendices were designed with this and expediency in mind. The team created a checklist for HIA practice standards and referred to them in anticipation of each stage of the HIA.

Stakeholder Engagement

The advisory committee, composed of experts on school food policy and research, helped the research team understand who may be affected by national standards and restrictions for snack foods and beverages sold in schools. More specifically, the advisory committee provided counsel regarding health determinants, health outcomes, vulnerable populations, priority research questions, potential health disparities and inequities, potential data sources, and potential methods. The team held five meetings coinciding with the scoping, assessment, recommendations, and reporting phases of the HIA. All committee members reviewed at least one section of the draft report and two members read the entire document.

TABLE A5.1 Stakeholder Involvement in Four Stages of the HIA

	Advisory committee	HIA process interviews	Key informant interviews	Peer reviewers
Scoping	x	x		x
Assessment	x		x	
Recommendations	x	x	x	x
Reporting	x			x

Screening

In the screening stage, a potential HIA is evaluated to determine whether the policy has significant health impacts that would be otherwise unconsidered by decision makers, whether the analysis is feasible and timely, and whether the decision-making process would be receptive to the HIA findings and recommendations. There are many applications for HIA, and government officials at all levels are increasingly using it to inform their decisions. However, an HIA is not always the right policy planning tool. If health is already a focus of a proposed policy or project, or if the potential health effects are too hypothetical, an HIA may not offer decision makers new information. That is why the screening stage of an HIA is critical.

An effective approach to screening can determine whether an HIA will add value and is the right tool for the decision at hand. At the end of the screening phase, the partners concluded that an HIA on the federal rulemaking process for all foods sold outside of the school meal programs could help synthesize relevant information, communicate comparative outcomes of rule scenarios, increase transparency in the policy decision-making process, and inform discussions about compromises related to elements of snack foods and beverages sold in schools. The following are the results from the screening stage of the HIA.

Potential Overlooked Health Impacts

The partners determined that the amount of information available on the impacts of nutrition standards on school district and school food services revenue is relatively thin and would be bolstered with an analysis of the impact of different state policies in the past five or 10 years. Nutrient standards for snack foods and beverages sold in schools have clear connections to dietary intake; however, the research team thought more abstract outcomes such as links to school services provisions, student learning outcomes, and chronic illness would be useful to examine. Additionally, it was concerned that there was a potential for unequally distributed impacts.

Feasibility and Timeliness

The partners determined that there was adequate scientific evidence and sufficient resources available to conduct an HIA on standards for snack food and beverages sold in schools. The research team thought it would be timely because the release of the report could be part of scientific evidence USDA would consider in developing proposed standards.

Receptiveness of Decision-Making Process

USDA's decision-making process on the proposed standards was closed during this HIA; thus staff from USDA could not be involved to serve as advisory members or guide the report. However, Section 208 requires the department to examine relevant scientific information, including the results of this HIA. The research team notified USDA of its decision to conduct an HIA. The team also informed the general public through newsletter postings in prominent venues during the assessment stage, and notified other stakeholders by inviting them to participate.

Stakeholder Involvement and Participants

During the screening phase, the partners conducted a stakeholder analysis to develop a list of populations, stakeholders, and organizations that might be affected by, have expertise about, or have an interest in the federal rulemaking process on competitive foods standards.[2-5] Stakeholder analysis is an analytical method used by facilitators, urban planners, and project managers to understand conflict and potential shared interests among collaborating stakeholders.[6-8] From this initial list, the partners invited individuals to participate as advisory committee members or stakeholder interviews. In addition to adhering to the practice standards, the research team had central objectives for engaging stakeholders related to the HIA goals.

TABLE A5.2a HIA Goals and Stakeholder Engagement Objectives

HIA goals	Engagement objectives
Synthesize the health effects of nutritional and school district financial changes that will result from USDA setting a national standard for foods sold outside of the school meal programs.	Interviews and advisory committees improve the comprehensiveness and accurateness of the research scope and health determinant pathways.
Evaluate and communicate comparative outcomes of different scenarios for the forthcoming USDA rule (e.g., strong, moderate, or weak nutrition standards).	Interviews improve the quality of the revenue analysis by including qualitative, contextual information for understanding how the revenue shapes school services and what the literature indicates (e.g., how the team interprets its findings).
Identify potential health disparities and inequities resulting from national standards for snack foods and beverages sold in schools.	Process interviews about research scope and recommendations that will help target vulnerable populations. Key informant interviews with school groups and students will provide context for interpreting findings related to stigma and other outcomes.
Inform national and state discussions about compromises related to policy elements.	Advisory committee participants and other HIA advisors will contribute to the dissemination strategy.
Make recommendations to increase positive health outcomes and minimize potential health risks.	Interviews and advisory committees improve the relevance of findings to the decision-making process, for policy content, and for policy implementation.

The research team engaged stakeholders to guide the research scope, help interpret research findings, gather qualitative information lacking from existing literature and data in the assessment phase, and develop policy recommendations. Stakeholders were involved through three strategies: (1) an advisory committee, (2) HIA process interviews, and (3) key informant interviews. As USDA's policy is national in geographic reach, the team aimed to include voices from urban, rural, suburban, and frontier districts across the three levels of engagement.

TABLE A5.2b Stakeholder Involvement by HIA Stage

	Advisory committee and other advisors	HIA process interviews or key informant interviews	Other
Screening	None	None	
Scoping	Prioritizing research questions Identifying and prioritizing impacted populations Identifying methods and data sources	Prioritizing research questions Identifying and prioritizing impacted populations Identifying methods and data sources Key informant assessment questions if at a school district	One peer reviewer
Assessment	Interpretation of preliminary findings	Impacts on: • Student school diet quality • Meal participation • School nutrition services' revenue • Sales of snack foods and beverages • School programming that uses revenue from the sale of snack foods and beverages	
Recommendations	Developing recommendations	Developing recommendations	
Reporting	Provide editing feedback Suggest recipients for dissemination		Two peer reviewers
Monitoring and evaluation	Suggest elements and methods for evaluating the HIA and monitoring its impacts		

Scope Development

Participant Roles

Upstream was responsible for conducting the HIA stages from scoping through completing a final draft report. The Pew Charitable Trusts' Kids' Safe and Healthful Foods Project and the Health Impact Project finalized and disseminated the final report and are responsible for evaluation and monitoring.

Decision Alternatives

The primary decision assessed by this report is the plausible set of regulations that will be developed by the USDA Secretary based on Section 208 of the Healthy, Hunger-Free Kids Act. As USDA has not previously set standards for all foods sold in schools throughout the school day, and Section 208 requires USDA to consider multiple sources of information in the development of standards, there are multiple potential alternatives. The development of two policy scenarios was based on the research team's interpretation of Section 208 with guidance from the advisory committee.

Potential Significant Health Determinants, Health Impacts, and Impacted Populations

Children's diet and nutrition-related health outcomes are the focus of this HIA. Children's dietary intake, in addition to physical activity, affects weight status and other chronic disease risk factors. Changes in revenue from selling snack foods and beverages can affect the school services provided by school district food service departments, education administration, student groups, and enrichment programs. Because revenue changes occur upstream and can affect children's eating behaviors or other health outcomes through the provision of school services, they are included in this report.

Children are the vulnerable population most impacted by standards for snack foods and beverages sold in schools. Within this population, sub-groups may be disproportionately affected through different levels of exposure. For example, the research team heard anecdotally from stakeholder interviews that higher-income students have more healthy and unhealthy food options available to purchase than low-income students and thus might experience a larger relative shift in product changes after implementation of standards. This is important, as low-income children are more likely to experience household food insecurity. The team also heard anecdotally from stakeholders that low-income students who are eligible for free or reduced meals might be disproportionately affected by standards because there would be fewer unhealthy non-meal options available. The team looked at existing disparities among geographic regions and among children's demographic characteristics as much as the data would allow. Where possible, it looked at regional disparities among states, and age, income, and ethnic or racial disparities among children populations.

Boundaries of Analysis

The current condition information encompasses children populations in all 50 states and the District of Columbia. Assessment of impacts was limited to existing data sets and populations studied in research literature that encompassed specific schools, school districts, communities, states, and nationally

representative samples. Empirical analysis of state policies' impact on school district revenue was limited by the data sets. Changes from the policy analysis could be evaluated in only 39 states and the District of Columbia based on limits to the policy classification system and available revenue information.

Data Gaps

The research team used existing data, literature, and stakeholder interviews to inform this report. State revenue data are from the Common Core of Data and the Food Research and Action Center. State food and nutrition environment policy scoring data are from the National Cancer Institute. Health outcome data are from the Centers for Disease Control and Prevention or other national sources and are cited where used in the report.[9-13] See the methods section in Chapter 2 for a description of the databases used to find current literature.

Gaps in data can be traced to the following:

- Qualitative interviews were not representative of all groups potentially impacted by the national policy. The timeline did not permit a representative sampling.
- The state-by-state policy analysis does not allow the understanding of specific impacts at the district or school level.
- Recent qualitative and quantitative data on school administrator, student group, activity clubs, or other organizations' use of revenue from snack food and beverage sales are lacking.
- Multiple outcomes the research team wanted to study have not been researched extensively, including children's stigma associated with federal meal programs and the relationship between snack foods and beverages and risk factors for specific chronic diseases (e.g., cancer, type 2 diabetes).
- Data on ethnic or racial disparities.

Stakeholder Review of Scope and Health Determinant Pathways

The research team developed a draft scope considering all potential pathways that linked the policy decision with direct, indirect, or cumulative health outcomes. The advisory committee helped revise and prioritize specific health outcomes and research questions. The team focused on outcomes with the greatest potential significance and those that would add the most to the existing national discussion. It also gathered input and revisions on scope through stakeholder interviews and a discussion with one HIA expert peer reviewer. It used guidance from the HIA Practice Standards and aligned various forms of stakeholder input with this HIA's goals. For a list of how stakeholder engagement aligned with these goals, see Table A5.2a.

Assessment

Baseline Conditions

The research team documented existing conditions based on the final health outcomes it could evaluate in relation to the policy. It evaluated and synthesized the best available evidence.

Impact Characterization

The team used notes from a recent HIA of the America's Methods Committee meeting prepared by Habitat Health Impact Consulting to develop a menu of impact characterization options. Team members reviewed characterization element definitions from six sources in a team meeting and created a revised version based on the scope of the policy.[14-17]

Recommendations

The research team developed recommendations based on findings from the assessment with input from the advisory committee and stakeholder interviews. The policy recommendations indicate where this report led to inconclusive results, the potential negative consequences, and the potential positive outcomes.

Reporting and Dissemination

This publicly available report includes a discussion of each stage of the HIA, current baseline conditions, identification of health impacts, relevant findings, and recommendations to manage potential impacts.

Peer Review Process

The Robert Wood Johnson Foundation requires all reports to involve an external review process. The research team developed a list of content and HIA process experts and invited two individuals to review the report. Advisory committee members also had the opportunity to review report drafts and provide feedback. The team asked one HIA expert and one school foods policy content expert to review the HIA report. The HIA expert reviewed the research scope and the final report. The content expert gave feedback on the final report.

Dissemination Plan

In the scoping phase, the research team developed a draft set of outlets and methods for distribution that it shared with the advisory committee for input. The report will be publicly available and will use a variety of dissemination methods, including public presentations, an executive summary, a policy brief, a press release, and newsletter postings.

Evaluation and Monitoring

Upstream suggests that the Kids' Safe and Healthful Foods Project team monitor the impact of the HIA on the policy decision-making process based on the following measures:

- Track media references to USDA's snack food and beverage regulatory process, the rule, and the HIA (e.g., the number and types of media, including websites, news articles, magazine articles, and the legislative process).
- Track academic and government studies that cite the HIA.
- Determine the extent to which HIA recommendations were used in the policy (e.g., in revised versions after public comment).
- Track other policies or projects that incorporate recommendations or other elements from the HIA.

Upstream recommends that The Pew Charitable Trusts and Robert Wood Johnson Foundation work with a university intern or hire an external evaluator to complete an evaluation of the HIA process, following these steps:

- First, review the final HIA report against the HIA practice standards. Have the evaluator fill out a form reviewing the report and the project manager from Upstream (or from the Kids' Safe and Healthful Foods Project) fill out a duplicate form repeating the same steps. The evaluator will then align the two sets of responses and conduct an interview with the project manager to understand what was not completed, or changed, from practice standards. The evaluator will then provide feedback about improvements for the next HIA.
- Second, conduct six to 12 confidential stakeholder interviews that include advisory committee members, USDA staff, a reporter, and an external HIA expert. The summary document of the interviews will not attribute responses to individuals in such a way that they can be identified.

References for Appendix 5

[1] R. Bhatia et al., *Minimum Elements and Practice Standards for Health Impact Assessment* (Oakland, CA: North American HIA Practice Standards Working Group, 2010).
[2] M. C. Campbell, "Building a Common Table: The Role for Planning in Community Food Systems," *Journal of Planning Education and Research* 23 (2004): 341–54.
[3] P. Harris et al., *Health Impact Assessment: A Practical Guide* (Sydney, Australia: Centre for Health Equity Training, Research and Evaluation [CHETRE], Part of the UNSW Research Centre for Primary Health Care and Equity, UNSW, 2007).
[4] L. Susskind and J. Thomas-Larmer, "Conducting a conflict assessment," in *Consensus Building Handbook: A Comprehensive Guide to Reaching Agreement* (Thousand Oaks, CA: Sage Publications, 1999), 99–136.
[5] S. L. Carpenter and W. J. D. Kennedy, *Managing Public Disputes: A Practical Guide to Handling Conflict and Reaching Agreements* (San Francisco, CA: Jossey-Bass, 1988).
[6] Campbell, "Building a Common Table," 341–54.
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[9] National Center for Educational Statistics, "Appendix B: Common Core of Data Glossary," 2009, nces.ed.gov/pubs2011/2011015.pdf.
[10] Classification of Laws Associated with School Students, "CLASS Data."
[11] Centers for Disease Control and Prevention, "Youth Risk Behavior Surveillance—United States 2009," *Morbidity and Mortality Weekly Report* 59, no. SS 5 (2010): 1–142.
[12] Centers for Disease Control and Prevention, "Youth Risk Behavior Surveillance," 1–142. (2009).
[13] Centers for Disease Control and Prevention, "Untreated Dental Caries (Cavities) in Children Ages 2-19, United States," last modified February 9, 2011, www.cdc.gov/Features/dsUntreatedCavitiesKids/.
[14] Bhatia et al., *Minimum Elements and Practice Standards*.
[15] *Technical Guidance for Health Impact Assessment (HIA) in Alaska, State of Alaska HIA Program* (Alaska: Department of Health and Social Services, 2011).
[16] T. Henderson et al., *Health Impact Assessment: Oregon Farm to School and School Garden Policy, HB 2800* (Portland, OR: Upstream Public Health, 2011).
[17] R. Bhatia et al., *A Health Impact Assessment Toolkit: A Handbook to Conducting HIA* (Oakland, CA: Human Impact Partners, 2010).

Appendix 6: Review of Existing State Policies' Guidelines on Snack and a la Carte Foods and Beverages Sold in Schools

This review is based on information provided by the National Association of State Boards of Education website, state websites, the CLASS policy analysis discussed in Chapter 2, and the Centers for Disease Control and Prevention's scan of existing state policies.[1-3] This was an informal policy scan; a legal consultant was not used to review administrative code language. Hence, these are rough estimates of where a state ranks in relation to the 2005 DGA (from CLASS) or the IOM standards.

TABLE A6.1 Summary of Range of Snack Food Policies

Snack dietary standards (non-a la carte)		Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Fruits and vegetables	Fiber and whole grains
Range of state policies (among states with each provision)	**Strong**	Strong policy across all grades (many states)	Restrictions on deep fat frying (AZ, KY, TX)	ES—150, MS—180, HS—200 (OR) 150 for snacks (LA) 1 oz for some items (many states)	32% by weight (KY) 8 g (HI)	7 g (MS) 30% of calories (KY, NV, RI, SC)	2 g saturated fat (HI, MD, MS, NJ, NM)	200 mg for snacks (HI, WV) 450 mg for certain entrées (KY) 480 for all entrées (CT, MA)	Fruits and vegetables offered at all points of service (AR, TX)	2 g fiber for snacks (HI) All grain-based products must be whole grain (MA)
	Average	Stronger policies in ES	No competitive foods around meal times No FMNV	200 for snacks	35% by weight	35% of calories	10% of calories from saturated fat No trans fat	No typical policy	No typical policy	No typical policy
	Weaker	Guidelines apply only to ES (GA, NC, SC)	No additional policies	250 for snacks (CA) 400 (IA) 450 for a la carte (OR)	40% by weight (WV) 30 g (LA)	23 g, except 28 g once per week (TX)	10% of calories from saturated fat (many states)	800 mg for entrées and 600 mg for snacks (AZ)		

TABLE A6.2 Summary of Range of Beverage Policies

Beverage dietary standards (non-a la carte)	Allowed	Differences by grade	Soda summary	Milk details
Strong state policy	Water, milk (8 oz), 100% fruit or vegetable juice (8 oz); no artificial sweeteners (MA)	Strong policy across all grades (many states)	None allowed (many states)	1% milk 8 oz: 22 g sugar Dairy alternatives allowed (MA)
Average or typical (among states with a policy)	Water, milk, 100% fruit or vegetable juice, some other beverage (50% juice, sports drink, or low-calorie beverages)	Stronger policy in ES and MS	None allowed	1% milk Limit on sugar of 22–32 g per 8 oz Dairy alternatives allowed

TABLE A6.3 List of Competitive Foods Policies by State

State Rank re: IOM or 2005 DGA Year enacted or revised	Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Foods to encourage: fruits and vegetables, fiber, and whole grains	Snack dietary standards (non-a la carte)
Alabama Close to IOM 2007		No CF during meals FMNV cannot be sold	Some items limited to 1 or 1.5 oz	30 g carbohydrate for snacks	10% daily value for snacks		360 mg for snacks		5% daily Value of vitamin A, vitamin C, iron, calcium, or fiber
Alaska No state policy									
Arizona 2007	HS: guidelines do not apply	Final preparation method cannot be deep-fat fried No deep-fat fried chips or crackers	400 calories for entrées and fruit smoothies 300 calories for others Various portion limits	35% by weight, with exceptions	35% of calories, with exceptions	10% of calories from saturated + trans fat, with exceptions	800 mg for entrées 600 mg for snacks	Must contain at least 1 g of fiber, with exceptions	
Arkansas Close to IOM 2007	ES: no vending machines; only items that are part of school meal can be sold in the cafeteria; no extra servings of desserts or french fries	French fries are limited by portion size and frequency No CF until 30 minutes after lunch			23 g in a la carte item			Fruits and vegetables offered at all points of service Choice of two fruits (including juice) must be offered with CF sales	
California Close to 2005 DGA 2007	ES: only items part of school meal can be sold during meals; allows dairy and whole grain items up to 175 calories in vending machines	A la carte—400 calories and 4 g fat per 100 calories	200 calories for snacks	35% by weight, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions No trans fats			
Colorado 1998	HS: restriction may be waived for mechanically vended beverages	No CF 30 minutes before and after meals							
Connecticut Close to IOM 2006		No CF 30 minutes before and after meals	200 calories for snacks	35% by weight or 15 g, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions No trans fats	480 mg	Fresh or dried fruits should be available when food is for sale	
Delaware 2004		No FMNV							
District of Columbia 2011		Must meet HUSSC Gold requirements	200 calories or part of school meal	35% by weight, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions No trans fats	480 mg for side dish 600 mg for entrée		
Florida 2006	ES and MS: no FMNV	FMNV can be sold one hour after lunch							

TABLE A6.3 List of Competitive Foods Policies by State

State Rank re: IOM or 2005 DGA Year enacted or revised	Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Foods to encourage: fruits and vegetables, fiber, and whole grains	Snack dietary standards (non-a la carte)
Georgia 2002	ES: no FMNV from beginning of school day until end of last lunch period								
Hawaii Close to IOM 2008	ES: no CF	No FMNV or foods listing sugar as first ingredient	200 calories for snacks	8 g for snacks, except yogurt	8 g fat for snacks	2 g saturated fat for snack	200 mg for snacks	2 g fiber for snacks	
Idaho No state policy									
Illinois 2006	HS: no restrictions ES: no confections, candy and potato chips during meal periods	Restrictions do not apply to the lunch room during meals	200 calories, with exceptions	35% by weight, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions			
Indiana 2006	ES: no vending machines							At least 50% of food items must be better choice foods	
Iowa Close to IOM 2009			400 calories for entrée 200 calories for other part of school meal	35% of calories, except fruit and yogurt	35% of calories, with exceptions	10% calories from saturated fat, except cheese No trans fat	Part of school meal or 600 mg for entrée (decrease to 480 mg in 2014) 400 mg for sides (decrease to 200 mg in 2014)	50% of grains must be whole grain	
Kansas 2010		No FMNV	200 calories with exceptions	35% by weight, with exceptions	35% of calories, with exceptions				
Kentucky Close to 2005 DGA 2005		No CF until 30 minutes after lunch, except a la carte Parts of school meal can be sold a la carte No deep-fried foods	1 oz portion for cookies Other snacks have limits of 2 oz or higher	32% by weight or 14 g	30% of calories, with exceptions	10% of calories from saturated fat	450 mg for certain entrées 600 mg for other entrées 300 mg for snacks		
Louisiana 2009		No FMNV or fresh pastries Mealtime restrictions	150 calories for snacks	30 g of sugar, with exceptions	35% of calories, with exceptions				

TABLE A6.3 State List of Competitive Foods Policies

State Rank re: IOM or 2005 DGA Year enacted or revised	Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Foods to encourage: fruits and vegetables, fiber, and whole grains	Snack dietary standards (non-a la carte)
Maine 2006		No FMNV CF must contribute both to the nutritional needs of children and the development of desirable food habits							
Maryland 2005	HS: fat and sugar limits do not apply	No FMNV until end of lunch		15 g sugar, with exceptions	9 g, with exceptions	2 g saturated fat			
Massachusetts Close to IOM 2010		No artificial sweeteners	200 calories, except a la carte entrées	35% of calories, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions No trans fat	480 mg for entrées 200 mg for others	All grain-based products must be whole grain	
Michigan Close to IOM 2010		State guidelines are voluntary	200 calories, with exceptions	35% by weight, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions No trans fat	230 mg, with exceptions		
Minnesota No state policy									
Mississippi Close to IOM 2008	ES: no CF	CF restrictions around meal times Only food items that are part of the school meal can be sold a la carte, and only if student has purchased meal	200 calories	35% by weight or 15 g, with exceptions	35% of calories or 7 g, with exceptions	10% of calories or 2 g from saturated + trans fat, with exceptions		Include vegetables and fruits (fresh or dried) when snack items are sold	
Missouri No state policy									
Montana No state policy									
Nebraska No state policy									

TABLE A6.3 State List of Competitive Foods Policies

State Rank re: IOM or 2005 DGA Year enacted or revised	Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Foods to encourage: fruits and vegetables, fiber, and whole grains	Snack dietary standards (non-a la carte)
Nevada Close to 2005 DGA 2005	ES: no food in vending machines	No FMNV	Various size limits on snack foods	35% by weight, with exceptions	30% of calories, with exceptions	10% of calories from saturated fat	600 mg		
New Hampshire No state policy									
New Jersey 2007		No FMNV, candy, or foods with sugar as first ingredient			8 g, with exceptions	2 g of saturated fat			
New Mexico Close to 2005 DGA 2006	ES: no CF in vending machines		200 calories, with exceptions	15 g, with exceptions	8 g, with exceptions	2 g saturated + trans fat, with exceptions			
New York 2006		No sweetened soda water, chewing gum, candies, water ices (except for those that contain fruit or fruit juices) until after lunch							
North Carolina 2005	ES: no snack vending; other nutrition guidelines for a la carte								
North Dakota No state policy									
Ohio No state CF policy									
Oklahoma 2007	ES and MS: no FMNV except for special occasions								
Oregon Close to 2005 DGA 2007	See calories		A la carte entrée: 450 calories Snacks: ES—150, MS—180, HS—200	35% by weight, with exceptions	35% of calories, with exceptions A la carte entrée: 4 g fat per 100 calories	10% of calories from saturated fat, with exceptions No trans fat			

TABLE A6.3 State List of Competitive Foods Policies

State Rank re: IOM or 2005 DGA Year enacted or revised	Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Foods to encourage: fruits and vegetables, fiber, and whole grains	Snack dietary standards (non-a la carte)
Pennsylvania 2007	ES: vending limited to fruits, vegetables, yogurt, low-fat yogurt, and reduced-fat cheese	Guidelines are voluntary, but schools that follow guidelines receive a supplemental state reimbursement No FMNV No fried foods	250 calories	35% by weight, with exceptions Sugar cannot be the first ingredient	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions Minimal trans fat		Fruits or vegetables will be available in at least one food vending area In school stores: at least 50% of grains must be whole grains	
Rhode Island Close to 2005 DGA 2008		Various restrictions on different foods		7 g per oz for grain products	30% of calories for grain products	10% of calories from saturated fat for grain products			
South Carolina 2006	CF guidelines only apply to ES			35% by weight, with exceptions	30% of calories, with exceptions	10% of calories from saturated fat 1% of calories from trans fat			
South Dakota No state policy									
Tennessee Close to 2005 DGA 2008	HS: no restrictions	Anything part of school meal can be sold a la carte	1 oz portion for cookies other snacks have limits of 2 oz or higher	35% by weight	35% of calories, with exceptions	10% of calories from saturated fat	480 mg for certain entrées 600 mg for other entrées 230 mg for snacks		
Texas Close to 2005 DGA 2007	ES: no CF	No onsite deep-fat frying Restrictions on fried potatoes No FMNV	Portion sizes for certain snacks		23 g, except 28 g once per week	Schools must include a request for trans fat information in all product specifications		Fruits or vegetables must be offered daily at all points of service	
Utah 2008		Guidelines are voluntary No FMNV	300 calories	35% by weight, with exceptions	35% fat, with exceptions	10% of calories from saturated fat, with exceptions No trans fat	200 mg, with exceptions		
Vermont 2008		Guidelines are voluntary	Various calorie limits	35% by weight, with exceptions or 30 g per 8 oz	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions	230 mg, with exceptions		

TABLE A6.3 State List of Competitive Foods Policies

State Rank re: IOM or 2005 DGA Year enacted or revised	Differences by grade level	Other provisions	Calories	Sugar	Total fat	Saturated and trans fats	Sodium	Foods to encourage: fruits and vegetables, fiber, and whole grains	Snack dietary standards (non-a la carte)
Virginia* 2010		Only school nutrition services can sell food during meals and only parts of school meal can be sold.							
Washington Close to 2005 DGA 2007				35% by weight or 15 g, with exceptions	35% of calories, with exceptions	10% of calories from saturated fat, with exceptions			
West Virginia Close to IOM 2008	ES: no food can be sold until 20 minutes after students have been served lunch	Only meal items during breakfast Only milk, milkshakes, and water during lunch No candy	200 calories	35% of calories, except fruit	35% of calories, with exceptions	10% of calories from saturated fat No trans fat	200 mg		
Wisconsin No state policy									
Wyoming No state policy									

CF = Competitive foods
FMNV = Foods of minimal nutritional value

* New guidelines (currently under review) must be either IOM or Alliance for a Healthier Generation Standards.

TABLE A6.4 List of Beverage Guidelines by State

State Rank re: IOM or 2005 DGA Year enacted or revised	Allowed	Differences by grade	Soda summary	Milk details
Alabama Close to IOM 2007	Water, milk, 100% fruit or vegetable juice (12 oz, 15 calories per oz), sports drinks, light juices, and teas (12 oz and 99 calories)	ES: water, milk, 100% juice (8 oz) MS: water, milk, juice (10 oz)	HS: diet soda (2002)	Low-fat Dairy alternatives allowed—no artificial sweeteners ES: 8 oz, 150 calories MS: 10 oz, 187 calories HS: 12 oz, 270 calories
Alaska No state policy				
Arizona 2007	Water, milk, 50% fruit or vegetable juice (12 oz), 50% fruit smoothie, sports and electrolyte-replacement drinks (12 oz)	ES: juice must be 100% fruit or vegetable (8 oz); smoothies must use 100% fruit; no sports drinks or electrolyte-replacement drinks	None	2% 12 oz dairy alternative allowed No more than 4 g of sugar per oz in flavored milk
Arkansas Close to IOM 2007	At least 50% of beverages shall be water, low-fat milk, or 100% juice 12 oz, except unflavored water		12 oz	12 oz Must offer 1% milk No more than 30 g sugar per 8 oz
California Close to 2005 DGA 2007	Water, milk, 50% fruit or vegetable juice with no added sweeteners, electrolyte drinks (42 g sugar per 20 oz)	ES: no electrolyte drinks	None	Low-fat Dairy alternatives allowed
Colorado 2008	Water, milk, 100% fruit or vegetable juice (12 oz, 120 calories per 8 oz), low calorie beverages (10 calories per 8 oz), other drinks (12 oz, 66 calories per 8 oz)	ES: water, milk (8 oz), 100% juice (8 oz) MS: water, milk (10 oz), 100% juice (10 oz)	HS: diet soda	Low-fat 12 oz Dairy alternative allowed Flavored milk: 150 calories per 8 oz
Connecticut Close to IOM 2011	Water, milk, 100% fruit or vegetable juice Beverages that are water and fruit or vegetable juice with no added sweeteners 12 oz, except water No artificial sweeteners		None	4 g sugar per oz and no artificial sweeteners Dairy alternatives allowed if 35% calories from fat and 10% from saturated fat
Delaware No state beverage policy				
District of Columbia 2011	Water, milk, 100% fruit or vegetable juice (8 oz)	ES and MS: juice limited to 6 oz	None	Low-fat 8 oz dairy alternatives allowed
Florida 2006	HS: FMNV may be sold one hour after lunch		HS: one hour after lunch	
Georgia 2002		ES: no FMNV from beginning of school day until end of last lunch period		
Hawaii Close to IOM 2008	Water (no flavoring or carbonation), milk, 50% fruit or vegetable juice 12 oz, except water and 1% milk		None	2% or more fat limited to 8 oz servings 22 g sugar per 8 oz Dairy alternatives allowed

TABLE A6.4 List of Beverage Guidelines by State

State Rank re: IOM or 2005 DGA Year enacted or revised	Allowed	Differences by grade	Soda summary	Milk details
Idaho No state policy				
Illinois 2006	Water (non-flavored, non-carbonated), milk, 50% fruit or vegetable juice, fruit smoothie (400 calories) with no added sugars and made from fruit or fruit drinks that contain at least 50% fruit juice, any beverage exempted from USDA's list of FMNV	HS: no restrictions	HS only	Dairy alternatives allowed
Iowa Close to 2005 DGA 2009	Water, milk, 100% fruit or vegetable juice, sports drinks	ES: no sports drinks or flavored water	None	Low-fat 27 g sugar per 8 oz in 2014 Lower in 2017 and 2020
Indiana 2006	At least 50% of beverages must be better choice beverages	ES: no vending machines		
Kansas 2010	Water, milk, 100% fruit or vegetable juice	Electrolyte replacement beverages (48 g of sweetener per 20 oz) in drink machines located near HS athletic training centers	None	1% Dairy alternatives allowed
Kentucky 2005	Water (non-carbonated), milk, 100% fruit or vegetable juice Other beverages (10 g sugar)	ES: 17 oz MS and HS: 20 oz	Diet soda	1%
Louisiana 2009	Water, milk, 100% fruit or vegetable juice (16 oz)	HS: beginning 10 minutes before lunch ends—water, 100% fruit or vegetable juice (12 oz, 120 calories per 8 oz), other beverages (10 calories per 8 oz)	HS: diet soda	Low-fat
Maine 2006	Beverages must contribute both to the nutritional needs of children and the development of desirable food habits		No FMNV	
Maryland 2005	Water, flavored water (20 calories), milk, 100% fruit or vegetable juice (12 oz), fruit or vegetable juice beverages with at least 10% juice and 100% vitamin C (12 oz), isotonic beverages (16 oz)		None	Flavored milk (30 g sugar per 8 oz) Soy milk allowed
Massachusetts Close to IOM 2010	Water, milk, 100% fruit or vegetable juice (8 oz) No artificial sweeteners	ES: juice limit 4 oz	None	1% 8 oz 22 g sugar per 8 oz Dairy alternatives allowed
Michigan 2010	State guidelines are voluntary Water (no flavoring or carbonation), milk, 100% juice or juice/water (10 oz) Caffeinated, fortified, or flavored beverages (20 oz, 5 calories per serving) 100% juice or 100% juice/water blends with carbonation (12 oz)	ES and MS: water (no flavoring or carbonation), milk, 100% juice or juice/water (10 oz)	HS: diet soda	1% Dairy alternatives allowed

TABLE A6.4 List of Beverage Guidelines by State

State Rank re: IOM or 2005 DGA Year enacted or revised	Allowed	Differences by grade	Soda summary	Milk details
Minnesota No state policy				
Mississippi Close to IOM 2008	Water, milk, 100% fruit or vegetable juice (120 calories per 8 oz) Light juice and sports drinks (99 calories and 12 oz) Other beverages (10 calories per 8 oz)	ES and MS: no light juice or sports drinks Juice and milk: ES—8 oz, MS—10 oz, HS—12 oz	HS: diet soda	Low-fat 160 calories per 8 oz Serving size: ES—8 oz, MS—10 oz, HS—12 oz Dairy alternatives allowed
Missouri No state policy				
Montana No state policy				
Nebraska No state policy				
Nevada 2005		MS and HS: allow electrolyte replacement beverages (12 oz)	None	
New Hampshire No state policy				
New Jersey 2007	12 oz limit on beverages except for milk with 2% or less fat	ES: only water, milk, 100% fruit or vegetable juice	None	Whole milk limited to 8 oz
New Mexico close to 2005 DGA 2006	Water, milk, 50% fruit juice (20 oz), sports drinks	ES: water, milk in vending machines; only after lunch MS: water, milk, 100% fruit juice (125 calories) ES and MS: no carbonated drinks	Only in HS: diet soda after lunch	2% Soy milk allowed
New York 2006			No sweetened soda water until after last lunch	
North Carolina 2005		ES: water, milk (1%), 50% fruit or vegetable juice	No soda during meals ES: no soda MS: no sugared soda	
North Dakota No state policy				

TABLE A6.4 List of Beverage Guidelines by State

State Rank re: IOM or 2005 DGA Year enacted or revised	Allowed	Differences by grade	Soda summary	Milk details
Ohio 2010	Water, milk, 100% fruit juice or 100% fruit juice and water blend (12 oz, 160 calories per 8 oz) Other beverages (12 oz, 66 calories per 8 oz) Any beverage (10 calories per 8 oz)	ES and MS: Water, milk, 100% fruit juice or 100% fruit juice and water blend (ES—8 oz, MS—10 oz, 160 calories per 8 oz)	HS: diet soda (12 oz)	Low-fat Flavored milk: 16 oz, 170 calories per 8 oz, changes to 150 calories per 8 oz in 2014 ES and MS: limited to 8 oz
Oklahoma 2007			HS: soda ES and MS: diet soda	
Oregon Close to 2005 DGA 2007	Water, milk, 100% fruit or vegetable juice (12 oz and 120 calories per 8 oz) Other beverages (12 oz, 66 calories per 8 oz)	ES and MS: no sports drinks	HS: diet soda	Low-fat 150 calories per 8 oz Serving size: ES—8 oz, MS—10 oz, HS—12 oz Dairy alternatives allowed
Pennsylvania 2007	Guidelines are voluntary, but schools that follow guidelines receive a supplemental state reimbursement Water, flavored water with artificial sweeteners (17 oz), milk, 100% fruit or vegetable juice (12 oz), carbonated beverages with 70–100% pure juice with water		None	At least 75% of milk offered must be 2% fat or less 12 oz or less No more than 30 g of sugar per 8 oz No artificial sweeteners
Rhode Island Close to DGA 2008	Water (sweetened with 100% fruit), milk, 50% fruit or vegetable juice		None	2% Dairy alternatives allowed 4 g sugar per oz
South Carolina 2006	No soda, soft drinks, sports drinks, punches, iced teas and coffees, and fruit-based drinks that are not 100% real fruit juice Portion size limit of 12 oz except water or nonfat, low-fat, and reduced-fat milk Must make available non-fat and 1% milk, water, and 100% juices	Guidelines apply only to ES schools	ES: no soda	12 oz limit for whole milk in ES school
South Dakota No state policy				
Tennessee Close to DGA 2008	Water (no flavorings or carbonation), milk, 100% fruit or vegetable juice, other beverages (non-carbonated, 15 calories) 8 oz except water	HS: no restrictions	HS only	Reduced-fat Dairy alternatives allowed
Texas Close to DGA 2009	30 g sugar per 8 oz		Only in HS school (12 oz) No more than 15% of beverages can be sugared, carbonated soft drinks	2%
Utah 2008	Guidelines are voluntary Portion size 20 oz except water			

TABLE A6.4 List of Beverage Guidelines by State

State Rank re: IOM or 2005 DGA Year enacted or revised	**Allowed**	**Differences by grade**	**Soda summary**	**Milk details**
Vermont 2008	Guidelines are voluntary Water, milk, 100% fruit or vegetable juice (12 oz), drinkable yogurt (12 oz, 200 calories per 8 oz)	ES: 4 oz limit for juice and 8 oz limit for milk or drinkable yogurt MS: 10 oz limit for milk, juice, drinkable yogurt	None	Low-fat 150 calories per 8 oz ES—8 oz, MS—10 oz, HS—12 oz
Virginia Will be close to IOM 2010	New guidelines (under review now) must be either Alliance for a Healthier Generation or IOM Standards			
Washington 2007				30 g sugar per serving
West Virginia Close to IOM 2008	Some of the beverage guidelines are voluntary Water, milk, 100% fruit or vegetable juice Only milk, milkshakes, and water during lunch	Juice sizes: ES—4 oz, MS and HS—8 oz	Only in HS and not during meals	1%
Wisconsin No state policy				
Wyoming No state policy				

References for Appendix 6

[1] "Classification of Laws Associated with School Students (CLASS Data)," 2011, class.cancer.gov/download.aspx.
[2] L. C. Masse et al., "Development of a School Nutrition–Environment State Policy Classification System (SNESPCS), "*American Journal of Preventive Medicine 33*, no. 4S (2007):S277–S291.S291.
[3] Centers for Disease Control and Prevention, *Competitive Foods and Beverages in U.S. Schools—A State Policy Analysis* (2012).

Appendix 7: Summary of Literature of Nutrition Policy and/or Program Impacts

This appendix summarizes literature that evaluates impacts from implementing competitive food nutrition policies or programs. Each research article was scored according to the guidelines in Appendix 2. Briefly, a score of "1" is considered weak, "2" is considered fair, and "3" or higher is considered strong. The results of the literature are provided here based on how they affect a specific outcome such that:

(+) indicates general positive impact on an outcome
(-) indicates general negative impact on an outcome
(0) indicates no impact
(+/0 or -/0) indicates inconsistent findings

Table A8.1: Survey of literature showing impacts on access to healthy and unhealthy items

Citation/Score	Policy	Population	Healthy	Unhealthy
Yvonne M. Terry-McElrath et al., "The School Food Environment and Student Body Mass Index and Food Consumption: 2004 to 2007 National Data," *Journal of Adolescent Health* 45, suppl. 3 (2009): S45–56. (Fair)	District wellness policies between 2004 and 2007	National sample, MS and HS students in the Youth, Education, and Society (YES) and Monitoring the Future (MTF) studies	(0/+) No change in fruit and vegetable offerings	Reduced the availability of regular sugar/fat food items in competitive food outlets
L. A. Lytle et al., "Influencing Healthful Food Choices in School and Home Environments: Results from the TEENS Study," *Preventive Medicine* 43, no. 1 (2006): 8–13. and L. A. Lytle et al., "School-Based Approaches to Affect Adolescents' Diets: Results From the TEENS Study," *Health Education & Behav* 31, no. 2 (2004): 270–87. (Strong)	Multicomponent intervention, including promoting and offering 100% fruit juice, water, low-fat milk, fruit and vegetables, and lower-fat options; limiting higher-fat a la carte options and snacks with more than 5 g of fat, as well as fruit drinks	16 middle schools, Twin Cities MN; 1997–2000; this research is part of the TEEN Study, a randomized, controlled school based intervention over 2-years	(+) Compared to control schools, intervention schools offered (P = 0.04) and sold (P = 0.07) a higher proportion of healthier foods a la carte.	
S. A. French et al., "An	Multicomponent intervention	20 secondary schools, St.	(+) At study end, 42% of	

Citation/Score	Policy	Population	Healthy	Unhealthy
Environmental Intervention to Promote Lower-Fat Food Choices in Secondary Schools: Outcomes of the TACOS Study," *American Journal of Public Health* 94 (2004): 1507–12. (Strong)	increasing availability of lower-fat (snacks 5 g or less per serving) foods served a la carte and school-wide student promotions of these lower-fat foods	Paul, MN; TACOS; 2-year group; randomized control	the a la carte foods were lower fat (an increase of 51%) in intervention schools, compared with 28% of the a la carte foods (a decrease of 5%) in control schools.	
Karen Weber Cullen, Kathy Watson, and Issa Zakeri, "Improvements in Middle School Student Dietary Intake After Implementation of the Texas Public School Nutrition Policy," *American Journal of Public Health* 98, no. 1 (2004): 111–17. (Fair)	Policy in all competitive food outlets; for middle schools, the policy restricts the portion sizes of high-fat and -sugar snacks (limits vary by food group), sweetened beverages (≤12 oz), and the fat content of all foods served (≤28 g fat per serving no more than 2 times per week); it also sets limits on the frequency of serving high-fat vegetables, such as french fries (3 oz per serving no more than 3 times per week)	3 MS in TX; 2001–02, 2002–03, 2005–06; repeated measures; longitudinal; natural experiment	(+/-) Beverage contracts specific 12 oz size; snack machine inventories adhered to policy and machines were off during lunch; 1% milk served, 5 different fruits and vegetables (not counting potatoes) served in a la carte	Snack bar provided more unhealthy items; vending machines provided less in year 3 than in year 1. Children brought more SSBs, desserts, candy, and snack chips from home.
Jill Hartstein et al., "Impact of Portion-size Control for School á La Carte Items: Changes in Kilocalories and Macronutrients Purchased by Middle School Students," *Journal of the American Dietetic Association* 108, no. 1 (2008): 140–44. (Weak/Fair)	A la carte/snack bar goals reduce all regular chips serving size bags to ≤1.5 oz, increase lower-fat chip offerings by 25%; offer bottled water in a 20 oz size; and limit all sweetened beverages to ≤12 oz.	2 schools in pilot in each CA, NC, TX; 2004; cross-sectional part of baseline	(+) Offered fruits and vegetables; all schools changed water and SSB serving sizes; 5 of 6 schools changed low-fat chip goal	
G. Dowaliby et al., *Connecticut's Healthy Snack Pilot Case Studies* (Middletown, CT: Connecticut State Department of Education, Bureau of Health and Nutrition Services and Child/Family/School Partnerships, 2007). and G. Dowailiby et al., *Connecticut's Healthy Snack Pilot Summary Data*	CT standards: Low-fat (1%) milk and dairy alternatives: 32 g total sugar per 8 oz, no artificial sweeteners; ≤35% total calories from fat and ≤10% calories from saturated fat per serving. Fruit or vegetable juice (100%) and water: no added sugar, artificial sweeteners or caffeine. Portion sizes: all drinks ≤12 oz (except water without added juice). Snacks and desserts: ≤35% total calories from fat and 7 g per serving (with the exception of nuts, seeds,	CT; 8 schools (3 ES, 4 MS, 1 HS); 2003–05; 3-year intervention pilot	(+) 5 of 8 schools followed standards in year 2 (only sold water, milk, 100% fruit juice, replaced snacks); students in all schools reported more water consumption; general increases in healthy food consumption across food types; No changes year 1; 2 schools had increased NSLP	(+/-) In 5 schools, fewer students reported consumption of SSBs; in 3 schools, more students reported SSB consumption (no statistics).

Citation/Score	Policy	Population	Healthy	Unhealthy
Report. (Middletown: CT: Connecticut State Department of Education, Bureau of Health and Nutrition Services and Child/Family/School Partnerships, 2007). (Weak/Fair)	peanut and other nut butters, and cheeses). Sat. fat and trans fat: ≤10% of calories from saturated fat and/or trans fat and 2 g per serving. Added sugar: ≤35% by weight and ≤15 g per serving. For low-fat smoothies, yogurt, and pudding: no more than 5 g total sugar per ounce. Snacks may not contain artificial sweeteners. Whole grain foods, FV available.		participation when healthy items offered.	
Michael W. Long, Kathryn E. Henderson, and Marlene B. Schwartz, "Evaluating the Impact of a Connecticut Program to Reduce Availability of Unhealthy Competitive Food in Schools," *Journal of School Health* 80, no. 10 (2010): 478–86. (Fair)	Connecticut Healthy Food Certification Nutrition standards: fat: <35% calories, 7 g package; sat fat: <10% calories, 2 g package; trans fat: 0 g; sugar: <35% and 15 g per package; sodium: <500 mg (<230 mg snacks, <480 mg dairy); soups: <7 g fat per serving, sat. fat <2 g per serving, trans fat 0 g, sugar <15 g per serving, sodium <1000mg	Repeated measures; cross-sectional survey; 151 school districts; CT	(+) On average, all CT districts reduced availability of unhealthy competitive foods. On average, all districts reported a reduction in the number of unhealthy a la carte snack categories offered from the baseline year to year 1, $F(1,71) = 41.127$, $F(1,68) = 61.390$, and $F(1,64) = 89.310$, for elementary, middle, and high schools, respectively, $p < .001$ for all levels. However, HFC participation was related to a significantly greater decline in unhealthy categories offered in elementary and high schools, $F(1,71) = 4.642$, $p = .035$ and $F(1,64) = 7.338$, $p = .009$, respectively. Middle schools showed a trend in this same direction, $F(1,68) = 2.919$, $p = .09$.	
Sarah E. Samuels et al., "The California Endowment's Healthy Eating, Active Communities Program: A Midpoint Review," *American Journal of Public Health* 100 (2010): 2114–23. and Sarah E. Samuels et al., *Healthy Eating, Active Communities Phase 1 Evaluation Findings 2005–2008* (Oakland, CA: Samuels and Associates, 2009). (Weak)	Implementation of SB 12 (foods). Allowed to sell seeds, nuts, butters, low-fat dairy individual items. Snack items <250 kcal total; 35% calories from fat, 10% total calories from sat. fat; 35% total weight from sugar. Dairy and whole grain products meet 35/10/35, and have <175 calories. Entrees must have <35% of calories from fat, 400 kcal max. SB 965 (drinks): 50–100% fruit and vegetable drinks with no added sweeteners, water with no added sweeteners, milk and dairy alternatives ≤2% fat, 28 g total sugars, 8 oz sports drinks with no caffeine, ≤42 g added sweetener per 20 oz in MS/HS	6 MS in CA; 2005 and 2008; multicomponent intervention, including wellness policy changes from state bills, HEAC	A comparison between baseline and midpoint data shows that the HEAC schools' adherence to competitive beverage standards increased from 45% to 78% between 2005 and 2008, and the adherence to competitive food standards increased from 23% to 67%.	

Citation/Score	Policy	Population	Healthy	Unhealthy
Anastasia M. Snelling and Teha Kennard, "The Impact of Nutrition Standards on Competitive Food Offerings and Purchasing Behaviors of High School Students," *Journal of School Health* 79, no. 11 (2009): 541–46. (Weak)	Policy in 2006: Beverages: water, milk (1% or skim), juices containing at least 25% juice (<12 oz); Snacks: <300 calories/item, <30% of total calories from fat, except seeds/nuts; <10% of total calories from sat. fat; sugar <35% by weight, whole grain breads and cereals offered, portion sizes 1.25 oz for snacks and sweets, 2 oz for cookies, 3 oz for bakery items and frozen desserts, 8 oz for yogurt, low sodium	3 public HS, in 1 county; non-experimental longitudinal study; descriptive info from food offerings and purchases; 2005 and 2007; coded foods by Stoplight Diet (green = low calorie, high nutrient; yellow = moderate calorie, moderate nutrient; red = high calorie, low nutrient)	(+/0) Decreased offering of unhealthy red items (57% in 2005 to 30% in 2007); increased moderately healthy yellow foods (meeting standards) (18% to 48%); decreased offering of healthiest green items (fruits, vegetables) 25% to 22% in 2007.	
Gail Woodward-Lopez et al. "Lessons Learned from Evaluations of California's Statewide School Nutrition Standards," *American Journal of Public Health* 100, no. 11 (2010): 2137–45. (Fair/Strong)	Implementation of SB 12 (foods). Allowed to sell seeds, nuts, butters, low-fat dairy individual items. Snack items <250 kcal total; 35% calories from fat, 10% total calories from sat. fat; 35% total weight from sugar. Dairy and whole grain products meet 35/10/35, and are <175 calories. Entrees must have <35% of calories from fat, and be ≤400 kcal. SB 965 Drinks: 50–100% fruit and vegetable drinks, no added sweeteners; water, no added sweeteners; milk and dairy alternatives ≤2% fat, 28 g total sugars, 8 oz sports drinks no caffeine, ≤42 g added sweetener per 20 oz in MS/HS	Data from HEAC, High School Study, and School Wellness Studies, 2005–08, 2007–08, and 2007–09	(0/+) ES/MS: little pre-legislation versus post-legislation change in the number of food and beverage items offered. HS reduced the number of different types of items offered by 25%–35% (beverages) and 10%–15% (food). Unlike foods, nearly all beverage categories were either 100% compliant or 0% compliant.	

Citation/Score	Policy	Population	Healthy	Unhealthy
M. Boles et al., "Changes in Local School Policies and Practices in Washington State After an Unfunded Physical Activity and Nutrition Mandate," *Preventing Chronic Disease* 8 no. 6 (2011): 1–13. (Fair)	2005 WA physical activity and nutrition mandate (PAN) impact on MS and HS practices	Public health surveillance data secondary data analysis compared WA (with mandate) to OR schools (no mandate), same time period	(+/-) MS and HS had a significant (18.8–20.0 percentage point) increase in the number of schools with restricted access to competitive foods (what foods and time of day). MS increased type of foods sold (10.4 percentage points). Unexpectedly, healthy food options (low-fat snacks, fruits, veggies) for MS/HS declined significantly, by 5.9 and 2.0 percentage points, respectively.	*Implementation of a complete ban—no change in offerings.* These schools may have been eliminating these venues for food purchases rather than reducing the availability of healthier food types in vending machines or school stores. Another explanation for the decline may be changing perceptions of school principals about what constitutes a "healthy" option.
J. E. Blum et al., "Impact of Maine's Statewide Nutrition Policy on High School Food Environments," *Preventing Chronic Disease* 8 no. 1 (2011): 1–10. (Fair)	Chapter 51 legislation in Maine 2004	89 HS, ME; cross-sectional survey	(+/0) Availability of soda in student vending significantly decreased pre–Chapter 51 versus post–Chapter 51 (P = .04). No significant changes were found for other SSBs and junk foods.	
Elaine S. Belansky et al., "Early Effects of the Federally Mandated Local Wellness Policy on School Nutrition Environments Appear Modest in Colorado's Rural, Low-Income Elementary Schools," *Journal of the American Dietetic Association* 110 no. 11 (2010): 1712–17. (Fair)	District wellness policies following 2004 federal mandate	40 school districts in CO; repeated random sample; cross-sectional surveys; 2005–07	(+/0) Lunchroom: (+) fresh fruits (0.8 choices in 2005 to 1.15 choices in 2007, $p<0.04$). Parties: 21.4% healthy to 48.7% $p<0.04$. No changes in veggies in other locations. (+) There were not significant healthy foods in vending machines.	
D. R. Taber et al., "Banning All	State policies governing the sale of	Bridging the Gap,	(+) Fewer students	

Citation/Score	Policy	Population	Healthy	Unhealthy
Sugar-sweetened Beverages in Middle Schools: Reduction of In-school Access and Purchasing but Not Overall Consumption," *Archives of Pediatrics & Adolescent Medicine* 166, no.3 (2012): 256-62. (Fair) .	soda and other SSBs in middle schools in 2006–07. States were classified as having (1) policy limiting the availability of soda and other SSBs (e.g., "Only milk, water, and 100% juice will be available in school"); (2) policy prohibiting soda but no policy limiting the availability of other SSBs (e.g., "Allowed beverages include milk, water, energy drinks, and electrolyte replacement beverages"); or (3) no policy limiting any type of SSB	BRFSS, Early Childhood Longitudinal Study Kindergarten Cohort; 1998–2007; national sample; correlation variance	reported in-school access in states that banned all SSBs (prevalence difference, −14.9; 95% CI, −23.6 to −6.1, p = 0.0001); no access differences between states banning only soda and those allowing all SSBs	
Janet M. Wojcicki and Melvin B. Heyman, "Healthier Choices and Increased Participation in a Middle School Lunch Program: Effects of Nutrition Policy Changes in San Francisco," *American Journal of Public Health* 96, no. 9 (2006): 1542–47. (Fair/Strong)	Water: no added sweeteners; juice and juice blends: 12 oz max, no added sweeteners, no caffeine or herbal supplements; milk or dairy substitute: 1% or fat-free, 1.4 oz (40 g) sugar per 12 oz, ≤12 oz; food: ≤30% cal fat, ≤10% cal sat. fat plus trans-fat, ≤35% sugar by weight; snacks must include no less than 5% of 8 nutrients; portion size limits 1.25 oz chips, crackers, popcorn, cereal, jerky; 2.5 oz trail mix, nuts, seeds, dried fruit; 2 oz cookies/cereal bars; 3 oz bakery items; 3 fl oz frozen desserts; 8 fl oz non-frozen yogurt; 12 oz limit for all beverages except water; fruits and veggies sold at all sites; warning labels on peanut foods	San Francisco Unified School District (SFUSD); surveys; 1 class per grade level in schools <500; 2 classes per grade level in schools 500–1,200; 3 classes per grade level in schools >1,200	(+)Beginning in August 2003, all SFUSD schools altered their snack bar menus to meet the revised district-wide nutrition standards., phased out soda, Twinkies, Slim Jims, and giant pizzas, and replaced them with healthier items such as sushi, fresh soup, deli sandwiches, 100% fruit juice, baked chicken with rice, etc.	
Nicole Larson and Mary Story, "Are 'Competitive Foods' Sold at School Making Our Children Fat?" *Health Affairs (Project Hope)* 29, no. 3 (2010): 430–35. (Strong)	Review	U.S. school-based studies through 2009	With few exceptions, cross-sectional (and longitudinal studies have found that students have better diets relative to the recommendations of the 2005 Dietary Guidelines for Americans when unhealthy competitive foods are not sold at school.	
P. C. Jaime and K. Lock, "Do School Based Food and Nutrition Policies Improve Diet and Reduce	Review	School-based nutrition policy studies, earliest record to 2007	4 studies on the impact of guidelines on **food availability**, focused primarily on fruit and vegetables offered at **school lunch (could be a la carte)**. All	

Citation/Score	Policy	Population	Healthy	Unhealthy
Obesity?" *Preventive Medicine* 48, no. 1 (2008): 45–53. (Strong)			studies showed that guidelines led to increased **fruit and vegetable availability, [ranging from + 0.28 servings/day to + 0.48 servings/day].**	

Table A8.2 Survey of literature on student purchases and/or general food intake

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
Gary D. Foster et al., "A Policy-based School Intervention to Prevent Overweight and Obesity," *Pediatrics* 121, no. 4 (2008): e794–802. (Fair)	Beverages: 100% juice (6 oz serving size), water (no portion limits), and low-fat milk (8 oz serving size); Snacks: allowed ≤7 g total fat, 2 g sat. fat, 360 mg sodium, and 15 g sugar per serving	4–6 grade; 10 schools; 1,349 students; mid-Atlantic region; 2-year matched randomized control; repeated measures	(0) Fruit and vegetable intake the same between intervention and control	Overall calorie intake the same between intervention and control
James F. Sallis et al., "Environmental Interventions for Eating and Physical Activity: a Randomized Controlled Trial in Middle Schools," *American Journal of Preventive Medicine* 24, no. 3 (2003): 209–17.(Strong)	Multicomponent intervention to provide and market low-fat foods at all school food sources included taste tests and new foods in menus.	24 MS; randomized controlled trial; San Diego CA	(0) Introduction of new items was limited; no significant changes in purchase or consumption	
L. A. Lytle et al., "Influencing Healthful Food Choices in School and Home Environments: Results from the TEENS Study," *Preventive Medicine* 43, no. 1 (2006): 8–13. (Strong)	Multicomponent intervention, including promoting and offering 100% fruit juice, water, low-fat milk, fruit and vegetables, and lower-fat options; limiting higher fat a la carte options and snacks with more than 5 g fat and fruit drinks	16 MS, Twin Cities, MN; 1997–2000; Teens Eating for Energy and Nutrition Schools (TEENS)	(0) No effects were seen for fruit and vegetables sales as part of the regular meal pattern lunch.	
Dianne Neumark-Sztainer et al., "School Lunch and Snacking Patterns Among High School Students: Associations with School Food Environment and Policies," *International Journal of Behavioral Nutrition and Physical Activity* 2, no. 1 (2005): 14. (Fair)	Nutrition intervention, looked at exposure to vending machines	20 HS, Minneapolis, St. Paul; TACOS study; 2-year group; randomized intervention by school; cross-sectional surveys and observations	(+) Student snack food purchases from vending machines were significantly more frequent among students from schools with a greater number of snack food vending machines (1–2 machines, 0.8 snack food purchases). Student soft drink purchases from vending machines were not significantly associated with the number of soft drink vending machines, but were significantly lower in schools in which machines were turned off during lunchtime. In schools with policies about the types of foods sold in vending machines, students reported making	

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
			snack food purchases an average of 0.5 days/week as compared to an average of 0.9 days/week in schools without policies. Similar non-significant trends were found for soft drink purchases.	
Y. Terry-McElrath et al., "The School Food Environment and Student Body Mass Index and Food Consumption: 2004 to 2007 National Data," *Journal of Adolescent Health* 3, suppl. 1 (2009): 45–56. (Fair)	District wellness policies between 2004 and 2007	National sample; MS and HS students in YES and MTF studies	(+MS/0 HS) MS—odds of daily or almost daily fruit intake were significantly associated with how often schools reported offering fruits and vegetables; students ate more green vegetables if offered at lunch or if offered low-fat food items; no relationships in HS	Students ate fruit less frequently when schools had regular sugar/fat food items in competitive food outlets; no HS relationships
Karen Weber Cullen, Kathy Watson, and Issa Zakeri, "Improvements in Middle School Student Dietary Intake After Implementation of the Texas Public School Nutrition Policy," *American Journal of Public Health* 98, no. 1 (2008): 111–17. (Fair)	TX policy in all competitive food outlets; for MS, the policy restricts the portion sizes of high-fat and -sugar snacks (limits vary by food group), sweetened beverages (≤12 oz), and the fat content of all foods served (≤28 g fat per serving no more than 2 times per week). It also sets limits on the frequency of serving high-fat vegetables such as french fries (3 oz per serving no more than 3 times per week).	3 MS; TX; 2001–02, 2002–03, 2005–06; repeated measures; longitudinal; natural experiment	(+) More milk and vegetables and fewer sweetened beverages, soft drinks, and snack chips were consumed in year 3 than during years 1 and 2. After we controlled for energy intake, dessert food servings were significantly lower in year 3 compared with year 1.	
Karen W. Cullen and Kathleen B. Watson, "The Impact of the Texas Public School Nutrition Policy on Student Food Selection and Sales in Texas," *American Journal of Public Health* 99, no. 4 (2009): 706–12. (Fair)	TX policy (implemented 2004) restricts the portion sizes of high-fat and -sugar snacks to ≤200 kcal per serving package and sweetened beverages to ≤12 oz, limits the fat content of milk offered to ≤1%, provides guidelines for the fat content of foods served, and sets limits on the	2004–05 evaluation to assess policy adherence, daily production records for 23 schools in 5 districts sent adequate data for food availability before and after implementation.,	(+/0) Regardless of district and school size, cafeterias served significantly fewer high-fat vegetable items per student post policy (P<.001). Post-policy snack bar sales of large bags of chips were significantly reduced (P = .006), and baked chips sales significantly increased (P = .048). Also, primary school served more portions of fruit per student both school years than secondary schools (by	

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
	frequency of serving high-fat vegetables such as french fries	pre/post cross-sectional study	about .32 servings). There was no impact on non-fried FV, milk, no changes in drinks or water in snack bars.	
G. Dowaliby et al., *Connecticut's Healthy Snack Pilot Case Studies* (Middletown, CT: Connecticut State Department of Education, Bureau of Health and Nutrition Services and Child/Family/School Partnerships, 2007). (Weak/Fair)	Low-fat (1%) milk and dairy alternatives: 32 g total sugar per 8 oz, no artificial sweeteners, ≤35% total calories from fat and ≤10% calories from saturated fat per serving. Fruit or vegetable juice (100%) and water: no added sugar, artificial sweeteners, or caffeine. Portion sizes: all drinks ≤12 oz (except water without added juice). Snacks and desserts: ≤35% total calories from fat and 7 g per serving (with the exception of nuts, seeds, peanut and other nut butters, and cheeses). Saturated fat and trans fat: ≤10% of calories from saturated fat and/or trans fat and 2 g per serving. Added sugar: ≤35% by weight and ≤15 g per serving. For low-fat smoothies, yogurt, and pudding, no more than 5 g total sugar per ounce. Snacks may not contain artificial sweeteners. Whole grain foods, FV available.	CT; 8 schools (3 ES, 4 MS, 1 HS); 2003–2005; 3-year intervention pilot	(+ 5 schools/0 3 schools) 5 schools showed a reduction in child consumption of regular soft drinks and sweetened tea. Students purchased more school meals when only healthy snacks were available.	
Simone A. French et al., "An Environmental Intervention to Promote Lower-fat Food Choices in Secondary Schools: Outcomes of the TACOS Study," *American Journal of Public Health* 94, no 9 (2004): 1507–12. (Strong)	Multicomponent intervention increasing availability of lower fat (Snacks ≤5 g per serving) foods in a la carte and school-wide student promotions of these lower-fat foods	20 secondary schools, St. Paul MN; TACOS; 2 year Group randomized control	(+ sales/0 consume) The intervention schools showed a significantly higher mean percentage of sales of lower-fat foods in year 1 (27.5% vs. 19.6%, P = .096) and a significantly higher mean percentage of sales of lower-fat foods in year 2 (33.6% vs. 22.1%, P = .042)	No differences in student reported food consumption choices between control and intervention
Anastasia M. Snelling and Teha Kennard, "The Impact of Nutrition	Policy in 2006 Beverages: water, milk (1% or skim), juices containing at least	3 public HS, outside single metro county; non-	(+) Increased purchase of green foods (11% in 2005	Decreased purchase of red foods from

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
Standards on Competitive Food Offerings and Purchasing Behaviors of High School Students," *Journal of School Health* 79, no. 11 (2009): 541–6. (Weak)	25% juice (<12 oz); Snacks: <300 calories/item; <30% of total calories from fat, except seeds/nuts; <10% of total calories from sat. fat; sugar <35% by weight; whole grain breads and cereals offered; portion sizes 1.25 oz for snacks and sweets, 2 oz for cookies, 3 oz for bakery items and frozen desserts, 8 oz for yogurt; low sodium.	experimental longitudinal study; descriptive info from food sales; 2005–07; coded foods by Stoplight Diet (green = low calorie, high nutrient; yellow = moderate calorie, moderate nutrient such as those meeting standards; red = high calorie, low nutrient)	to 20% in 2007) and yellow foods (6% in 2005 to 34% in 2007). Students purchased the more nutritious yellow and green foods when there were fewer red food offerings.	83% in 2005 to 46% in 2007. However, even with lower proportion of red food offerings (30% in 2007), these foods made up almost half of all competitive food purchases (47%).
R. R. Briefel et al., "School Food Environments and Practices Affect Dietary Behaviors of US Public School Children," *Journal of American Dietetic Association* 109, no. 2 (2009): S91–S107. (Fair)	Impact of exposure to restrictions on low-nutrient, energy-dense foods (LNED), vending venues, pouring contracts	Cross-sectional, SNDA III 2004–05, K–12	(+) Offer daily fresh FV through government program, reduce 36 kcal from LNED ($p<.05$) in ES. (+) Attending a school without stores or snack bars was estimated to reduce sugar-sweetened beverage consumption by 22 kcal per school day in MS children ($P<0.01$) and by 28 kcal in HS children ($P<0.01$). (+) The lack of a pouring rights contract in a school reduced SSB consumption by 16 kcal ($P<0.05$), and no a la carte offerings in a school reduced consumption by 52 kcal ($P<0.001$) in MS children. (+) The most effective practices for reducing energy from LNED foods were characteristics of the school meal program; not offering french fries reduced LNED foods consumption by 43 kcal in ES children ($P<0.01$) and SSB consumption by 41 kcal in HS children ($P<0.001$).	
Karen Weber Cullen and Debbe I. Thompson, "Texas School Food Policy Changes Related to Middle School a la Carte/Snack Bar Foods: Potential Savings in Kilocalories." *Journal of the American Dietetic Assocation* 105 (2005): 1952–54. (Fair)	Texas state policy in 2004 impacting the school competitive venues, including limiting sweetened beverages to 12 oz containers and high-fat, salty, and sweet foods to small, single-serving packages	23 MS in TX; cross-sectional; used sales records to estimate the energy savings to children from policy changes	(+) By reducing portion sizes to smaller, single-serving packages, 47 kcal per student was saved on a daily basis. Over a 180-day school year, an energy deficit equivalent to about 2 lb could occur if students replaced the large portion-sized snacks and beverages with the smaller sizes on a 1-to-1 basis, did not buy multiple small bags or small drinks, did not consume additional other foods or beverages, and did not change physical activity levels.	

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
Marlene B. Schwartz, Sarah A. Novak, and Susan S. Fiore, "The Impact of Removing Snacks of Low Nutritional Value From Middle Schools," *Health Education & Behavior* 36, no. 6 (2009): 999–1011. (Fair)	Policy: Snacks limited to total fat ≤35% of calories, saturated fat <10% of calories, added sugar ≤35% by weight, and limiting serving sizes. Beverages: water, milk, and 100% juice	2-year nonrandom intervention; 6 intervention schools, 6 control; CT; repeated surveys	(+) Intervention schools increased consumption of healthy drinks from year 1 to year 2, comparison schools had no increase (B = .33, p<.05); MNS intervention schools consumed more baked chips, pretzels, popcorn, and crackers; comparison schools stayed the same (B = .29, p<.05)	EBNS salty snacks intervention decreased chips, comparison increased slightly (B = -.30, p<.05); comparison schools increased consumption of SSBs from year 1 to year 2, intervention schools decreased (B = -.23, p<.05)
Jill Hartstein et al., "Impact of Portion-size Control for School á La Carte Items: Changes in Kilocalories and Macronutrients Purchased by Middle School Students," *Journal of the American Dietetic Association* 108, no. 1 (2008): 140–44. (Weak/Fair)	Intervention: a la carte/snack bar goals reduce all regular chips serving size bags to ≤1.5 oz, increase lower-fat chip offerings by 25%; offer bottled water in a 20 oz size, and limit all sweetened beverages to ≤12 oz	6 schools total: 2 schools in pilot in each CA, NC, TX; 2004; cross-sectional part of baseline	(+/0) Significant changes in percent of kilocalories from protein (P<0.05) and ounces of water (P<0.01), sweetened beverages (P<0.01), and regular chips (P<0.05) were found across the 6 schools. **No increases in FV purchases**	There was a significant reduction in kcal density per item sold P<0.01 for 2 of the schools.
J.A. Mendoza et al., "Change in Dietary Energy Density After Implementation of the Texas Public School Nutrition Policy," *Journal of the American Dietetic Association* 110 (2010): 434–440. (Fair)	Texas Public School Nutrition Policy restricted portion sizes of snacks and high-fat foods, reduced the fat content of all food, and restricted sales of sweetened beverages (30 g sugar/8 oz portions, in HS 12 oz portion size for regular soda, no more than 15% of beverages can be sugared, carbonated soft drinks, milk 2% or less).	Pre- and post-policy in TX, 2001–02 to 2005–06 after implementation of state policy, 3 public MS, cross sectional food records	(+) The following food groups increased: the NSLP mixed entrée, vegetables, fruit, and the NSLP dessert. The following food groups decreased: snack chips, fat/oil, and candy.	Following implementation of the Texas policy, students' energy density without beverages significantly decreased from 2.80+/-1.08 kcal/g to 2.17+/- 0.78 kcal/g (P<0.0001). Similarly, energy density including beverages significantly decreased from 1.38+/-0.76 kcal/g to 1.29+/- 0.53 kcal/g

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
				(P<0.0001)
Sarah E. Samuels et al., "The California Endowment's Healthy Eating, Active Communities Program: A Midpoint Review," *American Journal of Public Health* 100 (2010): 2114–2123. And S.E. Samuels et al., *Healthy Eating, Active Communities Phase 1 Evaluation Findings 2005–2008* (Oakland, CA: Samuels and Associates, 2009). (Weak)	Implementation of SB 12 and SB 965. Allowed to sell seeds, nuts, butters, low-fat dairy individual items. Snack items max of <250 calories, total 35% calories from fat, 10% total calories from saturated fat, 35% total weight from sugar. Dairy and whole grain products must meet 35/10/35, and be <175 calories. Entrees must have <35% of calories from fat, 400 cal max.	6 MS in CA, 2005 and 2008, multicomponent intervention including wellness policy changes from state bills, HEAC, no statistics, no controls	(+) The percentage of students reported consuming candy, chips, soda, and sports drinks at school decreased in 2008, decrease of students reporting they consumed these items at all the day prior to completing the survey (School vending 27% to 21%, school snack bar/store 36% to 27%, school fundraiser, 16% to 10%)	
Gail Woodward-Lopez et al., "Lessons Learned from Evaluations of California's Statewide School Nutrition Standards," *American Journal of Public Health* 100 (11) (November 2010): 2137–2145. (Fair/Strong)	Implementation of SB 12 (foods). Allowed to sell seeds, nuts, butters, low-fat dairy individual items. Snack items must be <250 kcal total, max 35% calories from fat, 10% total calories from sat. fat, 35% total weight from sugar. Dairy and whole grain products must meet 35/10/35, and be <175 calories. Entrees must have <35% of calories from fat, 400 cal max. SB 965 (drinks): 50–100% fruit and vegetable drinks with no added sweeteners, water with no added sweeteners, milk and dairy alternatives ≤2% fat, 28 g total sugars, 8 oz, sports drinks with no caffeine, 42 g added sweetener max per 20 oz in MS/HS	Data from CA: HEAC, High School Study, and School Wellness Studies, 2005–08, 2007–08, and 2007–09, cross sectional	(+/0) After legislation (+) water consumption 9%, p<.01; (-) soda at school (7%) p<.01; (-) veggies at school 3% p<.01. Gen non-significant trends: (-) consumption of sports drinks, candy, and chips at school, (+) consumption of milk and fruit. At home only significant change in consumption was water (+)—not compensating at home for changed intake at school.	
Donna B. Johnson et al., "Impact of School District Sugar-Sweetened Beverage Policies on Student Beverage Exposure and Consumption in Middle Schools," *Journal of Adolescent Health* 45 (3,	Limits sugar content of beverages, limits regular (sugar-sweetened) soda, and limits beverages other than soda containing added caloric.	65 schools, 29 school districts, WA, 2007–08 cross sectional		(+)The proportion of students who consumed SSB at each school was positively associated with SSB exposure at

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
Supplement) (September 2009): S30–S37. (Fair)				school (Pearson's correlation coefficient .40, p = .001). SSB exposure was a significant predictor of SSB behavior (b = .16, p =.001) in the expected direction: that is, more availability of SSB at a school leads to a higher percentage of students drinking SSB.
W. Gonzalez et al., "Restricting Snacks in U.S. Elementary Schools Is Associated with Higher Frequency of Fruit and Vegetable Consumption," *Journal of Nutrition* 139 (2009): 142–4. (Fair)	School policies restricting snack availability (no snack items available) or unrestricted (at least 1 snack item available)	National sample, 5th graders, cross sectional survey 2008–09	(+)Children in schools with policies restricting snack availability reported more occasionally eating fruits (p = .025) or frequently eating fruits (p = .05) and vegetables (p = .001)	
M. Fernandes, "The Effect of Soft Drink Availability in Elementary Schools on Consumption," *Journal of the American Dietetic Association* 108 (2008): 1445–52. (Fair/Strong)	Consumption based on access via policy	1998–99 began national cross sectional surveys, 5th graders, Early Childhood Longitudinal Study, Kindergarten cohort	(+) Controlling for covariates, limiting availability of soft drinks at school is associated with a 4% decrease (odds ratio 1.38) in the rate of any consumption overall. Black non-Hispanic and low-income children were significantly more likely to consume soft drinks at school, conditional on availability (p<0.01). Children attending schools located in the South were more likely to consume soft drinks at school (p<0.001).	
Jason M. Fletcher et al., "Taxing Soft Drinks And Restricting Access To Vending Machines To Curb Child Obesity," *Health Affairs* 29 (5) (May 1, 2010): 1059–1066. (Fair)	Examined impact of taxation of SSBs and vending machine bans	Early Childhood Longitudinal Study Kindergarten Cohort, 5th grade (2004) and 8th grade (2007) survey waves, national sample, descriptive statistics	(+/0) Less soda consumption based on purchases made at school for those students with limited access (8% versus 26% of fifth graders and 20% versus 28% of 8th graders reported any consumption from school-based sources; p = 0.001 level). However, no difference in overall consumption of soft drinks between those with access at school and those without. The results strongly suggest that limiting	

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
			access to soft drinks at school might not reduce children's soft drink consumption because of the many alternative outlets where they can obtain soft drinks, including homes, convenience stores, and other school outlets such as after-school events.	
D.R. Taber et al., "Banning All Sugar-sweetened Beverages in Middle Schools Reduction of In-school Access and Purchasing but Not Overall Consumption," *Archives of Pediatrics & Adolescent Medicine* (2011): E1–7. (Fair)	State policies governing the sale of soda and other SSBs in middle schools in 2006–2007. States were classified as having (1) policy banning soda and other SSBs (e.g., "Only milk, water, and 100% juice will be available in school"), (2) policy prohibiting soda but allows other SSBs (e.g., "Allowed beverages include milk, water, energy drinks, and electrolyte replacement beverages"), or (3) no policy limiting any type of SSB.	6900 students, 2 of 7 observations; Bridging the Gap, Early Childhood Longitudinal Study Kindergarten Cohort, 1998–2007, General linear models	The proportions of 8th-grade students who reported in-school SSB access and purchasing were similar in states that banned only soda (66.6% and 28.9%, respectively) compared with states with no beverage policy (66.6% and 26.0%, respectively). In states that banned all SSBs, fewer students reported in-school SSB access (prevalence difference, −14.9; 95% CI, −23.6 to −6.1) or purchasing (−7.3; −11.0 to −3.5), adjusted for race/ethnicity, poverty status, locale, state obesity prevalence, and state clustering. Overall SSB consumption was not associated with state policy; in each policy category, approximately 85% of students reported consuming SSBs at least once in the past 7 days.	
Sonya J. Jones et al., "Policies That Restrict Sweetened Beverage Availability May Reduce Consumption in Elementary-school Children," *Public Health Nutrition* 13 (4) (April 2010): 589–595. (Fair)	Examined exposure to SSB policy restriction and provision of alternate beverages or not	Early Childhood Longitudinal Study Kindergarten Cohort, multilevel logistic regression 107,191 children; administrator and student reports	Children in schools with a policy that allowed SSBs were 5 times more likely (OR = 5.16, 95% CI 4.18, 6.49) to purchase at least 1 SSB at school in the past week when the presence of alternative beverages was not considered. The population-attributable risk (from RR for association and prevalence of availability) was 35.7%, meaning that if all schools changed to a policy of no availability of SSBs, more than one-third of the children currently purchasing SSBs in elementary schools would be prevented from doing so. If the administrator did not have a policy that made an alternative beverage present, the policy regarding availability of SSBs (not available v. available) was associated with the percentage of purchase of SSBs, about 3–4% when not available vs. 16–27% when available.	
J.A.L. Spangler, "Beverage Vending Purchasing Patterns and Attitudes	Replaced sweetened beverages in vending machines with 100% juice and bottled water	1 HS, cross sectional, convenience sample WV, 2004	Changes in purchases (reduction of overall frequency) not significant	(+/0) $\chi 2$ analysis revealed students were significantly more likely to choose

Citation/Score	Policy or Intervention	Population, Design	Impact—Healthy Items	Impact—Unhealthy or Overall
in Southwest Virginia High School Students," Master of Science, Blacksburg, VA: Virginia Polytechnic Institute and State University (2006). (Weak)				healthier beverage vending options after 1 year compared to baseline (P<0.01). The number of students who agreed to choose healthy options increased from 39.4% at baseline to 59.3% at follow-up.
A.L. Cradock et al., "Effect of School District Policy Change on Consumption of Sugar-sweetened Beverages Among High School Students, Boston, Massachusetts, 2004–2006," *Preventing Chronic Disease* 8 (4) (2011): A74. (Fair)	Boston Public Schools Snack and Beverage Policy restricting sugar-sweetened beverages in Boston schools. Precludes sale of soft drinks, fruit drinks (i.e., non–100% vegetable or fruit juice beverages), and sports drinks anywhere in school buildings or on school campuses and had specifications that limited other beverage serving sizes.	quasi experimental study 2004: N= 1,079, 17 HS 2006: N=1,233, 18 HS	(+) After the policy implementation restricting sale of SSB in school: (+) HS: Significant decreased consumption of 1.71 (CI 95% 1.61–1.81) servings of SSB (2004) vs. 1.38 (CI 95% 1.30–1.47) servings (2006) Significant declines in consumption of soda (−0.16 servings; CI:−0.23 to −0.08), other SSB (−0.14 servings; CI: −0.23 to −0.06), and total SSB (−0.30 servings; CI: −0.43 to −0.17) between 2004 and 2006 (P<.001 for all). NHANES indicated no significant nationwide change in adolescents' consumption of sugar-sweetened beverages between 2003–2004 and 2005–2006.	

Table A8.3: Impact of competitive foods policy or intervention on caloric intake, BMI and weight status

Citation/Source	Policy or Intervention	Population, Design	BMI or calories	Weight Status (Age differences)
Vasanti S. Malik et al., "Intake of Sugar-sweetened Beverages and Weight Gain: a Systematic Review," *The American Journal of Clinical Nutrition* 84 (2) (August 2006): 274–288. (Strong)	Review of relationship between SSB and weight gain	5 cohort, 1 trial, 10 prospective, and 5 experimental, 2 prospective and cross-sectional	Mixed epidemiologic and experimental evidence indicates that greater consumption of SSBs is associated with weight gain and obesity. Although more research is needed, sufficient evidence exists for public health strategies to discourage consumption of sugary drinks as part of a healthy lifestyle.	
Susan Harrington, "The Role of Sugar-sweetened Beverage Consumption in Adolescent Obesity: a Review of the Literature," *The Journal of School Nursing: The Official Publication of the National Association of School Nurses* 24 (1) (February 2008): 3–12. (Strong)	Review of SSB and adolescent obesity	2 randomized controlled trials and 8 longitudinal studies	Modest, significant increases in BMI in relation to SSB consumption	
L.R. Vartanian et al., "Effects of Soft Drink Consumption on Nutrition and Health: A Systematic Review and Meta-analysis." *American Journal of Public Health* 97 (2007): 667–75.(Strong)	Meta analysis of relationship between soft drink consumption and nutrition and health outcomes including BMI	88 studies examined: 12 cross-sectional, 5 longitudinal studies, 4 long term experimental, 12 short term experimental; 55 other	The overall effect size for studies examining the link between soft drink consumption and body weight was 0.08 ($P < .001$; $Q_{47} = 337.73$, $P < .001$, fail-safe N = 3173). Larger effect sizes were observed in experimental studies than in cross-sectional or longitudinal studies. Also, further testing of moderators revealed that effect sizes were larger among (1) women, (2) adults, (3) studies focusing on sugar-sweetened soft drinks, and (4) studies not funded by the food industry.	
A. Datar and Nancy Nicosia, *Junk Food Availability and Childhood Obesity* (RAND, 2008). (Fair)	Estimate the causal effect of competitive food availability on children's body mass index (BMI) and other food- and school-related outcomes. Looked at BMI, total consumption of selected foods, junk food purchase in school.	Nationally representative. Sample from Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K). N = Approximately 10,000 children, in 5th grade in 2003–04 school year, public/private schools.	Schools' grade structure had no effect on weight. No relationship between children's fifth-grade weight status and the presence or sale of competitive foods in their schools was found.	

Mary Kay Fox et al., "Association Between School Food Environment and Practices and Body Mass Index of US Public School Children," *Journal of the American Dietetic Association* 109 (2 Suppl) (February 2009): S108–117. (Fair)	To examine the association between school food environments and practices and children's body mass index	Analytical study using data from SNDA III school year 2004–2005; nationally representative; N = 2,228 students from 287 public Schools, grades 1–12; 54% non-Hispanic white, 17% non-Hispanic black, 22% Hispanic, and 7% other. 42% certified to receive a free or reduced-price school lunch.	**(+)Vending Machines, MS:** VM in or near the food service area that sold low-nutrient, energy dense foods were associated with a higher BMI z score (Beta= 0.21; p<0.05). **(-)** A la carte **, MS:** the availability of low-nutrient, energy dense foods for a la carte purchase was associated with decreased BMI z score (Beta= -0.32; p<0.01), the opposite of the hypothesized association. **(0) HS:** No stat. significant associations between school food environments and practices and BMI z scores or the likelihood of obesity. Researchers hypothesized: This could reflect the increased autonomy of these older children in obtaining low-nutrient, energy-dense foods from other locations.
Terry-McElrath et al., "The School Food Environment and Student Body Mass Index and Food Consumption: 2004 to 2007 National Data." *The Journal of Adolescent Health* 45 (3 Suppl) (September 2009): S45–56. (Fair)	District wellness policies between 2004 and 2007	National sample, MS and HS students in YES and MTF studies	**(+)Vending Machines:** + assoc. between regular sugar/fat food items in VM/other CF outlets and student obesity (OR 1.14; p<.05). **(0) Non significant:** HS: All associations between the school food environment and student overweight and obesity were not significant when% of students eligible for F/R lunch was included. **(-)** A la carte **sugar/fat food HS:** Contrary to expectations, negative associations were also observed between regular sugar/fat food items for lunch/a la carte and both overweight (OR: 0.92, p<.05) and obesity (OR: 0.86, p<.01).
Ludwig et al., "Relation Between Consumption of Sugar-sweetened Drinks and Childhood Obesity: a Prospective, Observational Analysis," *Lancet* 357 (9255) (February 17, 2001): 505–508. (Fair)	Each school received teacher training workshops, classroom lessons, PE materials, wellness sessions, and fitness funds. Compared to control schools without intervention.	n=548 ethnically diverse children; mean age 11.7,48% female, 64% white, 15% Hispanic, 14% African-American, 8% Asian, 8% American-Indian; from public schools in 4 Massachusetts communities. Randomized control. Data collected prospectively during the Planet Health Intervention: For 19 months (Oct 1995–May 1997).	**(+)** For each additional serving of sugar-sweetened drink consumed: increases in BMI (mean .24 kg/m^2; 95% CI 0.10–0.39; p=0.03) and frequency of obesity (OR 1.6; 95% CI 1.14–2.24; p=0.02) were observed. The OR of becoming obese among children increased 1.6 times for each additional can or glass of SSB drink that they consumed every day. By contrast, diet-soda consumption was negatively associated with obesity incidence.
P. M. Anderson and K.F. Butcher, "Reading, Writing, and Refreshments: Are School	Examine whether	National sample using data from the National	**(+)** 10-point increase in the % of schools in a county that allow students access to junk food leads to a 1% increase in

Finances Contributing to Children's Obesity?" *The Journal of Human Resources* 41 (3) (2006): 467–494. (Fair)	schools under financial pressure tend to adopt potentially unhealthful food policies and whether students' Body Mass Index (BMI) is higher where they are more likely to be exposed to these food policies	Longitudinal Survey of Youth 1997 (NSLY97), School Health Policies and Programs Study (SHPPS) from 1994 and 2000, and U.S. Censuses 1990 and 2000. N = 3482 students; mean age: 16.2; 451 public MS & HS. Females: .471; white .686	students' BMI (p<.00001). As average weight for sampled adolescents is about 148 pounds. This translates into about 1.5 extra pounds per 10 percentage point increase in availability. No CI available.
Martha Y. Kubik et al., "Schoolwide Food Practices Are Associated with Body Mass Index in Middle School Students," *Archives of Pediatrics & Adolescent Medicine* 159 (12) (December 2005): 1111–1114. (Weak/Fair)	School-based dietary intervention to evaluate the association between student BMI and school-wide food practices.	16 middle schools, n=3088 8th graders from the Twin Cities MN; data collected as part of TEEN Study; Randomized to intervention school. 2 year.	**(+)** Student BMI increased 10% for every additional food practice (i.e., food as incentives, classroom fundraising) permitted in their school (95% CI 0.010–0.186; p<.03.)
Emma V. Sanchez-Vaznaugh et al., "'Competitive' Food And Beverage Policies: Are They Influencing Childhood Overweight Trends?" *Health Affairs* 29 (3) (March 1, 2010): 436–446. (Fair)	Examined whether new policies restricting sales of competitive foods and beverages influenced increasing rates of overweight children in the Los Angeles Unified School District and the rest of CA. California schools: 2001–04 (pre-policy) compared to 2004–08 (post-policy), LAUSD	LAUSD and CA Schools, 5th and 7th grade students. Combined analytic sample includes more than 5 million observations. N = 5,389,819; 763,181 of those observations were from LAUSD.	After the policies took effect: **(+)**Found a significantly lower rate of increase in overweight among 5th graders in Los Angeles (p<.005). 5th-grade girls in LAUSD experienced the largest change in overweight trends. **(+)**In the rest of CA, the lower rate of increase in overweight was significant (p<.001) among 5th grade boys and 7th graders. **(+**)5th and 7th graders: Average rates of increase in overweight prevalence occurring in the period before competitive food and beverage policies took effect were **significantly reduced afterward**, even after differences in individual-, school-, and district-level characteristics were controlled for. (+) In the post-policy period, overweight prevalence was no longer significantly increasing. (0) No change in overweight trends in 7th graders in LAUSD and 5th-grade girls in the rest of CA. In the period after the

	Healthy Bev Res 2004, CA SB 677, SB12, Portion Standards 2007 State & LAUSD Policies: Regulate fruit juice, requiring 50%+ fruit juice with no added sweeteners; no added sweeteners in water and sports beverages; ≤10% of calories from sat fat (state standard applies only to snacks and MS entrées); limit the fat in milk to 2% (LAUSD: only skim/low-fat milk allowed). LAUSD Policy: foods < 35% cal from fat (excluding nuts and seeds); <10% total calories from sat fat w/trans fat; 35% added sugar by weight max; and ≤600 mg of sodium per serving; no artificial flavorings, colors, caffeine CA2007 (SB 12) state rules apply to		policies took effect, the change in overweight trends was more pronounced, and the trend changes among 5th-grade girls in CA became significant after 2005.

	snacks and entrees in MS, but only to snacks in elementary schools.			
Gary D. Foster et al., "A Policy-based School Intervention to Prevent Overweight and Obesity," *Pediatrics* 121 (4) (April 2008): e794–802. (Strong)	The purpose of this work was to examine the effects of a multicomponent, School Nutrition Policy Initiative on the prevention of overweight (85.0th to 94.9th percentile) and obesity (>95.0th percentile) among children in grades 4 through 6 over a 2-year period. Beverages: 100% juice (6-oz serving size), water (no portion limits), and low-fat milk (8-oz serving size). Snacks: allowed ≤7 g of total fat, 2 g of saturated fat, 360 mg of sodium, and 15 g of sugar per serving	4th–6th grade; 10 schools; 1,349 students; mid-Atlantic region; 2-year matched random control, repeat surveys.	**(0)** Overall calorie intake the same between intervention and control, each reporting similar intake in self-reported consumption of energy (-104 kcal/d), fat (-3.78 g/d), and fruits and vegetable (-.04/day) over 2 year. Author's Note: It is unlikely that differences in energy intake had no role in mediating the intervention effects, but there were no group differences in self-reported energy intake. Children reported decreases of 2520 to 3780 kJ per day (600–900 kcal per day) raising questions about the validity of the self-reported intake data.	**(+)** Significantly fewer children in the intervention schools (7.5%) than in the control schools (14.9%) became overweight after 2 years ($p<.05$.) **(+)** OR overweight 33% lower for the intervention group (OR: 0.67; 95% CI: 0.47–0.96; $p<.05$). **(0)** No difference (control v. intervention) for obesity incidence. **(+)** OR incidence of overweight or obesity: 15% lower for intervention group (OR: 0.85; CI: 0.74 to 0.99; $p<.05$)
D.R. Taber et al., "Banning All Sugar-sweetened Beverages in Middle Schools Reduction of In-school Access and Purchasing but Not Overall Consumption," *Archives of Pediatrics & Adolescent Medicine* (2011): E1–7. (Fair)	State policies governing the sale of soda and other SSBs in middle schools in 2006–2007. States were classified as having	Public Schools in 40 states. 5th and 8th grade students. Policy data from Bridging the Gap; state obesity prevalence data from the 2003BRFSS; student data from the Early	**(+/0)** Laws that ban only soda: **(0)** no impact on access, purchasing or consumption. Laws restricting all SSBs: **(+)** Fewer students reported weekly purchase of SSBs at	If laws could eliminate SSBs in school, overall impact could be negligible because of outside school intake.

	(1) policy banning soda and other SSBs (e.g., "Only milk, water, and 100% juice will be available in school"), (2) policy prohibiting soda but allows other SSBs (e.g., "Allowed beverages include milk, water, energy drinks, and electrolyte replacement beverages"), or (3) no policy limiting any type of SSB.	Childhood Longitudinal Study Kindergarten Cohort, 1998–2007.	school (−7.3; Range −11.0 to −3.5, p<0.001). **(0)** Overall weekly SSB consumption was not associated with state policy. **(0)** No difference across policy types in **daily** purchases. **(+)** Losing access to SSBs within school associated w/ slightly lower probability of weekly SSB consumption, slightly higher probability of daily SSB consumption.	
Richard A. Forshee et al., "A Risk Analysis Model of the Relationship Between Beverage Consumption from School Vending Machines and Risk of Adolescent Overweight," *Risk Analysis: An Official Publication of the Society for Risk Analysis* 25 (5) (October 2005): 1121–1135. (Fair)	Data for Regular Carbonated Soft Drink (RCSD) consumption in schools: Continuing Survey of Food Intake by Individuals 1994–1996, 1998 (CSFII), the National Health and Nutrition Examination Survey 1999–2000 (NHANES), and the National Family Opinion (NFO) World Group Share of Intake Panel (SIP) study	Age: 13–18, 2,748 NHANES: M: 839, F 824; CSFII: M:536, F:549.	**(0)** Found no relationship between RCSD consumption from all sources and BMI in either the CSFII or the NHANES data. The risk assessment showed no impact on BMI by removing RCSD in school. These findings suggest that focusing adolescent overweight prevention programs on RCSD in schools will not have a significant impact on BMI.	
Richard A. Forshee et al., "Sugar-sweetened	Meta-analysis of	8 longitudinal studies and 2	**(0)** Overall estimate of association was 0.004 (95% CI : -	

Beverages and Body Mass Index in Children and Adolescents: a Meta-analysis," *The American Journal of Clinical Nutrition* 87 (6) (June (2008): 1662–1671. (Fair)	SSBs and weight gain (no policy intervention)	randomized control trial studies	0.006, 0.014) change in BMI during time period for each serving per day in SB consumption with fixed-effects model; 0.017 (95% CI: -0.009, 0.044) with the random effects model. Near zero relationship between SSB and BMI
J. Van Hook and C.E. Altman, "Competitive Food Sales in Schools and Childhood Obesity a Longitudinal Study," *Sociology of Education* 85 (1) (2012): 23–29. (Weak)	Compared BMI of children attending MS with access to competitive foods (CF) vs. no access	Longitudinal. Observational; Non-Randomized Representative. N: 21,410 children. Sample from Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K), 1998–1999. Children were followed from the fall of kindergarten through the fall of 8th grade (1998–99 through 2006–07 school years).	**(0)** Children who moved into MS offering CF were no more likely to gain or lose weight than children who attended schools that did not offer CF. Weight gain between 5th and 8th grades was not associated with the introduction or the duration of exposure to CF sales in MS. In addition, children who moved out of schools that sold CF were no more likely to gain or lose weight than children who remained at schools that sold competitive foods. *Note: did not control for type of competitive foods, most commonly sold items were considered "healthy." Also, the relationship between competitive foods and weight gain did not vary significantly by gender, race/ethnicity, or family socioeconomic status.
S. Templeton et al., "Competitive Foods Increase the Intake of Energy and Decrease the Intake of Certain Nutrients by Adolescents Consuming School Lunch," *Journal of the American Dietetic Association* 105 (2005): 215–20. (Weak/Fair)	Longitudinal study of plate waste—shows relationship between consuming competitive foods and throwing out school meal items	6th grade, Franklin County, Kentucky, n=493 no competitive foods, n=250 for competitive food consumers; data were collected over 24 days in 2 school years	Students who ate CF: Macronutrient content of lunch was 19–20% lower than no CF. • Significantly higher waste: (23–32%) of school lunch nutrients, which further reduced nutrient consumption ($p<.05$). • CF purchasers reduced their school lunch servings, portion weight and/or item selection and increased school lunch item plate waste, resulting in lower intakes of energy (400 kcal vs. 530 kcal for no competitive foods), calcium (300 mg vs. 362 mg for no competitive foods), and vitamin A (77 retinol equivalents vs. 113 retinol equivalents for no competitive foods) from the school lunch; and competitive foods supplied more than 1/3 of total energy for the meal. • Students who ate CF ate less micronutrients due to higher waste: vitamin A (68% more waste), vitamin C (57% more waste), 2–3 times more waste of thiamin and riboflavin, niacin (59% more waste), folate (34% more waste), calcium (89% more waste), and iron (64% more waste), ($P<0.05$) compared to students who did not eat CF.

			• No CI available	
M. Fernandes, "The Effect of Soft Drink Availability in Elementary Schools on Consumption," *Journal of the American Dietetic Association* 108 (2008): 1445–52. (Fair/Strong)	Energy-dense SSB consumption based on access to SSBs in elementary school children	1998–99 began national cross sectional surveys, 5th graders, Early Childhood Longitudinal Study, Kindergarten cohort	(+) Controlling for covariates, limiting availability of soft drinks at school is associated with a 4% decrease (OR 1.38; 95% CI: 1.11–1.70; p<.01) in the rate of any consumption overall. (+) Black, non-Hispanic and low-income children were significantly more likely to consume soft drinks at school when available (p<0.01). (+) Children attending schools located in the South were more likely to consume soft drinks at school (p<0.001).	
Sonya J. Jones et al., "Policies That Restrict Sweetened Beverage Availability May Reduce Consumption in Elementary-school Children," *Public Health Nutrition* 13 (4) (April 2010): 589–595. (Fair)	Examined exposure to SSB policy restriction and provision of alternate beverages or not	Early Childhood Longitudinal Study Kindergarten Cohort, multilevel logistic regression; n = 107,191 children; administrator and student surveys	Children in schools with a policy that allowed SSBs were 5 times more likely (OR = 5.16, 95% CI 4.18, 6.49) to purchase at least 1 SSB at school in the past week when the presence of alternative beverages was not considered. The population-attributable risk (from RR for assoc and prevalence of availability) was 35.7%, if all schools changed to a policy of no availability of SSBs more than one-third of the children currently purchasing SSBs in elementary schools would be prevented from doing so. If the administrator did not have a policy that made an alternative beverage present, the policy regarding availability of SSBs (not available vs. available) was associated with the percentage of purchase of SSBs, about 3–4% when not available vs. 16–27% when available.	
Jason A. Mendoza et al., "Change in Dietary Energy Density After Implementation of the Texas Public School Nutrition Policy," *Journal of the American Dietetic Association* 110 (3) (March 2010): 434–440. (Fair)	Texas Public School Nutrition Policy restricted portion sizes of snacks and high-fat foods, reduced the fat content of all food, restricted sales of sweetened beverages (30 g sugar/8 oz portions, in HS 12 oz portion size for regular soda, no more than 15% of beverages can be sugared, carbonated soft	Pre- and post- TX policy, 2001–02 to 2005–05 after implementation of state policy, 3 public MS, cross sectional food records	(+) Implementation of the policy was associated with greater lunchtime consumption of vegetables, milk, and several nutrients and lower consumption of sweetened beverages, snack chips, and % energy from fat	• (+) After implementation of policy, students' energy density from drinks significantly decreased from 2.80±1.08 kcal/g to 2.17± 0.78 kcal/g (p<0.0001). • (+) Similarly, overall food and drink energy density significantly decreased from 1.38±0.76 kcal/g to 1.29± 0.53 kcal/g (p<0.0001).

	drinks), milk 2% or less		
Karen Weber Cullen et al., "Improvements in Middle School Student Dietary Intake After Implementation of the Texas Public School Nutrition Policy," *Am J Public Health* 98 (1) (January 1, 2008): 111–117. (Fair/Strong)	TX policy in all comp. food outlets; for middle schools, the policy restricts the portion sizes of high-fat and sugar snacks (limits vary by food group), sweetened beverages (≤12 oz), and the fat content of all foods served (≤28 grams of fat per serving no more than 2 times per week). It also sets limits on the frequency of serving high-fat vegetables such as french fries (3 oz per serving no more than 3 times per week)	3 MS; TX, 2001–02, 2002–03, 2005–06; repeated measures, longitudinal, natural experiment	Fewer sweetened beverages, candy, chips, and dessert foods were purchased and consumed, but more of these items were brought from home and purchased from the snack bar. Y3 after implementation: Significantly (-) overall snack chip, soda, sweetened beverage, and dessert food consumption, and reduced the percentages of these items plus candy that were consumed from vending machines. Y1–Y3: (+) F/V consumption from .61 to 1.34 servings; (+) milk intake from 2.4 to 6.5 oz; (-) Sweetened beverage intake from 5.4 to 1.5 oz; (-) Snack chip intake 0.21 to 0.04 servings.
Nicole Larson and Mary Story, "Are 'Competitive Foods' Sold at School Making Our Children Fat?" *Health Affairs (Project Hope)* 29 (3) (March 2010): 430–435. (Strong)	Review of competitive foods available in the schools and their nutritional implications for young people.	Literature Review of 23 studies examining the relationship between competitive foods, dietary intake, and students' weight.	**With few exceptions, 9 cross-sectional and 1 longitudinal studies** have found that students have better diets, relative to the recommendations of the 2005 DGA when unhealthy competitive foods are not sold at school. **Policy interventions to modify the types of competitive foods available to students:** 4 studies found no improvement in students' dietary intake (Sallis et al 2003, Lytle et al 2004, French et al, 2004; Foster et al. 2008). 3 of these (Sallis, Lytle and French) were focused on increasing access to healthy foods, not restricting unhealthy foods. **Impact on pre and post school diet:** (Schwartz 2009) When schools removed snacks and beverages (e.g., SSBs, regular chips) not meeting the nutrition guidelines, students decreased their consumption of those foods at school and

			did not compensate by increasing consumption at home. (Samuels 2008)
Anastasia M. Snelling and Teha Kennard, "The Impact of Nutrition Standards on Competitive Food Offerings and Purchasing Behaviors of High School Students," *Journal of School Health* 79 (11) (November 1, 2009): 541–546. (Weak)	**Nutrition Standards for Competitive Foods** Policy in 2006 Bevs: water, milk (1% or skim), juices containing at least 25% juice (<12 oz); Snacks <300 calories/item, fat <30% of total calories from fat, except seeds/nuts; <10% of total calories from sat. fat; sugar <35% by weight, whole grains breads and cereals offered, portion sizes 1.25 oz for snacks and sweets, 2 oz for cookies, 3 oz for bakery items and frozen desserts, 8 oz yogurt, low sodium (no #).	3 public HS, outside single metro county, nonexperimental longitudinal study, descriptive info from food offerings and purchases 2005 and 2007, coded foods by Stoplight Diet (green: low calorie, high nutrient; yellow: moderate calorie, moderate nutrient such as those meeting standards; red: high calorie, low nutrient)	(+) healthy/still buying lots unhealthy. Increased purchase of green foods (11% in 2005 to 20% in 2007), yellow foods (6% in 2005 to 34% in 2007). Students purchased the more nutritious yellow and green foods when there were fewer red food offerings. (+) Decreased offering of unhealthy red items (57% in 2005 to 30% in 2007), increased moderately healthy yellow foods (meeting standards) (18% to 48%), decreased offering of healthiest green items (fruits, vegetables) 25% to 22% in 2007.
R.R. Briefel et al., "School Food Environments and Practices Affect Dietary Behaviors of US Public School Children." *Journal of the American Dietetic Association* 109 (2 Suppl) (February 2009): S91–107. (Fair)	Impact of exposure to restrictions on low nutrient, energy dense foods (LNED), vending venues, pouring contracts	Cross sectional, SNDA III 2004–05, K-12	**Caloric Contributions from SSB** SSB from school contributed: MS a daily mean of 29 kcal; 46 kcal **(+) School without stores/snack bar:** Reduced daily SSB consumption in MS by 22 kcal ($p<.01$); HS by 28 kcal ($p<.01$). **(+) No pouring rights contract:** Reduced SSB consumption in MS by 16 kcal/school day ($p<0.05$) **(+) No a la carte offerings:** Reduced SSB consumption in MS by 52 kcal/school day ($p<0.001$).

			(+) A la carte **but no LNED:** Reduced SSB consumption in MS by 26 kcal/school day (p<0.001) **(+)No vending machine:** HS: 40 kcal fewer per day of sweetened beverages, (p=0.07). **(+) HS Consumption of LNED:** Reduced if female (46 kcal fewer, P<0.01). More than NHW if Hispanic (47kcal more), or NHAA (70 kcal) (p<0.05).
D. Johnson et al., "Impact of School District Sugar-sweetened Beverage Policies on Student Beverage Exposure and Consumption in Middle Schools," *Journal of Adolescent Health* 3 (Suppl 1) (2009): 30–7. (Fair)	Limits sugar content of beverages, limits regular (sugar-sweetened) soda, and limits beverages other than soda containing added calories.	64 schools, 28 school districts, WA, 2007–08 cross sectional	**SSB access leads to consumption** (+)The proportion of students who consumed SSB at each school was positively associated with SSB exposure at school (Pearson's correlation coefficient .40, p = .001). SSB exposure was a significant predictor of SSB behavior (beta = .16, p =.001) in the expected direction: that is, more availability of SSB at a school leads to a higher percentage of students drinking SSB.
Gail Woodward-Lopez et al., "Lessons Learned from Evaluations of California's Statewide School Nutrition Standards," *American Journal of Public Health* 100 (11) (November 2010): 2137–2145. (Fair/Strong)	Implementation of SB 12 (foods). Allowed to sell seeds, nuts, butters, low-fat dairy individual items. Snack items max of <250 calories, total 35% calories from fat, 10% total calories from sat. fat,; 35% total weight from sugar. Dairy and whole grain products must meet 35/10/35, and max of <175 calories. Entrees must have <35% of calories from fat, 400 cal max. SB 965 (Drinks): 50–100% fruit and	Data from HEAC and School Wellness Studies, 7th & 9th grade, 2005–08 and 2007–09	(+/0) After legislation Gen non significant trends: (-) consumption of sports drinks, candy, and chips at school, (+) consumption of milk and fruit. At home only significant change in consumption was water (+)—not compensating at home.

	vegetable drinks no added sweeteners, water no added sweeteners, milk and dairy alternatives ≤2% fat, 28 g total sugars, 8 oz, sports drinks no caffeine, 42 g added sweetener max per 20 oz in MS/HS		
Martha Y. Kubik et al., "The Association of the School Food Environment with Dietary Behaviors of Young Adolescents." *American Journal of Public Health* 93 (7) (July 2003): 1168–1173. (Weak/Fair)	Multicomponent intervention including promotion and offering 100% fruit juice, water, low-fat milk, fruit and vegetables, lower fat options. Limiting higher fat a la carte options and snacks with more than 5 g of fat and fruit drinks	16 middle schools, n=598, Twin Cities MN; 1998–2000; TEENS; randomized to intervention school. 2 Year.	(+) Students from schools w/o a la carte consumed More than ½ a serving more of fruits per day than did students in schools w/ a la carte (1.95 vs. 1.30 servings; diff 0.65 (CI 0.24,1.07) P= .005). (-) Students w/o a la carte consumed, on average, nearly an entire serving more of fruits and vegetables than did students from schools with such programs (4.23 vs. 3.39 servings; diff 0.84 (CI 0.13,1.54); P=.02.) Schools w/o a la carte : consumed a mean % of daily calories from total fat that met the USDA dietary recommendations, whereas those from schools with these programs exceeded the recommendations (28.49% vs. 31.08%; diff–2.59 (CI–4.71,–0.47); P=.02). Students w/o a la carte : Exceeded USDA dietary recommendations (% daily calories from saturated fat) by less than 0.5%, whereas students exposed to a la carte reported mean intakes 1.5% higher than recommended levels (Difference–1.06 (CI–2.02,–0.09); P=.03).
Karen Weber Cullen and Debbe I. Thompson, "Texas School Food Policy Changes Related to Middle School a la carte/snack Bar Foods: Potential Savings in Kilocalories," *Journal of the American Dietetic Association* 105 (12) (December 2005): 1952–54. (Fair)	Texas state policy in 2004 impacting the school CF venues including limiting sweetened beverages to 12-oz containers and high-fat, salty, and sweet foods to small, single-serving packages	23 MS in TX, cross sectional; used sales records to estimate the energy savings to children from policy changes	(+) By reducing portion sizes to smaller, single-serving packages, mean kilocalories were reduced to 64 kcal/day/student (range: 21–121), mean 47 kcal per student was saved on a daily basis (range: 13–75). Over a 180-day school year, an energy deficit equivalent to about 2 lb could occur if students replaced the large portion-sized snacks and beverages with the smaller sizes on a 1-to-1 basis, did not buy multiple small bags or small drinks, did not consume additional other foods or beverages, and did not change physical activity levels.

Jill Hartstein et al., "Impact of Portion-size Control for School á La Carte Items: Changes in Kilocalories and Macronutrients Purchased by Middle School Students," Journal of the American Dietetic Association 108 (1) (January 2008): 140–144. (Weak/Fair)	Intervention: a la carte /snack bar Goals: reduce all regular chips serving size bags to ≤1.5 oz, increase lower-fat chip offerings by 25%; offer bottled water in a 20-oz size, and limit all sweetened beverages to ≤12 oz	6 schools total: 2 schools in pilot in each CA, NC, TX 2004, cross sectional part of baseline, MS	(+) Across 6 schools: Significant increase in percent of kilocalories from protein (P=0.03) and ounces of water (P=0.01), significant decrease sweetened beverages (P=0.01), regular chips (P=0.03).There was a significant reduction in kcal density per item sold P<0.01 for 2 of the schools.
A.L. Cradock et al., "Effect of School District Policy Change on Consumption of Sugar-sweetened Beverages Among High School Students, Boston, Massachusetts, 2004–2006," *Preventing Chronic Disease* 8 (4) (2011): A74. (Fair)	Boston Public Schools Snack and Beverage Policy restricting sugar-sweetened beverages in Boston schools. Precludes sale of soft drinks, fruit drinks (i.e., non–100% vegetable or fruit juice beverages), and sports drinks anywhere in school buildings or on school campuses and had specifications that limited other beverage serving sizes.	Quasi experimental study 2004: N= 1,079, 17 HS 2006: N=1,233, 18 HS	(+) After the policy implementation restricting sale of SSB in school: (+) HS: Significant decreased consumption of 1.71 (CI 95% 1.61–1.81) servings of SSB (2004) vs. 1.38 (CI 95% 1.30–1.47) servings (2006). Significant declines in consumption of soda (−0.16 servings; CI:−0.23 to −0.08), other SSB (−0.14 servings; CI: −0.23 to −0.06), and total SSB (−0.30 servings; CI: −0.43 to −0.17) between 2004 and 2006 (P<.001 for all). NHANES indicated no significant nationwide change in adolescents' consumption of sugar-sweetened beverages between 2003–2004 and 2005–2006.

Table A8.4 Impact of policy on school service revenues

Study/Score	Policy	Population/Design	School Service Impacts
Arizona Department of Education, *Arizona Healthy School Environment Model Policy Implementation Pilot Study* (Arizona Department of Education, 2005). (Fair)	No foods of minimal nutritional value sold during school day; nutrient requirements for all vending and a la carte options. Policy includes 1) food service operation; 2) nutrition education; 3) food choices at school and 4) physical education and healthy school environment. Items 1 and 3 were required and 2 and 4 were suggested. AZ Dept of Education supplied each of the 8 pilot schools with nutrition and physical education curricula to facilitate items 2 and 4	8 schools (ES/MS/HS); preliminary evaluation of a pilot study	(0) Each school that offered additional foods via vending, al a Carte or school stores showed no negative financial impacts after making healthy changes to their food selections.
D. B. Bellis, "School Meal Programs: Competitive Foods Are Widely Available and Generate Substantial Revenues for Schools. Report to Congressional Requesters. GAO-05-563" (US Government Accountability Office, 2005). (Fair)	Reports information from 2 nationally representative surveys about the prevalence of competitive foods in schools, competitive foods restrictions and groups involved in their sale, and the amounts and uses of revenue generated from the sale of competitive foods.	CA, CT, MI, MO, SC	(-/+) The effects of changes on revenues were often unclear because of limited data. From the limited data available, it appears that changes had varied effects on revenues across districts.

Study/Score	Policy	Population/Design	School Service Impacts
Brown et al., "Managing Sales of Beverages in Schools to Preserve Profits and Improve Children's Nutrition Intake in 15 Mississippi Schools," *J Am Diet Assoc.* 109 (12) (December 2009): 2036–42. (Fair/Strong)	3 changes to beverage vending were implemented over the course of the 2005–06 school year. Schools agreed to work with beverage vendors to change the faces of vending machines or display cases in school stores to reflect physical activity, school logos, or any of the more healthful beverage choices. Schools also agreed to change the drinks offered to increase the number of more healthful choices offered and reduce the number of sweetened non-nutritive beverages. Each school could determine the specific mix of beverages offered to meet local needs as long as no more than 50% of the choices included sugar-sweetened beverages. Schools were asked to price more healthful drinks lower than sweetened non-nutritive beverages by 25% when possible (actual pricing ranged from 10% to 25% discounts).	Prospective, quasiexperimental study; examining 2 K–12 schools, 8 MS, 5 HS	(-/+) Relative to profits, 3 schools reported lower profits in the 2005–06 school year as compared to the 2004–05 school year. Total annual profits in 2005–06 were lower than those reported in 2004–05. There appeared to be no specific impact of enrollment or the percentage of children receiving free meals on profits or units sold. The largest, most affluent schools were not the most profitable schools relative to beverage sales. Similarly, schools with 75% to 95% free meals were in the middle profitability range ($6,000 to $14,000). Schools with 100% free meals reported between $300 and $5,000 in profits. The range of profits in both years demonstrates the variability in profit by individual schools.

Study/Score	Policy	Population/Design	School Service Impacts
Center for Weight and Health, University of California, Berkeley, *Pilot Implementation of SB 19 in California Middle and High Schools: Report on Accomplishments, Impact, and Lessons Learned.* (Berkeley, CA: Center for Weight and Health, University of California, Berkeley, 2005). (Fair/Strong)	California Senate Bills 19 and 56, (the Pupil Nutrition, Health and Achievement Act of 2001) Specifically, the 16 pilot schools were required to develop and implement policies to address the following: • SB 19/56 nutrition standards for competitive foods and beverages • Increased availability, access to, and consumption of California-grown fruits and vegetables (through the Buy California Initiative of 2002) • Nutrition education supporting the link between food choices, health, and physical activity • Healthy fundraisers • Ensuring that students do not go hungry • Sufficient levels of vigorous physical activity Each school was awarded approximately $200,000 for a total ranging from $197,000 to $740,000 per district to cover a 21 month implementation period from January 2003 through September 2004.	16 middle and high schools in 9 California school districts; policy evaluation	(-/+) Thirteen out of the 16 sites (81%) achieved increases in food service per capita gross revenues (reimbursable meals plus a la carte) from year 1 to year 2. (-) 14 out of the 16 sites (88%) experienced decreased food service a la carte revenues from year 1 to year 2. Decreases in a la carte revenues of 43% to 89% in 8 of the 14 sites resulted from the complete elimination of student a la carte food offerings. (+) Increases in reimbursable meal sales compensated for losses in a la carte sales in 11 of the 14 schools that experienced such losses (79%).

Study/Score	Policy	Population/Design	School Service Impacts
Connecticut State Department of Education, *Summary Data Report on Connecticut's Healthy Snack Pilot.* (Hartford, CT: Connecticut State Department of Education, 2006). (Weak/Fair)	The Healthy Snack Standards focus on decreasing fats and sugars, increasing nutrient density and moderating portion sizes. During the pilot year, the 5 schools that followed the Healthy Snack Standards eliminated all snack foods and beverages that did not meet the standards. The only beverages sold were milk, water (without sugar or artificial sweeteners) and 100 percent juice. The choice of snack foods was locally determined at each school, based on such factors as current snack offerings, student preferences, cost and availability. Schools could choose any snack foods from CSDE's list of approved snacks.	Sep 2003 to June 2005—evaluation of Healthy Snack Pilot: 8 schools	(-/+) Free-meal eligible students increased in 5 schools, with the increase ranging from 3 to 27 students (7.3 percent to 325 percent). Free-meal eligible students decreased in 3 schools, ranging from 1 to 47 students (0.3 percent to 17.8 percent). Reduced-price meal eligible students increased in 3 schools, with the increase ranging from 2 to 6 students (6.1 percent to 60 percent). From year 1 to year 2, the student food cost percentage increased in 7 of the 8 schools. Food costs did not change appreciably when healthy snacks were provided.
Karen W. Cullen and Kathleen B. Watson, "The Impact of the Texas Public School Nutrition Policy on Student Food Selection and Sales in Texas," *American Journal of Public Health* 99 (4) (April (2009): 706–712. (Weak/Fair)	Lunch food production records from 47 schools in 11 Texas school districts for the school years before (2003–04) and after (2004–05) policy implementation. Cafeteria servings of fruit, vegetables (regular and fried), and milk served each day were calculated. 23 schools from 5 districts provided records of a la carte sales of candy, chips, desserts, drinks, ice cream, and water. We examined aggregated school-level differences in total items served or sold per day per student between study years.	Repeated measures, ANOVA, between-group factors (school level: primary and secondary; district size: small and large). We examined main effects for year, school level, and district size, with interactions for year by school level and year by district size included.	Revenue and Sales data not reported, though sales of unhealthy foods decline: Regardless of district and school size, cafeterias served significantly fewer high-fat vegetable items per student post policy (P<.001). Post policy snack bar sales of large bags of chips were significantly reduced (P=.006), and baked chips sales significantly increased (P=.048).

Study/Score	Policy	Population/Design	School Service Impacts
Karen Weber Cullen et al., "Improvements in Middle School Student Dietary Intake After Implementation of the Texas Public School Nutrition Policy," *Am J Public Health* 98 (1) (January 1, 2008): 111–117. (Strong)	TX policy in all comp. food outlets; for middle schools, the policy restricts the portion sizes of high-fat and sugar snacks (limits vary by food group), sweetened beverages (≤12 oz), and the fat content of all foods served (≤28 grams of fat per serving no more than 2 times per week). It also sets limits on the frequency of serving high-fat vegetables such as french fries (3 oz per serving no more than 3 times per week).	3 MS; TX, 2001–02, 2002–03, 2005–06; repeated measures, longitudinal, natural experiment, We report the results of a naturalistic study that assessed the effect of the Texas Public School Nutrition Policy on lunch consumption of middle school students in southeast Texas.	(+) Increase in free (77%), reduced-price (127%), and full price (143%) NSLP meals served in year 3 compared with year 1. Each school recorded an increase of about 200 students during this period and an increase in the number of children eligible for free or reduced-price meals.
S.A. French et al., "Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study," *Am J Public Health* 91 (1) 2001: 117. (Fair)	Low-fat snacks introduced into vending machines at reduced cost; promotions of low-fat options	Convenience sample of 12 schools in Minneapolis–St. Paul, Minn. Sites selected for demographic and geographic diversity.	(0) Price reductions of 10%, 25%, and 50% on low-fat snacks were associated with significant increases in low-fat snack sales; percentages of low-fat snack sales increased by 9%, 39%, and 93%, respectively. Promotional signage was independently but weakly associated with increases in low-fat snack sales. Average profits per machine were not affected by the vending interventions.
Simone A. French et al., "An Environmental Intervention to Promote Lower-fat Food Choices in Secondary Schools: Outcomes of the TACOS Study," *American Journal of Public Health* 94 (9) (September 2004): 1507–1512. (Strong)	Decrease in price for low-fat a la carte options; student-run promotions of low-fat foods	20 secondary schools, St. Paul MN; TACOS; 2 year group randomized control	(0) No significant differences over time were observed for any of the food service revenue variables examined.
S.A. French et al., "Pricing strategy to promote fruit and vegetable purchase in high school cafeterias," *Journal of American Dietetic Association,* 97(9) (1997): 1008–1010. (Fair)	Price of fruit, carrots, salad reduced by approx. 50%; use of promotions for reduced-price foods	2 high schools; intervention; 3 observations	(0) Price reduction led to increased sales of fruit and carrots (no change for salad); no significant change in total dollar sales for a la carte purchases during intervention period

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GAO-03-569: *School Meal Programs. Revenue and Expense information from Selected States* (2003). (Fair)	In school year 1996–97, the Department of Agriculture instituted more stringent requirements for the nutritional content of school meals. GAO was asked to study the school food service revenues and expenses and how they have changed since the requirements went into effect.	6 states; secondary data analysis	(-) The 6 states had a small though increasing shortfall in total revenue compared to expenses over the 5-year period. Their total expenses increased by about 22 percent, while their total revenues increased by about 20 percent. The portion of total school food service expenses covered by federal reimbursements declined from 54 to 51 percent, and the portion of expenses paid by state funds was small and declined slightly. Labor and food purchases were the principal expenses for the 6 states, sharing nearly equal proportions and changing only slightly. Labor expenses, which included salaries and benefits for food service employees, grew slightly while food expenses decreased slightly. Other expenses, such as contract services, made up a smaller portion of expenses, and this portion remained constant.
R. E. Litchfield and B. Wenz, "Influence of School Environment on Student Lunch Participation and Competitive Food Sales," *Journal of Child Nutrition & Management* 35(1). (Fair/strong)	Examined NSLP participation and CF purchasing among students before and after local wellness policy implementation and assessed factors in the school environment influencing NSLP participation and CF purchasing. Data was collected as part of the USDA-funded Team Nutrition Local Wellness Demonstration Project, a 3-state collaborative project.	Selected school districts (N = 16) included 8 large and 8 small districts, each comprising 4 high and 4 low policy scores. Data were collected for large districts in 1 elementary school (ES), 1 MS and 1 HS, while small district data collection included all buildings (K–12). ES were excluded from data analysis because no CF was available to students in any of the districts. Data were analyzed as 8 MS, 8 HS, and 8 small school (SS) (N = 24).	(0) NSLP meals per student per week and CF sales per student per year did not change significantly over the 3 years.

Study/Score	Policy	Population/Design	School Service Impacts
Michael W Long et al., "Evaluating the Impact of a Connecticut Program to Reduce Availability of Unhealthy Competitive Food in Schools," *The Journal of School Health* 80 (10) (October 2010): 478–486. doi:10.1111/j.1746-1561.2010.00531.x. (Fair)	Evaluating the impact of Connecticut's Healthy Food Certification (HFC), a program which provides monetary incentives to school districts that choose to implement state nutrition standards for all foods sold to students outside reimbursable school meals. HFC certification required districts to eliminate the sale of unhealthy snacks in both vending and a la carte.	Food service directors from all school districts participating in the National School Lunch Program (NSLP) (N = 151) in Connecticut were surveyed about the availability of competitive foods before and after the 2006–07 implementation of HFC. Food categories were coded as healthy or unhealthy based on whether they met the Connecticut Nutrition Standards. Data on NSLP participation were provided by the State Department of Education. Changes in NSLP participation and availability of unhealthy competitive foods in elementary, middle, and high schools were compared pre- and post-HFC across districts participating (n = 74) versus not participating (n = 77) in HFC.	(-/+) Average NSLP participation increased across the state. Participating in HFC was associated with significantly greater NSLP participation for paid meals in middle school; however, implementing HFC did not increase overall NSLP participation beyond the statewide upward trend.
C. Peterson, "Competitive foods sales are associated with a negative effect on school finances," *Journal of the American Dietetic Association* 111(6): 851–7. (Strong)	Examine revenue from competitive foods vs. school lunch	Observational study used a multivariate time series analysis of annual foodservice financial data from repeated observations of 344 Minnesota public school districts between 2001 and 2008 (N =2,695). First, revenue from competitive foods was assessed in terms of whether or not such revenue displaced or complemented revenue from	(-) significant negative relationship between competitive foods revenue and reimbursable meals revenue, even while controlling for districts' foodservice and demographic characteristics.

Study/Score	Policy	Population/Design	School Service Impacts
		reimbursable meals. Second, profit from competitive foods was assessed in terms of whether or not such profit displaced or increased total school foodservice profit.	
C. Probart et al. "Factors Associated with the Offering and Sale of Competitive Foods and School Lunch Participation," Journal of the American Dietetic Association 106(2) (2006): 242–247. (Strong)	NA	Random sample of 271 high schools in Pennsylvania that were selected to be representative of the entire population of high schools in Pennsylvania based on chosen demographic characteristics. Statistical analyses: Descriptive and multiple regression analyses.	(-) % of students eligible for free or reduced price lunch were significant predictors of a la carte sales; enrollment negatively associated with number of vending machines; enrollment inversely related to average daily participation in school lunch
Sarah E. Samuels et al., *Healthy Eating, Active Communities Phase 1 Evaluation Findings 2005–2008*. (Oakland, CA: Samuels and Associates, 2009). (Weak/Fair)	Implementation of SB 12 and SB 965. Allowed to sell seeds, nuts, butters, low-fat dairy individual items. Snack items must have a max of<250 kcal, max total 35% calories from fat, 10% total calories from saturated fat, 35% total weight from sugar. Dairy and whole grain products must meet 35/10/35, and be <175 calories. Entrees must have <35% of calories from fat, 400 cal max	6 MS in CA, 2005 and 2008, multicomponent intervention including wellness policy changes from state bills, HEAC	(0) Meal sales appear to be the most important indicator of food service financial health; a la carte sales and vending sales did not contribute substantially to the bottom line in these schools.
West Virginia University, Robert C. Byrd Health Sciences Center, Health Research Center. *West Virginia Healthy Lifestyles Act: Year One Evaluation Report*	Implementation of the Act's school-based components, which provide policy direction for physical education, health education, fitness assessments, body mass index (BMI)	Natural experiment of policy impact in traditional public schools in West Virgina (n=696)	(-/+) Findings based on qualitative data only; results were mixed with 80% of principals reporting stable or increased revenue and superintendents reporting that vending income is a significant part of their revenue stream.

Study/Score	Policy	Population/Design	School Service Impacts
(Morgantown, WV: West Virginia University, 2009). (Weak)	assessments and the availability of vended beverages on campus, began in August 2006.		
Janet M. Wojcicki and Melvin B. Heyman, "Healthier Choices and Increased Participation in a Middle School Lunch Program: Effects of Nutrition Policy Changes in San Francisco," *American Journal of Public Health* 96 (9) (2006): 1542–1547. (Fair/Strong)	SFUSD Nutrition Standards	SFUSD, surveys, 1 class per grade level in schools <500; 2 classes per grade level schools 500–1,200; 3 classes per grade levels schools >1200	(-/+) At worst, revenues did not change and profits at some schools increased. The increase in revenue can be explained by the increase in overall participation in the federally subsidized school lunch program. Participation in the federally subsidized reduced-price lunch program, in contrast to the free lunch program, decreased in the 2003–04 school year. Despite the decrease in reduced-price meal participation at these schools, the district experienced an overall increase in participation in the federally subsidized school lunch program (both free and reduced price) because of the larger number of free student lunches provided to students in the 2003–04 school year than in the 2002–03 school year. Participation in the paid lunch line (which offered food also provided as part of the free and reduced-price lunch program) decreased from the 2002–03 school year to the 2003–04 school year.
Gail Woodward-Lopez et al., "Lessons Learned from Evaluations of California's Statewide School Nutrition Standards," *American Journal of Public Health* 100 (11) (November 2010): 2137–2145. (Fair/Strong)	Evaluation of CA statewide nutrition standards—California, Senate Bill 12 (SB 12)	Data from HEAC and School Wellness Studies, 18+ HS in CA, 2005–08 and 2007–09	(-/+) at the 5 schools that provided data for non-food service sales of competitive foods and beverages, 4 venues experienced a decrease in revenue of more than 5%, and 1 venue experienced an increase of 1 cent per student per day; food service a la carte sales decreased at 60% of the schools. However, meal sales increased at all schools, and these increases were large enough to compensate for the reduction in a la carte sales, such that all schools experienced an increase in total revenues.

Study/Score	Policy	Population/Design	School Service Impacts
J. Johanson et al., *Raw Deal: School Beverage Contracts Less Lucrative Than They Seem.* (Washington, DC: Center for Science in the Public Interest; 2006). (Strong)	Analysis of 120 school beverage contracts from 16 states.	Secondary analysis of school beverage contracts across ES/MS/HS	(-) School beverage contracts generate an average of $18 per student per year for schools and/or school districts and schools/districts have negotiated very different deals with the same companies. Revenue to schools/districts ranged from about $0.60 to $93 per student per year. The majority of schools/districts had total annual revenues of less than $20 per student. Only 1 small high school had total annual revenue of more than $50 per student. The majority (67%, on average) of revenue generated from school beverage sales goes to beverage companies rather than to the schools. Children (and their parents) have to spend 1 dollar in order for their school to raise 33 cents.

Appendix 8: The Peer Review Process

As noted in Appendix 5 of the report, numerous stakeholders were engaged throughout the course of the HIA, including a formal advisory committee and interviews with those whom the policy would directly affect, such as students, parents, teachers, advocates, industry representatives, and content experts in the field. In addition, the full report underwent an external peer review process.

The National Research Council of the National Academy of Sciences notes that peer review occurs only intermittently with HIAs and that the benefits should be weighed carefully against the risk of delays that would render the assessment less relevant in the policy decision-making process.* In this case, however, the research team felt that the report would benefit from the added scrutiny and rigor of external peer review, as this is the first HIA to be conducted on a federal rulemaking process.

Thus, the research team developed a list of content and HIA process experts and invited two individuals to review the full report—one an experienced researcher in the topic area, the other a specialist in the field of HIAs. Each reviewed the document in full and provided feedback to the research team. Reviewers' comments were integrated into the final report or otherwise addressed. Following publication, each individual was provided a response to all comments submitted as part of the peer review process, indicating if changes were made. If no changes were made, a rationale was provided for this decision. In order to provide timely input into the federal rulemaking process, the reviewers were not provided an opportunity to reevaluate the revised report prior to publication.

Reference for Appendix 8

* National Research Council of the National Academies, *Improving Health in the U.S.: The Role of Health Impact Assessment* (Washington, D.C.: The National Academies Press, 2011).