Analyzing the Sustainability of the Impact of New USDA School Meal Guidelines on Fruit and Vegetable Selection and Consumption in School Cafeterias.

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Abstract

In 2012, United States Department of Agriculture (USDA) changed regulations of its National School Lunch Program (NSLP) amid to criticism of previous regulations for lacking to facilitate choices of healthier options. The program has been under scrutiny because of increasing obesity rates in the country. However, when new guidelines came out there were allegations of waste, which would be expected with a dramatic policy change. The purpose of this study is to analyze the long-term impact of this policy change and identify whether students' tastes and eating habits eventually adapted to healthier menus. Our results indicate that the new regulations had a huge impact on the vegetable selection in middle and high schools. The vegetable waste also increased at a lower rate, subsequently, resulting in an increase of vegetable consumption. The long-term results were the opposite for elementary schools. Our results showed that while changed regulations had positive long-term impact on healthy consumption in middle and high schools, they had the opposite impact in elementary schools. The results showed that a policy that is designed similarly for different aged children did not provide same results for all types of school. Therefore, we should not rely on a single policy to address behavioral issues. To have better results we recommend more individualized behavioral techniques – complementary to NSLP regulations, in different grade schools.

Introduction

In recent years, USDA's National School Lunch Program (NSLP) became a battleground between political parties, government agencies, school lunch personnel, food suppliers and others (New York Times 2012). The program received a tremendous amount of criticism from various parties because it lacked regulations to provide healthier and balanced foods in school cafeterias. As a result, USDA updated its NSLP regulations which went into effect in 2012. However, while the new regulations made sure to increase the selection of fruits and vegetables, they did not guarantee a sustainable selection and consumption of fruits and vegetables. This study examines the sustainability power of these regulations on fruit and vegetable selection and consumption over time.

United States Department of Agriculture (USDA) provides nutritional, free or reduced price meals to over 30 million children through it National School Lunch Program (NSLP) (FRAC 2016; USDA 2016). This makes USDA an important player in feeding kids in the US. With the rise of obesity and the new emphasis put on the consumption of fruits and vegetables, USDA's role is more important than ever. USDA updated school lunch guidelines in 2012 due to the criticism towards the nutritional content of its reimbursable meals. The new standards required that students take either a fruit or a vegetable to qualify for a reimbursable meal (USDA, 2012).

12 schools were recruited in 2012 to participate in this research to study the impact of the new USDA policy on the consumption of fruits and vegetables in school cafeterias. The schools were randomly chosen to collect fruit, vegetables and white milk selection and waste data before new USDA regulations went into effect. To investigate the sustainability of the program, researchers revisited the same set of schools in 2015. Thus, the analysis is based on the data from

years 2012 and 2015. These findings shed light on the effectiveness and sustainability of NSLP guideline changes. They also provide detailed information on changes of fruit and vegetable selection, as well as, consumption at school cafeterias across different grade levels over the three-year period.

The objective of this study is to identify the sustainability of NSLP's new regulations in school lunchrooms. While USDA's intentions were to increase the selection of fruits and vegetables it was not clear how students would behave after regulations went into effect. First, our findings identify if *one-size-fits-all* regulations have similar impact on children in different age groups. Second, the study determines if there is a need for behavioral interventions as a result of reactance by students.

The paper proceeds in the following order. We talk about the problem background highlighting previous literature and possible solutions offered by researchers. Then, we talk about the data and methodology and discuss the results and potential interventions to further increase the consumption of fruits and vegetables. Then we conclude by summarizing the problem, the study's limitations and discuss future research possibilities.

Background

With increasing obesity rates in last decades, researchers tried to identify causes of obesity and provided potential solutions to fight the epidemic. According to U.S. Department of Health and Human Services (2012) 36% of adults (20 years or older) were obese and 69% of adults were overweight in 2012. A data from Centers for Disease Control and Prevention (CDC 2015) shows that 18% of children of ages 6-11 years old and 21% of children of ages 12-19 years old were obese during 2012. It is also argued that children are the most vulnerable group to the epidemic

since they are susceptible to sugar and other substances and are prone to various health problems (Sorof and Daniels 2002; Liem and Mennella 2002; Adair 2008). Birch (1999), Westenhoefer (2002) and Schaub and Martin (2011) also argue that eating behaviors and obesity developed at young ages continue into the adulthood behavior.

This makes the issue more pressing. Energy imbalance, food deserts, lack of exercise, prevalence of calorie rich foods, and socioeconomic factors are cited as some of the main reasons for the obesity epidemic (Alwitt and Donely 1997; Morland and Filomena 2007; Pratt, Stevens and Daniels 2008; Just and Gabrielyan 2016). Governments' attempts to fight the epidemic by imposing sugar – and/or fat taxes were not successful so far (Allais, Bertail and Nichele 2010; 2010, Cawley and Frisvold 2015).

At the meantime, researchers tried to find other ways to fight the epidemic using behavioral models that can be used in food environments to increase the selection and consumption of healthy items without limiting available choices. The research shows that limiting available options does not give desired outcome. Just and Wansink (2010) argue that by giving students more options increases the selection and consumption of these options. Verbal prompts, priming, and trigger foods have also shown to impact the choice towards healthier items (Hanks, Just and Wansink 2012; Wansink, Shimizu and Camps 2012; Dai et al. 2014;).

Wansink, Just and Smith (2011) argue that making fruits and vegetables visually appealing increases the selection of fruits and vegetables by 100%. It is also argued that by making these healthier items more convenient to choose and eat also increases their selection and consumption (Wansink et al. 2013). While these studies analyze the impact of a single change in school lunchrooms, Greene et al. (2016) show that the mixture of such techniques also works.

The authors argue that techniques designed to promote fruit selection and consumption also had a positive and significant impact on vegetable selection and consumption.

Since USDA NSLP program provides daily food to more than 30 million children, it became a point of aspiration and criticism (Clark and Fox 2009; Gearhardt et al. 2012). In 2012, amid to this criticism and new evidence from researchers, USDA updated its NSLP program regulations for its reimbursable meals. New regulations were designed to increase fruit and vegetable selection and consumption by making it mandatory to have one item from each category on the tray to make a reimbursable meal. While it was costly for schools to incorporate new regulations (Wharton, Long and Schwartz 2008; Newman 2012) they were designed to align with 2010 Dietary Guidelines of America (Byker et al. 2013) and decrease the amounts of wasted fruits and vegetables in school cafeterias (Marlette, Templeton and Panemangalore 2005; Cohen et al. 2013).

One of the challenges of any new regulation and interventions is that it is not clear how sustainable they are over the years. Byker et al. (2014) argue that 45% of served food was wasted during a week of observations in one elementary school. However, the authors do not have any prior information on waste data before the regulations went into effect. And while Narayan (2014) shows that Smarter Lunchroom based interventions increase the selection of vegetables in schools, the author does not provide waste data either. Meanwhile, Cohen et al. (2014) analyze the impact of new regulations comparing fall 2013 data with fall 2011. The authors include both selection and consumption data in their analysis. Their findings indicate that fruit selection and vegetable consumption increased after new regulations.

We add to existing literature by analyzing the sustainability impact of USDA's new NSLP regulations in 2012 by incorporating more schools in the analysis. We also compare two periods with longer time change between them.

Data/Methods

To analyze the sustainability of new NSLP regulations that went into effect in the fall of 2012 we collected data from 12 schools in the Northeast region of the U.S. The data was collected in the spring semester of 2011-2012 academic year. The same schools were visited during the same period of the academic year 2014-2015. However, two schools dropped in 2015 and the total number of schools analyzed was only 10 in 2015. Waste data was collected using quarter-waste method (Hanks, Just and Wansink 2014). A paper-based questionnaire was used by researchers who had prior training on this type of data collection. Student-tray observations were collected wherein researchers recorded the amount of food thrown away. Selection and waste numbers were averaged across all the trays representing the average selection and waste numbers.

Table 1 includes mean values for selection and waste for both 2012 and 2015. The table also includes p-values of t-tests between group means. The t-test method was used to compare the group means and to report the statistical changes, if available. The food menus were compared between schools to ensure that schools had similar menu items during the visits. Each school was visited once during each period. School-wise cluster design is used to analyze the data. STATE 14 is used for the analysis.

Results/Discussions

The results are driven from average numbers in Table 1. While we observed a decrease in fruit selection in elementary schools there was a positive change in middle and high schools. The average fruit selection increased by 24% (an increase from 0.37 to 0.46) ($p < 0.001$) and 19%

(from 0.42 to 0.50) ($p = 0.002$) in middle and high schools, respectively. In elementary schools the average fruit selection decreased by 34% (from 0.62 to 0.41) ($p < 0.001$). Even though fruit selection decreased in elementary schools, students selecting fruits, on average, threw away less fruits. It was observed by a statistical decrease of fruit waste of 28% ($p = 0.001$). We also observe an increase of fruit waste in middle schools. The wasted fruits in middle schools increased by 55% ($p < 0.001$). The fruit waste stayed almost the same in high schools and the change was not statistically significant.

We observed a similar pattern for vegetable selection. Vegetable selection decreased by 51% (from 0.68 to 0.33) in elementary schools and increased by respective 284% (from 0.19 to 0.73) and 25% (from 0.51 to 0.64) in middle and high schools. All the changes were statistically significant at $p < 0.001$ level. We also observed a statistically significant increase of vegetable waste in all types of schools. Vegetable waste increased by 26% (a change from 0.19 to 0.24), 375% (from 0.08 to 0.38), and 78% (from 0.23 to 0.41) in elementary, middle, and high schools, respectively.

The results show that selection of white milk decreased by 21% from 0.19 to 0.15 in elementary schools ($p = 0.001$). In middle schools we also observed a decreases in white milk selection by 62% (or from 0.21 to 0.08) ($p < 0.001$). There was no change in milk selection in high schools. Similarly, white milk waste stayed the same for elementary schools in the same time period. However, we observe a positive and a significant decrease of white milk waste in middle ($p< 0.001$) and high schools ($p = 0.039$). The white milk waste decreased by 78% in middle schools (from 0.09 to 0.02) and by 29% (from 0.07 to 0.05) in high schools.

The results show that the changes went in both directions depending on the type of the item or the school grade. They do not allow us to claim that new regulations had completely

positive or negative impact on the selection and consumption of healthy items. Many factors impact the results and it is difficult to identify any specific factor that had more or less influence on the results.

It is also interesting that we observe very similar results for different grade levels for fruit and vegetable selection and waste pattern. This shows that the regulations have a similar impact when it comes to fruits and vegetables. While our results reveal an increase in fruits and vegetable selection in both middle schools and high schools, we also observe an increase in the wasted amounts of respective items. It is possible that while students are forced to take more fruits and vegetables, they do not feel obliged to eat all or any of them. Therefore, more behavioral methods could be incorporated into school cafeterias to promote more selection and consumption of these items.

We also observed that the new regulations had a different impact on elementary schools compared to middle and high schools. One of the possible explanations is that children of different ages behaved differently as a result of new regulations. Rasmussen et al. (2006), among others show that age has a significant impact on selection and consumption of fruits and vegetables. Even though children at elementary schools selected less fruits and vegetables, they also wasted less. Thus, it is possible that younger children might be more adaptive to new menu items than their older counterparts. Another explanation can be the differences of personal characteristics of lunchroom personnel and/or administrative requirements in each of the schools. Gabrielyan et al. (2016) show that personal characteristics of food service directors have a significant impact on the adoption of new techniques in school cafeterias.

New regulations required the schools to incorporate new techniques to increase fruit and vegetable selection to be eligible for reimbursements from USDA. However, it is not clear how

schools fulfilled these requirements to be eligible. USDA has limited supervising means in place which does not allow a thorough monitoring of all the schools. Another factor that might have impacted our findings is the time period between two data collection points. The results might have been more accentuated if the second data collection was closer to the time when new regulation went into effect. At the same time, our findings depict more accurate sustainability picture.

Conclusions

Obesity rates have been constantly increasing in last decades. And children were cited to be the most vulnerable segment in the society to be impacted by this trends. USDA plays a vital role in providing food to children in the schools. By serving food to more than 30 million students in a given day through its NSLP program, USDA has been in the center of public attention. Researchers tried to identify what role USDA regulations play in the bigger picture of obesity. As a result of public debate and new scientific evidence, USDA updated its NSLP regulations in 2012 to incorporate more fruits and vegetables in its menus.

There is a limited number of research that analyze the impact of these new regulations and their sustainability. The aim of this study is to identify the sustainability of these regulations after three years they went into effect. For this purpose, 12 schools were recruited to participate in the study in the spring 2012. Same schools (2 dropped out) were visited in 2015. We analyze the difference between fruit, vegetable, and white milk selection and waste for a three-year period.

Our results showed that while there was a statistical and significant increase in vegetable and fruit selection there was also an increase in wasted mounts of respective items in middle and

high schools. The picture was opposite in elementary schools; a decrease in fruit selection, a decrease in vegetable selection and an increase in both fruit and vegetable waste.

The results highlight the notion that regulations do not work the same in all types of schools. To make the regulations more effective they have to have a flexibility based on different school grades and/or locations (rural vs. urban). We also recommend using more behavioral techniques in school cafeterias taking into account the school's grade level and its region.

Limitations

The data was collected from the same group of schools. However, the time difference between two groups might have played a role in potential changes. It is possible that there were other changes (socio-demographic, new food venues around the schools, etc.) that were not controlled in this study.

Another limitation of the study is that each school was visited once for both visits.

Future research

It is interesting to find out how the compliance by schools towards new regulations and new technologies impacts student behavior towards selecting and eating more fruits and vegetables. This will allow us to identify the impact of different compliance levels on the selection and consumption of healthy items. We hypothesize that schools that have higher compliance levels and do thorough changes in their cafeterias report higher selection and consumption rates for fruits and vegetables.

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Table 1. Average fruit, vegetable, and white milk selection and waste data and respective t-test p-values for mean differences across schools by grade level.

Item/Category		Elementary Schools			Middle Schools			High Schools		
		2012	2015	T-test (p-val)	2012	2015	T-test (p-val)	2012	2015	T-test (p-val)
		Mean (St. Dev)			Mean (St. Dev)			Mean (St. Dev)		
Fruit	**Selection**	0.62 (0.71)	0.41 (0.50)	< 0.001	0.37 (0.59)	0.46 (0.53)	< 0.001	0.42 (0.56)	0.50 (0.58)	0.002
	Waste	0.18 (0.46)	0.13 (0.29)	0.001	0.20 (0.41)	0.31 (0.47)	< 0.001	0.15 (0.31)	0.16 (0.34)	0.288
Vegetable	**Selection**	0.68 (0.73)	0.33 (0.50)	< 0.001	0.19 (0.40)	0.73 (0.53)	< 0.001	0.51 (0.79)	0.64 (0.57)	< 0.001
	Waste	0.19 (0.38)	0.24 (0.41)	0.001	0.08 (0.25)	0.38 (0.44)	< 0.001	0.23 (0.43)	0.41 (0.45)	< 0.001
Milk	**Selection**	0.19 (0.43)	0.15 (0.36)	0.004	0.21 (0.42)	0.08 (0.28)	< 0.001	0.21 (0.43)	0.21 (0.41)	0.967
	Waste	0.06 (0.23)	0.06 (0.19)	0.761	0.09 (0.25)	0.02 (0.11)	< 0.001	0.07 (0.22)	0.05 (0.16)	0.039