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Have You Counted the Ingredients on Your Child's Lunch Tray?: An Economic Analysis of Sustainability Initiatives Within the School Lunch Program

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Abstract

In 2010, President Obama signed the Healthy Hunger Free Kids Act, establishing a monetary incentive for schools that served meals following a more rigorous nutritional requirement than standard guidelines. This act is a step in the right direction towards placing more importance on school lunches, however America's lunchroom practices continue to be environmentally unsustainable, and students absorb this message. The production and transportation of processed cafeteria food contributes to climate change, its packaging is polluting, and its consumption contributes to obesity. The use of premade foods and sales from vending machines increase as lunch times grow ever shorter. In addition, poor school lunches are connected to lower standardized test scores, attendance rates, and graduation rates. Fortunately, solutions to these problems are possible through school lunch program initiatives. Some examples are farm to school programs, food education, school gardens, cooking lessons, taste tests, etc. Studies are beginning to show that these initiatives improve student food choice, willingness to try new foods, and the environmental impact of the school, to name a few. So why do most programs remain unchanged and why haven't lawmakers encouraged these initiatives in the National School Lunch Program? Is it a matter of costs, effort, or a lack of knowledge? Using economic analysis, this research seeks to uncover the benefits of the National School Lunch Program and further uncover potential policies that could increase the use of innovative strategies and take the benefits beyond the cafeteria.

Introduction

In 2010, President Obama signed the Healthy Hunger-Free Kids Act, which established a more rigorous nutritional requirement for school lunches than standard school lunch guidelines. Once in effect in 2012, school districts that served meals meeting these higher standards would be reimbursed for each meal served with an additional six cents subsidy. This created a monetary incentive to motivate schools to serve healthier meals (Healthy, Hunger-Free Kids Act of 2010, December 13, 2010). With improving childhood health as the focus of her platform, First Lady Michelle Obama also pushes for progress in school cafeterias through her *Let's Move* Campaign. The *Let's Move* website discusses the issue, the progress made with the Act in effect since 2012, and provides links to USDA resources that help schools provide healthier school meals. A key component of the first lady's initiative is the HealthierUS School Challenge, a rigorous set of standards for school lunch program food quality, participation, nutrition education, and physical activity opportunities. In February of 2012, the number of U.S. schools meeting the HealthierUS Challenge was 2,862, surpassing the goals for the program. *Let's Move* has also helped match local chefs with schools to help create meals that are more nutritious and better-tasting for kids. Mrs. Obama has also challenged the country to put 6,000 salad bars in schools. Helping districts achieve this is the *Let's Move Salad Bars to Schools* campaign under the Food Family Farming Foundation, National Fruit and Vegetable Alliance, United Fresh Produce Association Foundation, and Whole Foods Market (Healthy Schools, n.d.).

The United States has been recognizing the consequences of their food choice on their weight and health more and more. Obesity, in adults as well as children, has become an epidemic in this country (Rethinking School Lunch, 2010). The Healthy, Hunger-Free Kids Act and Michelle Obama's campaign are examples of how the government has begun taking action

against obesity by introducing healthier food options to America's children. School lunch programs create an avenue to accomplish this because they are in the hands of the federal government already, since most operate under the USDA's National School Lunch Program (NSLP) (National School Lunch Program, 2013). These efforts to improve school lunches imply that policy makers recognize the importance of forming healthy eating habits during childhood, and so leaders need to ensure that school children in the U.S. are receiving the correct message about food. Human health, however, is only one of the many issues tied to how we educate our children about food, and offering more nutritious food in schools only partially addresses these problems. The Center for Ecoliteracy outlines some of the issues school lunch is connected to in their *Rethinking School Lunch* document (2010). They are matters of environmental sustainability, nutrition, public health, justice, community, economics, and academic achievement.

Several studies and reports (Azuma and Joshi, Cohen et al, Center for Ecoliteracy, National Farm to School Network, Dillard, Action for Healthy Kids, Kavanagh, etc.) recognize that initiatives must make fundamental, system-wide, and comprehensive changes to school lunch programs to effectively benefit student health, environmental sustainability, and the community. This is because this type of change ensures that initiatives will influence children's lifestyle choices and increase the likelihood of the improvements carrying over into adulthood. When executed in this way, school lunch programs have the potential to inspire future generations of consumers who are environmentally-conscious, active in supporting their local communities, and who understand where their food comes from. Though schools may face challenges in implementing comprehensive lunch program initiatives, the changes are in the interest of the schools themselves, as lunch can be a valuable resource for education and

initiatives can be financially viable (Rethinking School Lunch, 2010). Further support for why we should reform school lunches comes from the National Farm to School Network. The organization provides a fact sheet that demonstrates the cross-sectoral benefits of farm to school programs (The Benefits Of Farm To School, 2016). The following sections provide rationale for implementing school lunch program initiatives in further detail and are categorized by the topics that the issues connected to school lunches fall under, as previously mentioned.

Environmental Sustainability, Nutrition, and Public Health

The Center for Ecoliteracy states that focusing on the reform of school lunch programs for the environment goes hand-in-hand with improving the nutrition of school meals. Nutrition and food choice is strongly linked to environmental sustainability. The source of our food and how it is produced largely influences the conditions of the environment. Growing, processing, transporting, marketing, preparing, and disposing of food contribute to sustainability topics such as resource use, energy, pollution, water, soil conservation, and workers' rights. Food discussion can also lead to understanding the interrelations of hunger, trade policy, energy use, and climate change (Rethinking School Lunch, 2010). With the information and processes learned through lunch program initiatives connected to large public policy issues, we see that the matter is about much more than just school lunch.

Through being more environmentally conscious when sourcing ingredients for school food, the nutritional value often improves as well. Nutrition and food quality is an important focus for school lunches due to the epidemic of diet-related disease that the United States currently faces. One in every three children in the U.S. is overweight or obese, and obesity increases the risk of detrimental diseases such as diabetes, heart disease, hypertension, osteoporosis, and several types of cancer (Center for Science in the Public Interest, 2012). The

majority of the Americans polled (73%) agree that preventing childhood obesity is an important government priority (Robert Wood Johnson Foundation & Trust for America's Health, 2010).

This epidemic exists largely because American children's diets do not support good health. According to researchers at the University of California, adolescents in the United States are only consuming an average of 3.5 of the recommended seven to eight servings of fruits and vegetables per day. In addition, this tends to decline as they become teenagers (C. & Atkins, 2010). On the USDA's Healthy Eating Index, 80 is the minimum score for a healthy diet out of 100, and the average American child scores a 55.9 (Diet Quality of Children Age 2-17 Years as Measured by the Healthy Eating Index-2010, 2013).

Schools share a part of the responsibility to teach and show children about nutrition and lifestyle choices to help them adopt long-term healthy behaviors. Though lunch is only a small part of children's exposure to food throughout the day, the White House Task Force on Childhood Obesity states "The school environment impacts the behavior, and thus the health and well-being of students... Children's choices depend on what is visible and easily accessible; seemingly small differences in the school environment can have large impacts on what children eat" (Solving The Problem of Childhood Obesity Within a Generation, May 2010, p.37). Schools must help our children understand the connection between their food choice, their health, and the environment to begin reversing the trends of declining individual and environmental health in the United States.

Justice, Community, and Economics

Additional reasons for school lunch reform initiatives exist that are interconnected with nutrition and sustainability. Sourcing sustainable food for school lunches supports local

agriculture and the local economy. It stimulates local economic activity, increases income for local farmers, and creates jobs. Purchasing sustainable food for schools also helps to ensure improved working conditions for the growers and processors. School meals play a part in our community because they improve the food security of families: the better the quality of food children receive in schools, the more food security for the children and their families. School meals are especially important to children from low-income families who qualify for free or reduced-price lunches because this aid also improves food security. Ensuring meals for low-income family children also provides incentive for their parents to send them to school. The students receiving free or reduced-price lunch make up two-thirds of participants in the National School Lunch Program. According to the House Committee on Education and Labor, school lunch is the only opportunity for millions of these kids to eat a healthy meal all day. As our children's understanding of food systems, the environment, and the importance of buying local and healthy food increase, so will that of the community, as their knowledge and choices influence their parents and other adults around them. (Rethinking School Lunch, 2010).

Academic Achievement

Perhaps one of the most persuasive reasons to reform school lunch programs is that they can be used to improve the main purpose of schools, which is education. Schools can take advantage of the impact that food and nutrition has on academic achievement through initiatives. Studies show that better nutrition is connected to higher achievement on standardized tests as well as improved cognitive function, attention, memory, attendance, cooperation, and other behavioral indicators (Rethinking School Lunch, 2010). The National Farm to School Network has found that farm to school initiatives have enhanced overall academic achievement, increased knowledge on agriculture, gardening, eating healthy, local foods, and seasonality, as well as

improved student life skills, self-esteem, and social skills (The Benefits Of Farm To School, 2016).

School lunch initiatives place a higher importance overall on meals for student achievement, but some current trends in school systems show that they are moving in the opposite direction. For example, with the pressure of standardized test scores determining government funding to schools, districts are cutting lunch times shorter and shorter for more instructional time (Godoy & Aubrey, 2015). The Pennsylvania Department of Education requires at least five hours per day of academic instruction in a 180 day school year for elementary school students, and more for secondary school students (Instructional Time and Act 80 Exceptions, 2009). By contrast, many school districts allot only 15-20 minutes to school lunch, which includes time spent waiting in cafeteria lines. Researchers at Harvard University have found that lunches shorter than 25 minutes rush kids to eat, and therefore they eat less (Cohen, et al., 2015). This research concludes that lunch times of at least 25 minutes may improve dietary intake of children and decrease waste from lunchrooms (Cohen, et al., 2015). Giving children enough time to eat is important in seeing the benefits of proper nutrition for academic success. School lunch program initiatives must recognize this in order see the positive impacts of the changes they make. Initiatives providing ample time for lunch will see better results because children are more likely to reach for the healthier options that initiatives bring into cafeterias and actually consume them. Given this information, schools that are decreasing cafeteria time may actually be hurting standardized test results. Placing more priority on lunch programs, and not just time in the classroom, for better standardized test scores may be a more productive strategy for schools to follow.

Challenges in Procurement of Initiatives

Pressure on schools for good test scores is only one of many obstacles preventing schools from taking advantage of the benefits that come with making lunch programs a priority. School districts face challenges procuring school lunch program initiatives. A key reason for this is that the National School Lunch Program is run by the USDA, and the USDA's agricultural interests reflected in the NSLP guidelines may make sourcing fresh, local ingredients difficult for schools. According to J. Amy Dillard of the University Of Baltimore School Of Law, as long as the NSLP functions under the USDA, the food served in school lunches will always be in the favor of agricultural lobbies (2008). The conflicting objectives of the National School Lunch Program, to promise a market for United States agriculture and also support children's health, complicate sourcing sustainable and healthy food for school meals. This is because through the USDA's Federal Farm Bill, school children are primarily fed agricultural commodities overproduced by agribusinesses, and the interests of agribusiness are usually not in line with the sustainability and health interests of school lunch programs (Dillard, 2008). Agribusiness is the industry of farming and agriculture, which like any other large industry, favors corporate profits over the wellbeing of consumers or the conditions of the planet (Food and Agriculture, n.d.).

The commodity foods that schools receive are primarily wheat, oats, corn, soybeans, sugar crops, and other grain and fiber crops. These are the focus products of agribusinesses and are produced using heavily industrial farming practices, which are environmentally unsustainable and can compromise the nutritional value of the food. These practices include mono-cropping, heavy commercial fertilizer use, intensive pesticide use, reliance on genetically engineered seeds, exhaustive water irrigation, and mechanized farming methods. The industrial production of animal products, with the use of concentrated animal feeding operations (CAFOs), is also environmentally unsustainable (Industrial Crop Production, 2016). Government support for

commodity crops makes their production much cheaper, and so most large-scale farmers produce them over more nutritional plant foods. In addition, these crops are seldom consumed by people directly. They are usually processed into products like high fructose corn syrup and enriched wheat flour before eaten or fed to livestock for animal products. In fact, 47% of the soy and 60% of the corn grown in the United States is fed to livestock (Animal Feed, 2016).

The issue with the government supporting industrial livestock through agricultural subsidies is that animal products are much less healthy than plant-based foods and the production of them is detrimental to the environment. Governmental support for animal products also comes in the form of the USDA's commodity foods program. Through this program, the USDA purchases millions of dollars' worth of agricultural dairy and meat commodities to benefit agribusiness in the United States. These food products are then distributed to food assistance programs, including the National School Lunch Program. According to the Physicians Committee for Responsible Medicine, this program has been a longstanding barrier to healthy school lunches. In their 2012 School Lunch Report Card, the committee explains the USDA's commodity foods program makes dairy and processed meat products very affordable options for schools to serve in lunches. However, these foods are usually high in fat and/or cholesterol and contribute to diseases such as obesity, heart disease, and cancer (2012 PCRM School Lunch Report Card, October 2012). In addition, agribusiness' lobby power is the reason why the NSLP requires fluid milk in lunches (Rethinking School Lunch, 2010). This holds true, despite the diseases linked to dairy consumption listed above as well as the high rates of lactose intolerance found among African American children. There is also no governmental support for non-dairy alternatives in lunch programs (Dillard, 2008). Animal product production is unsustainable because it is resource-intensive and inefficient as a food source. To demonstrate this, A.U.M.

Films and Media compiled facts to conclude that if a person's diet did not include animal products for one day, it would save 1,100 gallons of water, 45 pounds of grain, 30 square feet of forested land, 20 pounds of carbon dioxide equivalent, and one animal's life (The Facts, 2014).

Worse yet, the USDA supports commodity crops arriving at schools already highly processed through The National Processing Agreement (NPA). This is an agreement between the USDA and distribution agencies of federally donated foods. The agreement increases conflicting interests within the NSLP as it allows distributors to create contracts with food processors to turn commodities received by the USDA into processed foods to reduce costs and paperwork. The end result is the distribution of highly processed foods to schools that are unhealthful and minimize the food preparation within school cafeterias (United States Department of Agriculture Food and Nutrition Service, 2012). In addition, the National School Lunch Program guidelines specify a minimum amount of calories that must be served in lunches, but not a maximum (Rethinking School Lunch, 2010). While the Healthy Hunger-Free Kids Act recommends age-specific calorie content for school meals, schools are not required to follow them (Healthy, Hunger-Free Kids Act of 2010, December 13, 2010).

The challenges that school lunch programs face in procuring initiatives while participating in the NSLP would be eased if the National School Lunch Program itself adopted an initiative, creating and supporting systematic change in participating schools. Small signs of progress already show, as the USDA recognizes the importance of unprocessed, locally grown foods in school lunches and has been openly in favor of the farm-to-school concept since 2009. This has been reflected in some legislation, such as the 2008 Fresh Fruit and Vegetable program, a geographic preference option in the 2008 Federal Farm Bill, to help schools source local food,

and the "Know Your Farmer, Know Your Food" initiative in 2009 (Rethinking School Lunch, 2010).

Financing School Lunch

We can see that many reasons to implement initiatives to improve school lunch programs exist, and doing so can be financially viable. According to Marc Zammit, the vice president for Corporate Sustainability Initiatives and Culinary at the Compass Group, schools can save up to 50% on food purchases by offering fresh and healthy food, since they are no longer paying for the packaging, labor, and shipping costs that accompany processed food (Rethinking School Lunch, 2010). Fresh ingredients are also more affordable when the systematic benefits are considered. Healthier food programs could mean fewer overweight children, and therefore fewer absences. In states where attendance partially determines government funding, one absence can cost a school district up to twenty dollars. This means that excessive absences by children who are overweight could cost an average-sized Los Angeles school district $15 million per year (Action for Healthy Kids, 2013, p.5).

Schools can also choose to filter more money back into lunch programs by reducing a la carte food options within the school, such as vending machines, to help fund program reform. In doing this, schools will earn back the money they are losing from underpricing competitive foods by an average of 39% (Kavanagh, 2010, p.12). In addition, reallocating resources from a la carte sales to the lunch program may result in a net gain of profit for the school. In one case, a South Carolina school district realized a net gain of almost $50,000 in profits when restricting vending machines and rejecting a soft drink contract. Making the lunch program the only option for students to purchase food at school means lunch participation increases, more meals are served, and more government funding through the NSLP is gained (Rethinking School Lunch, 2010).

The savings of improving school lunch programs are even larger when considering the impact on the hidden costs to student health and the environment. Making lunch from fresh ingredients as opposed to serving processed foods, as well as nutritional education and increased understanding of food systems through initiatives, could prevent students from having to pay costs of food-related illness later on in their lives. Obesity-related medical costs in the United States were $147 billion in 2009. This number was double that from the previous decade and 10% of all medical spending in the country (Finkelstein, 2009, p.w822).

Given the numerous potential benefits and opportunities for school districts to adopt lunch program initiatives, why do most programs remain unchanged and why haven't lawmakers encouraged these initiatives through the National School Lunch Program? What is missing that would link existing knowledge of school lunch improvement initiatives and the procurement of them? Could it be a matter of costs, or effort? Are schools under informed on initiative implementation or its benefits? Are they simply uninterested? Using economic analysis, this research seeks to uncover the benefits of the National School Lunch Program and further uncover potential policies that could increase the use of innovative strategies and take the benefits beyond the cafeteria.

What is the National School Lunch Program?

In order to effectively explore the outcomes of healthy and sustainable school food initiatives further, it is beneficial to first know more information on the National School Lunch Program (NSLP) and some of its history. The majority of school feeding programs across the country operate under the United States Department of Agriculture's (USDA) National School

Lunch Program, which is a federal assisted meal program that operates in public schools, non-profit private schools, and child care establishments. The NSLP reimburses school districts for serving low-cost lunches that follow nutritional guidelines established by the USDA (National School Lunch Program, 2013).

The National School Lunch Program also provides extra funding to schools for serving free or reduced-price lunches to qualifying students from low-income families (National School Lunch Program, 2013). The NSLP allows the federal government to have a substantial influence over what food is served to American students. Through history, changes to the NSLP have been made in the effort to improve the health of America's children, showing its potential for requiring and regulating stricter initiatives (Healthy Schools, n.d.).

The origins of school food programs in the United States began with private societies and charities developing initiatives in urban areas in the late nineteenth and early twentieth centuries. Formal programs under policies of individual schools grew in popularity as knowledge on the importance of health and nourishment for education spread. However, some time passed before the programs were full responsibilities of the schools. At first, they were in collaboration with separate, private groups, and were run by volunteers. During the depression era in the 1930's is when states and municipalities adopted legislation to enable schools to serve lunch to students, increasing the number of programs and allowing schools in rural areas to also have programs (Gunderson, 2014).

Commodity donation programs were the first form of federal assistance for school lunch programs. The Federal Surplus Commodities Corporation, established in 1935, purchased and distributed surplus food from markets to schools for discounted prices. Representatives from this group also were employed to expand lunch programs in each state, growing the participating

schools to 78,841 by 1942. Other assistance programs founded in the same year were the Works Progress Administration and the National Youth Administration (Gunderson, 2014).

The National School Lunch Act was approved in 1946, allowing permanent lunch programs in schools and the Federal Government to authorize appropriations for them. The act declares that the policy is a, "measure of national security" (Gunderson, 2014, p.19). This is because the impetus for passing this piece of legislation was its benefit to the U.S. military. After 150,000 young men were rejected for service in World War II because they were malnourished and underweight, the federal government recognized the importance of ensuring children, their future troops, got fed (Gunderson, 2014). The initial purpose of the NSLP was therefore to provide school children with sufficient calories. This is ironic because in 2010, 9 million young adults in the United States would have been too overweight to enlist in the army. In addition, replacing enlistees discharged for weight problems costs the military over $60 million per year (Rethinking School Lunch, 2010).

The early National School Lunch Program distributed federal funds to states based on the number of children deemed unable to pay the full cost of school meals based on family per capita income compared to U.S. per capita income. The Act required State Educational Agencies and participating schools to agree on meeting minimum nutrition requirements and serving free and reduced-price lunches to those in need, without discrimination. School lunch programs also had to operate on a non-profit basis and maintain appropriate records (Gunderson, 2014).

Since the National School Lunch Program was first established, it has been amended several times. Early amendments changed and expanded the program to grant further aid to children in the neediest areas. The amendments made in 1962 were very significant, as they altered how funds were distributed to states and established a complex formula to determine and

distribute special funds to needy children. In 1966, the government passed the Child Nutrition Act to expand and strengthen the National School Lunch Program to "safeguard the health and well-being of the nation's children and encourage domestic consumption of agriculture foods" (Gunderson, 2014, p.23). Programs under this act included the Special Milk Program, Pilot Breakfast Program, and assistance in funding for equipment and additional staff. The Child Nutrition Act was unprecedented because it consolidated the federal government's involvement in school lunch programs, centralizing it under the USDA instead of scattered throughout several agencies (Gunderson, 2014).

Later amendments to the Lunch Act and the Child Nutrition Act through the 1970's accommodated special medical and dietary need cases, extended the breakfast program, and other alterations. Further action in the 1970's resulted from public outcry to the high hunger rates persisting in the country. At the 1969 opening plenary session of the White House Conference on Food, Nutrition, and Health, conference panels concluded with recommendations to expand school feeding programs so that all children have lunch available and all needy children should be provided one. In 1971, congress amended the National School Lunch Act to establish uniform guidelines and criteria of eligibility for free and reduced-price school lunches across the nation. States were required to receive funds and commodities at this point and also were required to plan for annual expansion. A National State Advisory Council on Child Nutrition was put in place to moderate the Acts and to keep in perspective how to improve (Gunderson, 2014).

At this point in the National School Lunch Program's evolution, provisions had grown and refined the program with the understanding of the importance of sufficient calories for childhood development. With this perspective, combatting malnourishment meant providing students with enough calories and adequate amounts of each macronutrient in school lunches.

However, none of these provisions had been to improve the micro-nutritional value, quality, or source of the food that schools serve. In addition, vitamins and minerals were primarily attained through engineering and fortifying foods, such as enriching refined white flour, instead of through natural sources such as fruits and vegetables. These processed foods were considered to be technical developments in school food service at the time, as they simplified required facilities and preparation as well as increased acceptability of school food among students (Gunderson, 2014).

Post 1970's school food had not been improved much until the Fresh Fruit and Vegetable Program in 2002. Further efforts then came with Michelle Obama's *Let's Move* initiative such as the small developments previously mentioned. The campaign also inspired the Healthy Hunger-Free Kids Act of 2010 (Healthy Schools, n.d.). The main concern of these efforts were still just the food children are served, which is only part of the battle. We understand that the most effective way to positively impact the lives of children with school lunch programs are comprehensive approaches. This means integrating the experience in the cafeteria, lessons in the classroom, hands-on activities, such as growing and cooking some of the food served, as well as taste tests (Rethinking School Lunch, 2010).

Literature Review

Studies already exist that demonstrate the benefits of placing importance on the school lunch system through program initiatives. Research has shown the connection of food choice and nutrition to student achievement. Pan, Sherry, Park, and Blanck look at the association between obesity and absenteeism in United States schools in 2009. Previous to this research, some case

studies had existed examining this association, but Pan and his colleagues' study was national and thus examined the association among the general population of adolescents in the U.S. The purpose of this study was to examine the association between school absenteeism attributed to illness or injury (sick days) and obesity among adolescents ages 12-17 in the United States. By confirming a connection between adolescent obesity and absenteeism, the researchers would help bring attention to the importance of preventing obesity among students to improve school attendance (Pan, Sherry, Park, & Blanck, 2013).

The data for this research came from the National Health Interview Survey (NHIS) of 2009 conducted by the National Center for Health Statistics. This survey is an on-going and cross-sectional collection of interviews with U.S. civilian households and asked household members about basic health and sociodemographic information. From this survey, Pan and his fellow researchers had a final sample of 3,470 adolescents to complete their data analysis. Within the demographic information collected by the 2009 NHIS, the information important to this study was how many days the children in the household had missed in the past 12 months due to illness or injury, which could be a number ranging from 0-240. This number was mostly reported by their parents/guardians on behalf of the adolescents. The study's key exposure variable was the weight status of the students whose attendance was reported. This was determined by comparing body mass indexes (BMI), which was calculated using parent-reported information on their children's weight and height, to CDC growth charts that display age and sex-specific BMI percentile classifications. Adolescents with body mass indexes in the 95^{th} percentile or higher were classified as obese, 95th-85^{th} percentile was overweight, 5^{th}-85^{th} was normal weight, and 5^{th} percentile or less was underweight. Other exposure variables in the study were sociodemographic characteristics and disease status such as age group, sex, race/ethnicity, and

poverty-to-income ratios of the families. The researchers controlled the data further by excluding surveys on children with certain diseases and conditions of that could have effected weight status or school attendance, such as mental retardation, autism, diabetes, seizures, physical disabilities, ADHD, etc. (Pan, Sherry, Park, & Blanck, 2013).

Pan and his colleagues used SAS-Callable SUDAAN for their statistical analysis and used descriptive statistics to examine the variables being studied within their sample. The Poisson regression was used to look at the association between absenteeism and obesity. Finally, the researchers calculated rate ratios (RRs) for the relative difference in mean school days missed for obese adolescents, compared to adolescents of normal weight, controlling for all variables. The analysis found that adolescents with significantly increased RRs for school absence had the characteristics of overweight (1.29), obese (1.33), ADHD (1.43), respiratory allergy (1.47), and skin allergy/eczema (1.39). In a controlled analysis, overweight and obese children had 36% and 37% more absent days than students of normal weight. In addition, the results included that boys had 21% fewer sick days than girls and blacks had 38%, and Hispanics 34%, fewer sick days than non-Hispanic white adolescents (Pan, Sherry, Park, & Blanck, 2012).

Researchers of the Karolinska Instituet in Sweden looked at the completion of secondary school and upper secondary schools in children treated for obesity compared to those in matched control children. The sample of this study was 1,061 children from the Swedish childhood obesity treatment registry, BORIS, who were at most 20 years old at the time of the follow up study. The data was controlled for mental retardation and the researchers randomly selected 7,780 individuals to serve as controls. These control children were matched with those treated for obesity by gender, age, and living area. Level of education at the obese children's' follow-up visits were divided into four groups: not graduated from secondary school, graduated from

secondary school but have not started upper secondary school, started but not graduated from upper secondary school, and graduated from upper secondary school. The results show that a much lower proportion of obese individuals completed higher education levels than the matched individuals of normal weight, as only 56% of obese students completed secondary school compared to 76% of the control individuals. The researchers concluded that this difference did not seem to depend on gender, ethnicity, or socioeconomic status, the only evident factor contributing to the difference was obesity. The conclusion states that obesity in childhood is associated with severely lower educational level (Hagman, Danielsson, Brandt, Ekbom, & Marcus, 2015).

Another piece of research that is important when looking at school lunch policy was conducted by the United States Department of Agriculture and found that the eating habits of the United States' school children are not good for their health or well-being. The Center for Nutrition Policy and Promotion under the USDA published a report on the diet quality across all children in the country measured by the Healthy Eating Index-2010 (HEI-2010) in 2013. This index assesses diets using twelve components that measure quality based on how well they meet the recommendations of the *2010 Dietary Guidelines for Americans* and the USDA Food Patterns. Nine of these twelve parts assess nutritional adequacy and the other three assess components that should be limited in a diet for good health such as refined grains, sodium, and empty calories. The group of nine adequacy components and the group of three moderation components each total to a score within a range of 0-100, higher scores indicate higher intakes for the former, but lower intake for the latter. Therefore, a higher score overall on the index reflects a higher quality diet (Diet Quality of Children Age 2-17 Years as Measured by the Healthy Eating Index-2010: Nutrition Insight 52, July 2013).

The data for this study was collected through the National Health and Nutrition Examination Survey (NHANES), which asked participants to estimate their typical one-day diet. This survey was carried out using a standardized, computer-assisted, and validated method by trained interviewers for the USDA. The data from the NHANES survey of three separate years, 2003-2004, 2005-2006, and 2007-2008, were compared. The surveys of each year had sample sizes 2,996, 3,237, and 2,703, of children ages 2-17, respectively. The index scores were calculated in Microsoft Excel (2007) and the differences in average score found between the three time periods were not statistically significant. This research found that the maximum total diet quality score of children aged 2-17 ranged between 47 and 50 for all three time periods. The average scores for all 12 components of the HEI-2010 were below standards, and the closest components to standards were *dairy*, with a score of 83-84 percent, and *total protein* (meat, fish, poultry, eggs, etc.), with a score of 80-84 percent. The two components with the lowest scores were *greens and beans* and *whole grains*, scoring 14-18 percent and 16-18 percent, respectively. This indicates that children consume much less dark green vegetables, beans, and whole grain foods than the recommended amount for a healthy diet. (Diet Quality of Children Age 2-17 Years as Measured by the Healthy Eating Index-2010: Nutrition Insight 52, July 2013).

The Physicians Committee for Responsible Medicine's 2012 School Lunch Report Card, an evaluation of the meals served by the National School Lunch Program, acknowledges that attention on the importance of improving the healthfulness of school meals is increasing as 12.5 million children are obese and almost one quarter of teenagers have been diagnosed with diabetes or prediabetes in the United States. The study claims that the Healthy, Hunger-Free Kids Act of 2010, "makes some of the most significant changes to the NSLP in decades…but still leaves room for improvement" (2012 PCRM School Lunch Report Card, October 2012, p.1).

The USDA nutrition guidelines still allow schools to serve high-fat, high-cholesterol dairy products and processed meats regularly on their menus, and do not require plant-based entrée offerings.

In order to score a good grade on the report card, the PCRM required that schools go beyond USDA nutrition guidelines. The grading process was based on surveys completed by food service directors from 22 school districts from across the country. Many of these districts were among the 100 largest districts in the United States. The 2012 grading criteria was based on two categories: obesity and chronic disease prevention and nutrition and healthy eating initiatives in the districts. Within the first category, researchers looked at the degree to which districts met USDA NSLP nutrition requirements. They also examined whether they offered healthful vegetarian entrée options and made available healthy egg-free and dairy-free entrees, as well as the variety of these vegan items. The category of nutrition and healthy eating initiatives contained subcategories evaluating the content within school lunch foods. These looked for the content of vitamins, minerals, adequate fiber, and lower fat. To score high within these subcategories, schools had to offer low-fat vegetable side dishes, fresh fruit, and non-dairy beverage options. They also had to provide nutrition education, labeling of vegetarian foods, and innovative food programs, such as participation in the USDA's Fresh Fruit and Vegetable program, school gardens, cooking classes, farm-to-school programs, taste tests, etc. The findings of the Physicians Committee for Responsible Medicine include an increasing trend in vegetarian and vegan entrees in school lunches. Out of the schools evaluated, 59% offered at least one vegetarian option every day, and 76% of these were vegan. The researchers also found that 95% of the districts offered an alternative to dairy milk, which is down from 100% in the 2008 report card. Nutrition education was offered in 77% of schools and 95% of the districts included

inventive nutrition programs within their food service department. Schools earned the most A's on the 2012 report card than any from previous years, and none earned an F. The average grade of the participating school districts improved by five percentage points, from a C+ (78.7) in 2008, to a B (84.4) in 2012. The PCRM states that the positive trends seen in the results could play an important role in improving childhood health. They say the Healthy, Hunger-Free Kids Act of 2010 was a good starting point for improving school lunch quality and nutrition. However, the concluding statement on the report card said that schools must go beyond the suggestions of the Act in order to fight the childhood obesity epidemic in the United States and serve more low-fat vegan entrees, eliminate processed meats, and educate children on the benefits of a plant-based diet (2012 PCRM School Lunch Report Card, October 2012).

School Lunch Program Initiatives

It is important for school districts to understand that simply offering healthier food in lunchrooms, like the Healthy, Hunger-Free Kids Act helped to do, is not enough to inspire children to eat the healthier food, educate them about the food system, or help them become better adults. Changing student's attitude, knowledge, and behavior in relationship to food requires a comprehensive approach to school lunch program initiatives. They must involve the academic curriculum and hands-on experiences in addition to improvements in school food (Rethinking School Lunch, 2010). Some examples are farm to school programs, food education, school gardens, cooking lessons, taste tests, etc. Studies show that these initiatives improve student food choice, willingness to try new foods, and the environmental impact of the school, to name just a few.

School lunch program initiatives could contribute to higher attendance and graduation rates because, according to the National Farm to School Network, they improve student eating behaviors and increase willingness to try new foods. Initiatives provide an opportunity for schools to form relationships with local farmers and producers and individual farmers gain a five percent increase in income from farm to school sales. The same report shows that through farm to school initiatives, community interest in buying local food grows and economic activity is stimulated. One study says that an additional $2.16 of local economic activity is stimulated for every one dollar invested in a farm-to-school lunch program and 1.67 jobs were created in the community for every job created by school districts through buying local food (The Benefits Of Farm To School, 2016). This information could provide community leaders with an incentive to get on board with implementing school lunch program initiatives and supporting schools as they do so.

Numerous cases of schools that have taken advantage of food's potential experienced improvements in various areas. One example is the citywide project of the Burlington School District in Vermont. This is a collaboration of eleven schools to integrate local foods into school meals and also address food insecurity, the condition of limited or uncertain access to adequate food, of students in the city. Burlington saw a change in student attitude as almost half of the students indicated a preference for more fresh fruit to be served at breakfast due to farm to school activities, 43% we more willing to try new foods due to experience with taste tests, and students demonstrated a positive change in perception about fast food. Furthermore, only one year after of the Burlington program was put in place, 60% of students reported eating more fruit than in the previous year. The majority also ate new foods, ate healthy snacks more often, and ate unhealthy foods less often (Joshi & Azuma, 2009).

The parents of the Burlington students reported many positive changes in their children within their eating habits, behavior, and skills. These include, improved life skills, self-esteem, and social skills, as well as reduced screen time and increased physical activity. This program impacted the community as well, as parents also reported positive changes in their food purchases and practices as a result. The farm to school program additionally resulted in positive impacts for teachers and food staff. Teachers also reported believing the program efforts would affect long-term food choices of students (Joshi & Azuma, 2009). The Burlington School District's program is only one of many successful school lunch initiatives across the country. Others include the Abernathy Elementary farm to school program in Oregon, the Los Angeles Unified School District's "CSA in the Classroom" program, the "Fresh from the Farm" program in Chicago, "Mixed Greens" in Michigan, and "SchoolFoodPlus" in New York (Joshi & Azuma, 2009).

What's Next?

Investigating the questions posed at the end of the introduction further will guide this research to its next stage. What is missing that would link existing knowledge of school lunch improvement initiatives and the execution of them in schools and/or in NSLP policy? This research will take a two-fold approach to begin figuring out what this missing link is through cost-benefit and regression analysis.

When considering costs and benefits, many people think about them just in terms of money. However, both monetary and non-monetary costs and benefits exist in economic analysis, and it is important to look at both. Cost-benefit analysis (CBA) is useful for evaluating

public policy issues because it considers the costs and benefits to society as a whole, and not just in terms of expenditures and revenues. CBA is a method for policy assessment that quantifies the value of all policy consequences in monetary terms to all members of society. The value of a policy is determined by net social benefit (NSB), which is equal to the social benefits minus the social costs. (Boardman, Greenberg, Vining, & Weimer, 2001). This research will conduct a cost-benefit analysis on fundamental, systematic, and comprehensive school lunch program initiatives.

Cost-benefit analysis will allow both the tangible and intangible costs and benefits of initiatives to be included within the economic analysis of the programs. This is key because some of the most important benefits of school lunch program initiatives are intangible. These are seen system-wide, when the initiatives make system-wide changes, in the students, faculty, school finances, and surrounding community. Initiatives could help make people better people, and so some intangible benefits are the changes in the people involved and their practices. Such changes could be seen within children in the form of improved behavior, decreased anxiety, increased environmental awareness, and learned knowledge on the food system and agriculture. These are likely to contribute to creating a more conscious future generation of consumers, an additional benefit since this is vital for seeing change in the United States as a whole. Other intangible benefits of initiatives could be communities brought together, improved satisfaction and morale of food staff members, and positive impacts on parent and family outlook on food and food security. All these benefits are in addition to the tangible benefits of school lunch program initiatives, such as decreased environmental destruction, more revenue for schools, improved test scores, increased economic equality, etc. Intangible benefits will play an important role in offsetting key tangible costs within the cost-benefit analysis of school lunch program initiatives.

These will primarily be monetary infrastructure and additional food expenditures, since healthy and sustainable food can be more expensive than conventional cafeteria food.

The second part of this two-fold approach to analyzing school lunch program initiatives is economic regression analysis. Regression is a statistical measure that attempts to determine the strength of the relationship between a dependent variable and a series of independent variables. While the dependent variable in a regression remains the same, the independent variables are changing (Regression, 2016). The economic regression analysis technique will be useful to examine the dollar savings of schools participating in the school lunch program initiatives. One way to carry this out would be using standardized tests score averages across schools, across districts, across states, as the dependent variable and factors that affect these scores, such as racial percentages, local income levels, teachers' salaries, unemployment levels, etc. as the independent variables. With using these variables, the analysis would control for the impact of the initiatives in place. Through completing a cost-benefit analysis and an economic regression analysis, this research hopes to contribute in explaining why more schools have not procured comprehensive school lunch program initiatives and why they should. It also hopes to help in pushing for public policy for initiatives to be subsidized, or even required in schools.

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