

Consumption of Fruits and Vegetables in Middle School Students Following the Implementation of a School District Wellness Policy

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Please note that this study was published before the SY2014-15 implementation of the Smart Snacks Nutrition Standards for Competitive Food in Schools, as required by the Healthy, Hunger-Free Kids Acts of 2010. As such, certain research relating to food in schools may not be relevant today.

ABSTRACT

Purpose/Objectives

In 2010, a large urban school district implemented a district-wide school wellness policy that addressed childhood obesity by requiring schools to increase health and physical education contact hours for students and to improve the nutritional standards of school meals. Schools were required to serve a different fruit and vegetable each day of the week. The purpose of this study was to measure consumption patterns of fruits and vegetables of middle school students in an urban middle school located in a high-needs neighborhood.

Methods

Consumption of fruits and vegetables was measured through a study of 4-week plate waste collection ($n = 3,810$) during two semesters of the 2011-2012 school year. Descriptive statistics and paired t-tests with the significance level set at $p < 0.05$ were used to express differences in consumption of fruits and vegetables.

Results

During four weeks of observations, students consumed more fruits than vegetables. Specifically, a significantly higher percentage of servings of fruits (70%) was consumed than servings of raw vegetables (57%). Also a significantly higher percentage of fruits (70%) was consumed compared to cooked vegetables (41%). Students consumed significantly more fruits (79%) and cooked vegetables (46%) in the second semester than in the first semester, 60% and 35% respectively. No significant differences were observed between males and females for fruit, raw vegetables, and cooked vegetables.

Applications to Child Nutrition Professionals

Although the school wellness policy mandates that schools provide healthy lunches, less than optimal consumption rates indicate that students may not be benefiting from the new nutrient standards. A number of variables may influence the consumption of foods served in school cafeterias. Food service professionals can play a key role in positively introducing and nudging children to consume the healthy foods now being served.

INTRODUCTION

The number of obese children in the United States has almost tripled in the last decade. According to the National Health and Nutrition Examination Survey (NHANES) of 2005-08, 16% of children and adolescents were considered obese (CDC, 2013). Minority children are at greater risk, with 38% overweight and 20% obese Mexican Americans and 34.9% overweight and 20% obese Non-Hispanic Black (Ogden & Carroll, 2010). Obese children are reported to be more likely to become obese adults (Biro & Wien, 2010).

School meal programs such as the National School Lunch Program (NSLP) and School Breakfast Program (SBP) can play a key role in influencing children's diets and ultimately their weight and health status. About 30 million students participate in the NSLP, of which 17.5 million receive a free or reduced-priced lunch each school day (USDA, 2013). Students participating in the NSLP consume about 35% of their daily calories during the school day and students participating in both the SBP and the NSLP consume about 47% of the daily calories from foods offered at school (Gleason & Dodd, 2009). For comparison, the benchmarks for these meal programs are 25% of daily calorie intake for the SBP and 33% of daily calorie intake for the NSLP (Fox & Condon, 2012). Therefore, school meals are considered a significant contributor to many children's daily caloric intake.

After the 2004 WIC and Child Nutrition Reauthorization Act, schools have changed the school food environment (Turner & Chaloupka, 2012). These changes have included increased participation in school gardens and farm-to-school programs, and increased availability of healthy food choices in school lunches. There is interest in determining if new nutrient standards and school food policies are contributing to improved eating habits, or consumption of healthy foods in students.

A 2002 study explored consumption patterns of the school meals by students through a review of plate waste studies (Guthrie & Buzby, 2002). Students participating in the NSLP wasted about 12% of the calories in the food they were served, with girls wasting 16.6% and boys wasting 9%. Vegetables and salads were the most common food types that were wasted. Excessive plate waste from school lunches may indicate that children are not receiving the nutrients offered in school meals.

More recently, studies have focused on eating behaviors in children with particular attention to fruit and vegetable consumption. Studies have shown that student consumption of healthier items from the NSLP increase over time and exposure (Cullen, Watson, & Zakeri, 2008), and students who do not consume meals from the NSLP report little intake of fruit, vegetable or milk (Cullen, Watson, & Dave, 2011). The NSLP can impact children's eating behaviors, but implementing healthier meal standards alone may not necessarily improve students' food and beverage consumption instantly. It may take several exposures and time for children to accept the new healthy school lunches. Behavioral interventions that encourage healthy eating habits and collaboration among policy makers, school educators, and food service professionals could help nudge students to make healthier food choices and accept the new healthier school lunches.

In 2010, a large urban school district implemented a school wellness policy that addressed childhood obesity by requiring schools to increase health education and physical education contact hours for students and to improve the nutritional standards of school meals by reducing the amount of sodium, fat and added sugar. In addition to requiring schools to follow the USDA standard of offering two servings of fruits and vegetables daily, this district wellness policy required schools to offer a different type of fruit and vegetable each day and provide fresh fruit at least two days of the week. Under the new requirements, students were exposed to a diversity of local fresh fruits and vegetables to which they may not have had much or any exposure prior to the new school lunch menus.

The purpose of this study was to measure consumption patterns of fruits and vegetables of middle school students following the implementation of new nutrient standards in an urban middle school located in a high-needs neighborhood. Consumption rates were measured in the fall and spring semesters to see if further exposure to local fruits and vegetables would increase students' consumption rates of these healthy foods.

METHODS

Participants

This study was conducted at an urban middle school (grades 6 - 8) with an enrollment of 379 students in 2011. Students were 99% African American and 1% Hispanic with 86% of all students eligible to receive a free or reduced-priced lunch. The percentages of students who met or exceeded the math and reading standards in 2011 were 29% and 23%, respectively. The school supports 23% of the student population in special education needs.

School Menu

The school menu was limited to one type of hot meal that included one fruit serving and one vegetable serving which were pre-portioned and the same for each student. All students included in this study chose to receive all items of the school lunch, and, therefore, received the fruit and vegetable serving daily. There was no salad bar option available at the school. However, the daily lunch menu also included a vegetarian option for students and only 1% of the students in the sample (n=4) chose this option. For this reason, this study did not include measurements of consumption of the vegetarian option. Similar fruit and vegetable items were offered during the two semesters. All fruit and vegetable items recorded during each semester for this study are noted in Table 1.

Table 1. *Fruits and Vegetables Tracked during Semester One (S1) and Semester 2 (S2) at a Middle School*

Raw Vegetables		Cooked Vegetables		Fruit	
S1	S2	S1	S2	S1	S2
Baby Carrots	Baby Carrots	Baked Beans	Buttered Peas	Apple	Apple
Romaine Salad	Coleslaw	Baked Potato	Collard Greens	Applesauce	Banana
Spinach Salad	Spinach Salad	Fries	Roasted Sweet Potatoes	Banana	Cantaloupe
		Collard Greens	Sweet Potatoes	Cantaloupe	Wedge
		Glazed Carrots	Steamed Broccoli	Wedge	Grape Juice
		Kale	Steamed Corn	Orange	Orange
				Wedge	Wedge
				Pear	Pear

Data Collection

This study measured consumption of raw and cooked vegetables and fresh fruits served at school lunch through analyses of plate waste. Food consumption patterns were measured for four weeks of the 2011-2012 school year: two weeks in the first semester, Fall 2011, and two weeks in the second semester, Spring 2012. Consumption data was collected using V-Project, a smartphone application developed at Brigham Young University. V-Project was developed for the collection of food consumption patterns and plate waste data with minimal impact on student behavior as data can be collected without direct interactions with students (The Veggie Project: BYU, 2012). To collect data with V-Project, the data collector entered basic information prior to data collection: school name, collector name, description of meal recorded (such as "lunch"), fruit and vegetables offered, and any notes the data collector needed to make about the data collection site.

As the students' trays were observed, the data collector recorded the gender of each student and the portion of each fruit and vegetable item consumed by the student. At this middle school, there were no fruit and vegetable alternatives available for students; however, students could elect not to have an item placed on their food tray and this was noted in V-Project. For each food item selected, the data collector then selected "0," "0.5," or "1.0" to indicate the portion 0%, 50%, or 100%, respectively, consumed by the student. The data collector then hit the submit button and repeated this process to record consumption patterns for all subjects. Upon completion of data collection each day, all of the data was emailed in the form of an Excel spreadsheet that was imported directly into STATA for data analyses. Over the course of the two semesters, 3,810 lunch trays were observed and evaluated (n=1,750 for semester 1; n=2,060 for semester 2).

Data Analyses

Descriptive statistics utilizing means were expressed as percentages of servings of raw vegetables, cooked vegetables and fruits consumed by students. All student consumption data was initially aggregated in order to describe the general trends in consumption patterns. From this data set, means were expressed as percentages of all sampled students who consumed fruits, raw

vegetables and cooked vegetables. Data was then categorized by gender to distinguish any differences in consumption patterns between males and females. The differences in consumption patterns between the two semesters and between male and female student consumption patterns were tested using paired t-tests with statistical significance set at the $p < 0.05$ level. This study received approval by the University's Institutional Review Board.

RESULTS AND DISCUSSION

This study examined the consumption of fruits and vegetables of students in a middle school located in a lower socioeconomic area in a large urban school district that had implemented new nutrient standards for the school lunch. A total of 3,810 lunch trays were observed over two semesters.

When looking at consumption patterns of the items served in the school lunches, these results indicate that middle school students consumed more fresh fruits than vegetables for the 2011-12 school year (Table 2). Specifically, students consumed a significantly higher number of servings of fresh fruit (70%) than raw vegetables (57%). Students also consumed significantly more fresh fruit (70%) than cooked vegetables (41%). Students consumed a significantly higher number of servings of fruits (60% in semester 1 and 75% in semester 2) and cooked vegetables (35% semester 1 and 46% in semester 2) in the second semester when compared to the first semester (Table 3). There were no significant differences in consumption of raw vegetables between the first semester and second semester, 59% and 55%, respectively. There were no significant differences in consumption patterns for fruits, raw vegetables, and cooked vegetables between male and female students (Table 4).

Table 2. *Percentage of Servings of Fruits and Vegetables Consumed by Middle School Students for the 2011-2012 School Year (N=3,810)*

	Fruit		Cooked Vegetables		
	n	M + SD (%)	n	M + SD (%)	T-score (p-value)
Servings consumed	3,194	69.91 + 45.87	2,551	40.85 + 49.16	-23.11 (<.0001)
	Fruit		Raw Vegetables		
	n	M + SD (%)	n	M + SD (%)	T-score (p-value)
Servings consumed	3,194	69.91 + 45.87	1,259	57.03 + 49.52	-8.25 (<.0001)

^aSchool year includes both semesters 1 and 2.

Table 3. *Comparison of Percentage of Servings of Fruits and Vegetables Consumed by Middle School Students for Two Semesters of the 2011-2012 School Year*

	Semester 1		Semester 2		
	n	M + SD (%)	n	M + SD (%)	T-score (p-value)
Fruit (servings)	1,134	60.32 + 48.94	2,060	75.19 + 43.19	-8.88 (<.0001)

	Semester 1		Semester 2		
Raw vegetables (servings)	623	59.23 + 49.18	636	54.87 + 49.80	1.56 (.1188)
Cooked vegetables (servings)	1,127	34.60 + 47.59	1,424	45.78 + 49.83	-5.74 (<.0001)

Table 4. *Comparison of Percentage of Servings of Fruits and Vegetables Consumed by Middle School Male and Female Students during the 2011-2012 School Year*

	Male		Female	
	n	M + SD (%)	n	M + SD (%)
Fruit (servings)	1,775	71.04 +1.07	1,419	68.49 + 1.23
Raw vegetables (servings)	688	56.54 + 1.89	571	57.62 + 2.07
Cooked vegetables (servings)	1,422	42.19 + 1.31	1,129	39.15 + 1.45

Note: Paired t-tests showed no significant differences between male and female consumption of fruit, raw vegetables, and cooked vegetables.

The school site for this study was of particular interest because it is located in an area of low socioeconomic development and high needs families. Understanding the eating habits of children in low socioeconomic areas is of particular importance since many of these children are at increased risk for obesity and other adverse health outcomes. The obesity rate is 1.45 times higher for children living in lower socioeconomic areas than those living in higher socioeconomic areas (Navalpotro et al., 2012). Low socioeconomic status has been correlated with unhealthy behavior, reduced access to health care, poor quality health care, and even higher risk for mortality and morbidity in general (Beckles & Truman, 2011). A high prevalence of obesity also puts children who live in low socioeconomic areas at high risk for obesity-related chronic diseases such as metabolic syndrome and Type 2 Diabetes (Lawman & Wilson, 2012). The school is located in an area that has been documented to have a high rate of poverty, child and adult obesity, Type 2 Diabetes cases, and hypertension cases (BRFSS, 2010).

Students from a low socioeconomic background may be more likely to participate in the NSLP. This study supports that idea as the research was carried out in a high-poverty area where 86% of the students at this particular school participated in the NSLP and received a free or reduced-priced lunch in 2011-2012. Research on the health impact of participation in the NSLP has shown mixed results (Paxton et al., 2012; Clark & Fox, 2009; Ralston, Newman, Clauson, Guthrie, & Buzby, 2008). Participation in the NSLP alone may not necessarily guarantee that students will benefit from the healthy foods provided in school meals.

To understand if students are benefiting from school lunch following the changes in the nutrient standards for school meals, this study measured student consumption of the fruits and vegetables in the school lunch. Students at this school were consuming more fresh fruits compared to raw vegetables or cooked vegetables. This finding is not unexpected as previous studies have indicated students' preference for fruits over vegetables due to their sweeter flavor (Molaison, Connell, Stuff,

Yadrick, & Bogle, 2005). Results from this study correspond to other studies examining student consumption patterns of school meals in which students were more likely to consume more fruits than vegetables (Navalpotro et al., 2012; Rosario et al., 2012; Condon, Crepinsek, & Fox, 2008; Guthrie & Buzby, 2002; Birch & Fisher, 1998).

Provisions of the wellness policy implemented at this school required the school food service to provide a different fruit and vegetable with lunch each day to increase students' exposure and access to healthier foods. However, an increase in fruit and vegetable availability in school meals does not necessarily lead to increased consumption of these items as students' consumption patterns are strongly influenced by their taste preferences and other factors (Condon, Crepinsek, & Fox, 2008). In this study, 30% of the fruit was discarded, and many of the vegetables, served raw or cooked, were not consumed. Only 57% of raw vegetables and 41% of the cooked vegetables served were consumed or at least tasted by students. These observations correspond to research by Condon et al. (2008) who noted that a large number of students in their study did not consume vegetables, especially dark-green vegetables, orange vegetables, and legumes. Unfortunately for this study, there was no data collected prior to the enactment of the policy that could be used to determine whether consumption patterns have been impacted by the implementation of the new nutrient standards for school lunches.

CONCLUSIONS AND APPLICATION

At this particular school, there was some improvement in fruit and vegetable consumption when students were solely provided new, fresh, and diverse types of fruits and vegetables. Increased exposure to these foods in the future would be expected to further improve fruit and vegetable consumption. While a policy implementation and change in the school food menus resulted in some improvement in the students' eating behaviors, it is also important to understand and consider all of the factors that influence children's eating behaviors and food choices. Studies have indicated that factors such as parental and familial health and eating habits, participation in the NSLP, pairing of food items, and nutrition education can also influence children's eating habits (Weker, 2006; Birch & Davidson, 2001).

Although federal, state and local laws have mandated nutritional improvements to school meals, students may not be consuming these healthier offerings. Other health promotion methods, such as education, student empowerment, social marketing, and environmental changes should be considered to encourage students to consume healthier school meals. Behavioral economic research strategies and school health policies together can serve as a powerful method of nudging children to consume more healthy foods during the school day. By making simple, low-cost or even free changes to a school cafeteria environment, students can be encouraged to consume healthier foods. Food service providers can play a key role in influencing students' food choices through their preparation and presentation of school meals. Hanks, Just, and Wansink (2012) organized a "lunchroom make-over" at a public high school by making changes such as hanging posters, using descriptive names to advertise food items, serving salads in transparent containers, displaying fruit in baskets, using colorful linens, introducing a shorter line where healthier options were served, placing healthier food in more accessible areas, and also nudging teachers to provide verbal cues to promote children to choose healthy options. This low-cost revamp of the cafeteria required minimal time and effort on staff and resulted in increasing student consumption of fruits from 40% to 47.7% and vegetables from 33.7% to 42%. This demonstrates that small, low-cost changes in the school environment can promote healthy behaviors and could be applied to a school such as the one in this study where limited funding and resources are available. While these strategies have proven to be effective, multiple strategies may be needed to ensure students understand the purpose of the improvement in lunch standards so that they can embrace the healthier school meals.

This study looked at the consumption rates of fruits and vegetables of middle school students. As there are many factors that influence children's eating habits, measuring consumption rates, even at one middle school in this case, was difficult to assess. There were several limitations to this project. All school lunches were pre-portioned by kitchen staff and distributed to the students. It was assumed that all students receiving a tray received equal portions and similar types of the food

items at both schools. Only one type of meal was provided and students could opt-out from receiving any one of the food items. These students were noted and not included in our analyses. It was also assumed that students consumed food items from their own tray and the amount of food shared between or among students' trays was minimized. Students were also able to purchase a snack item in addition to their lunch. However, the lunch staff enforced a rule that students could only purchase snacks after they consumed their lunch and disposed of the tray. Despite efforts to control snacking, students could bring snacks from home. To stay within the scope of this study, the researchers cannot fairly say whether snacks influenced students' consumption of fruits and vegetables.

It is also important to note the limitations of the V-Project application. Because this smartphone application was created for a specific plate waste study, applying it to our study did have limitations. The application only allows the user to enter observed consumption patterns of 0%, 50% or 100% of each food item and does not include consumption of any other percentages, i.e. 75%. Observations of consumption were rounded to one of the three values available on V-Project.

Despite the limitations of this study, the results support many of the studies in the literature showing less than optimal consumption rates of school lunch fruits and vegetables in middle school children. While consumption of fruits and cooked vegetables marginally improved, there were still fairly high rates of discarded food items. Despite improved nutrition standards of the school lunches, students may not be benefiting from those changes. School wellness policy alone does not ensure that children are eating healthy meals. School administrators, teachers, staff, and food service providers must work collectively to engage students and promote healthy eating. Food service staff members are well positioned to be leaders in this initiative. Behavioral economic strategies currently being studied include cafeteria lighting, food presentation, signage, and nudging students. These strategies will require personnel to implement and monitor these strategies, and food service personnel have the opportunity to be at the forefront of these initiatives.

Childhood obesity has tripled in the last decade and is a national health priority. As obese and overweight children are more likely to develop into obese and overweight adults, it is important that this issue be addressed. Understanding children's eating habits and behaviors can play a crucial role in promoting healthy behaviors among young people. Because children spend so much time in school during the impressionable years of their life, it makes sense to use schools as doorways to reach children and promote healthy behaviors. School health policy can play an important role in initiating changes in school environments to promote healthier habits. Most importantly, it is necessary to use a strategy that includes multiple facets of education, persuasion, and guidance when encouraging students to consume healthier foods. Multiple exposures and familiarity of new food items influence the length of time it takes to implement behavior changes in children. With the increase rate of childhood obesity, it is necessary for school communities to renew their sense of dedication to promote a school cultural change that enhances students' health.

REFERENCES

- Beckles, G.L., & Truman, B.I. (2011). Education and income - United States 2005-2009. *CDC MMWR Morbidity and Mortality Weekly Report*, 60, 13-16.
- Behavioral Risk Factor Surveillance System (BRFSS). (2010). Government of the District of Columbia, Department of Health. Obesity in the District of Columbia. *Department of Health Obesity Report*, 1-97.
- Birch, L.L., & Fisher, J.O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, 101, 539-545.
- Birch, L.L., & Davidson, K.K. (2001). Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatric Clinics of North America*, 48(4), 893-907.
- Biro, F. M., & Wien, M. (2010). Childhood obesity and adult morbidities. *American Journal of Clinical Nutrition*, 91(5), 1499S-1505S. doi:10.3945/ajcn.2010.28701B
- Centers for Disease Control and Prevention (CDC). (2013). National Health and Nutrition Examination Survey. Retrieved from <http://www.cdc.gov/nchs/nhanes.htm>

Clark, M.A., & Fox, M.K. (2009). Nutrition quality of the diets of US public school children and the role of the school meal programs. *Journal of the American Dietetic Association*, 109(2 supplement 1), S44-S56. doi:10.1016/j.jada.2008.10.060

Condon, E.M., Crepinsek, M.K., & Fox, M.K. (2008). School Meals: Types of foods offered to and consumed by children at lunch and breakfast. *Supplement Journal of the American Dietetic Association*, 109(2), S67-S78. doi:10.1016/j.jada.2008.10.062

Cullen, K.W., Watson, K., & Zakeri, I. (2008). Improvements in middle school student dietary intake after implementation of the Texas Public School Nutrition Policy. *American Journal of Public Health*, 98(1), 111-117. doi:10.2105/AJPH.2007.111765

Cullen, K.W., Watson, K.B., & Dave, J.M. (2011). Middle-school students' school lunch consumption does not meet the new Institute of Medicine's National School Lunch Program recommendations. *Public Health Nutrition*, 14(10), 1876-1881. doi:10.1017/S1368980011000656

Fox, M.K., & Condon, E. (2012). *School Nutrition Dietary Assessment Study IV: Summary of findings*. United States Department of Agriculture Food and Nutrition Services: Office of Research and Analysis. Retrieved from http://www.fns.usda.gov/ora/MENU/Published/CNP/FILES/SNDA-IV_Findings.pdf

Gleason, P.M., & Dodd, A.H. (2009). School Breakfast Program but not School Lunch Program participation is associated with lower body mass index. *Journal of the American Dietetic Association*, 109(2), S118-S128. doi:10.1016/j.jada.2008.10.058

Guthrie, J.F., & Buzby, J.C. (2002). Several strategies may lower plate waste in school feeding programs. *Food Review*, 25(2), 36-42.

Hanks, A.S., Just, D.R., & Wansink, B. (2012). Smarter lunchrooms: Libertarian paternalism can address new school lunchroom guidelines and childhood obesity. Retrieved from <http://ssrn.com/abstract=2079843>

Lawman, H.G., & Wilson, D.K. (2012). A review of family and environmental correlates of health behaviors in high-risk youth. *Obesity*, 20(6), 1142-1157. doi:10.1038/oby.2011.376

Molaison, E.F., Connell, C.L., Stuff, J.E., Yadrick, M.K., & Bogle, M. (2005). Influences on fruit and vegetable consumption by low-income black American adolescents. *Journal of Nutrition Education*, 37, 246-251. doi:10.1016/S1499-4046(06)60279-0

Navalpotro, L., Regidor, E., Ortega, P., Martínez, D., Villanueva, R., & Astasio, P. (2012). Area-based socioeconomic environment, obesity risk behaviors, area facilities and childhood overweight and obesity. Socioeconomic environment and childhood overweight. *Preventive Medicine*, 55(2), 102-107. doi:10.1016/j.ypmed.2012.05.012

Ogden, C., & Carroll, M. D. (2010). Prevalence of obesity among children and adolescents: United States: Trends 1963-1965 through 2007-2008. Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.htm

Paxton, A.E., Baxter, S.D., Tebbs, J.M., Royer, J.A., Guinn, C.H., Devlin, C.M., & Finney, C.J. (2012). Nonsignificant relationship between participation in school-provided meals and body mass index during the fourth-grade school year. *Journal of Academy of Nutrition and Dietetics*, 112(1), 104-109. doi:10.1016/j.jada.2011.08.037

Ralston, K., Newman, C., Clauson, A., Guthrie, J., & Buzby, J. (2008). *The National School Lunch Program: Background, trends, and issues*. Economic Research Report No. EER-61 2008.

Rosário, R., Araújo, A., Oliveira, B., Padrão, P., Lopes, O., Teixeira, V., . Moreira, P. (2012). The impact of an intervention taught by trained teachers on childhood fruit and vegetable intake: A randomized trial. *Journal of Obesity*, 2012, 1-8. doi:10.1155/2012/342138

The Veggie Project: Brigham Young University. (2012). Retrieved from <https://veggieproject.byu.edu/Pages/data.aspx>

Turner, L., & Chaloupka, F.J. (2012). Slow progress in changing the school food environment: Nationally representative results from public and private elementary schools. *Journal of the Academy of Nutrition and Dietetics*, 112(9), 1380-1389. doi:10.1016/j.jand.2012.04.017

United States Department of Agriculture Food and Nutrition Services (USDA). (2013). USDA School Meals: Healthy Meals, Healthy Schools, Healthy Kids. Retrieved from <http://www.fns.usda.gov/usda-school-meals-healthy-meals-healthy-schools-healthy-kids>

Weker, H. (2006). Simple obesity in children: A study on the role of nutritional factors. Abstract. *Medycyna Wieku Rozwojowego*, 10(1), 3-191.