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Peer-Reviewed Article

## **Is School Lunch a Contributory Factor to Childhood Over-Weight or Obesity in Elementary School Children?**

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**Abstract:** The federally sponsored lunch program known as the National School Lunch Program (NSLP) was initiated in 1946. One of its main goals is to provide free nutritionally balanced meals to school children daily, but it is not known whether this program reduces or increases the risk of overweight or obesity in children. Researchers advocated that school lunches contribute to childhood overweight or obesity, but there has not been conclusive evidence. This cross-sectional study (Ledford 2011) examined the impact of the NSLP versus home-prepared meals on childhood over-weight or obesity after adjusting for race, gender, ethnicity, and physical activity. The implication for positive social change include knowledge and guidance useful to researchers, policymakers, parents, school administrators, and the community to help to make school lunches healthier but with less calories and to design interventions designed for the prevention and management of overweight or obesity in children.

**Keywords:** BMI, NSLP, Obesity, Overweight, YRBS, SEM

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### **Prevalence of Overweight and Obesity Globally and in the U.S.**

The rates of childhood obesity have more than tripled in the past 30 years, which had a prevalence of obesity among children ages 6 to 11 years increasing from 6.5% in 1980 to 19.6% in 2008, and the disease is now recognized as a public health concern affecting over nine million children in the United States (Centers for Disease Control and Prevention, 2007, 2009; U.S. Department of Health, n.d.). Childhood overweight and obesity are continuous epidemics that

begin in childhood and extend through adulthood; as a result, they are the leading causes of numerous health problems. The *British Medical Journal* defined overweight or obesity as an excess of body weight compared to set standards (as cited in CDC, 2009). The excess weight may come from bone, fat, muscle, and/or body water. It is asserted that Individuals with a Body Mass Index (BMI) of 25 to 29.9 are considered overweight. Obesity refers explicitly to having an aberrantly high proportion of body fat. Individuals with a BMI of 30 or more are considered obese (CDC, 2009).

Adult diseases related to obesity are now becoming more prevalent among young people, and this trend continues into adulthood. The World Health Organization (WHO, 2017) estimated that “in 2016, more than 1.9 billion adults aged 18 years and older were overweight. Of those over 650 million adults were obese. Globally, about 13% of the world’s adult population (11% of men and 15% of women) were obese in 2016. The worldwide prevalence of obesity nearly tripled between 1975 and 2016” (para. one). Correspondingly, an estimated 41 million children under the age of five years were overweight or obese and over 340 million children and adolescents aged 5-19 were overweight or obese in the same year (WHO, 2017). In addition to long-term physical health risks, overweight and obese children and adolescents face significant mental health and psychosocial morbidities, which are linked to concurrent health problems.

These health problems increase the risk of developing hypertension, high cholesterol, respiratory diseases, orthopedic problems, depression, and type 2 diabetes (U.S. Dept. of Health and Human Services, n.d.). The increasing economic impact of overweight and obesity is also a concern. CDC (2017) asserted that overweight and obesity and the diseases associated with them have a grave impact on the economy of the U.S. health care systems. For example, the

hospitalization costs for overweight or obese children were estimated at \$127 million during 1997-1999, which was up from \$35 million during 1979-1981 (Institute of Medicine, 2005). Because combating overweight or obesity in children can be very effective in curbing the high cost of health care (IOM, 2018), research into overweight and obesity in childhood, with a focus on prevention, must be given high priority.

### **Overweight and Obesity in Children**

Childhood obesity has become a national epidemic and is now a major public health concern globally as well, because it affects children all over the world. Since the 1960s, childhood obesity in the United States has increased by 54% in children 6 to 11 years and by 39% in children 12 to 17 years. The most recent data (2015-2016) showed that one in five school age children and young people (ages 6-19 years) in the United States are obese (CDC, 2017).

One factor presumed to contribute to the trend of increasing overweight and obesity among children is the consumption of fast foods. Children in the United States spend most of their time at school or in a childcare setting. In fact, about 12 million children under five in the United States (63% of the nation's children) are enrolled in some type of childcare arrangement each week (National Resource Center in Health and Safety, 2008). It has also been noted that most parents leave work just in time to pick up their children from aftercare/childcare. For convenience, some parents stop to get dinner from one of the many fast food restaurants available and their children often finish eating prior to getting home. There is no time for play or proper digestion, and the children are sent to bed (Ledford, 2011). Studies conducted by scientists at the United States Department of Agriculture (USDA) Agricultural Research Service and Harvard University showed decreased nutritional dietary quality and increased caloric intake

among U.S. children on days when they consumed fast food. U.S. children who ate fast food, compared with those who did not, consumed more total calories, more calories per gram of food, more total and saturated fat, more total carbohydrates, more added sugars, and more sugar-sweetened beverages, but less milk, fiber, fruit, and non-starchy vegetables. The study also revealed out of the two days surveyed, those children who consumed fast food on only one day showed nutrient shortfalls on that day. However, they did not show these shortfalls on the other days. This study confirmed the findings of previous studies (USDA, 2016).

The United States Department of Agriculture (2014) also reported that:

“childhood overweight is the result of an imbalance between the calories a child consumes as food and beverages and the calories a child uses to support normal growth and development, metabolism, and physical activity. In other words, overweight or obesity results when a child consumes more calories than the child uses. The imbalance between calories consumed and calories used can result from the influences and interactions of a number of factors, including behavioral and environmental factors.”

It is the interactions among these factors-rather than any single factor-that are thought to cause overweight (CDC, 2016).

### **The National School Lunch Program (NSLP)**

The National School Lunch Program (NSLP) plays a vital role in the lives of millions of children on a daily basis. This program is a federally funded program that provides about one third of children’s daily nutritional and caloric requirements and feeds approximately 31 million school children each school day. Because this program has a tremendous impact on children’s health, the school is an ideal place to start the prevention of childhood obesity. It has been

reported that children who bring their lunch to school tend to be less overweight than those who eat lunch at school (Journal of Human Resources, 2009). However, children who are on the NSLP are more likely to consume milk, meats, grains, and vegetables, and have higher nutrient intakes in comparison to students who are not part of this program (USDA, 2010). Parents who are in a hurry may buy lunches for their children from fast food restaurants. While school meals have to meet nutritional standards and stay within budgetary constraints, the meals must at the same time be appealing so that children will actually want to eat what is served (Ledford 2011). Calories must be adequate to meet nutritional needs. The USDA also stressed that school meals should not add to the rising prevalence of childhood obesity (USDA, 2009). In spite of all the available evidence, it is still not known whether school lunch increases or decreases the risk of obesity.

### **Contributory Factors to Childhood Obesity**

Childhood obesity is a national and global epidemic. Olshansky et al. (2005) stated that the obesity epidemic may result in reduced life expectancy as early as the first half of this century, with the current generation of children living shorter and less healthy lives than their parents. Not only is childhood overweight or obesity harmful at the individual level, it is also costly to society as a whole. Because of poor nutrition and lack of physical exercise, many children are at risk for chronic diseases that were previously termed *old people* diseases, and childhood diabetes, hypertension, and other debilitating diseases have become widespread (Olshansky et al, 2005). The school plays a vital role in the health and welfare of children, and nutrition and physical activity is considered an essential part of children's day to day routine. However, there have been contradicting findings on whether or not the National School Lunch Program contributes to childhood obesity.

Floriani and Kennedy (2008) affirmed that promotion of physical activity continues to be recommended as an essential component of *obesity* treatment and prevention interventions and Robin (2007) averred that poor eating habits, including inadequate intake of vegetables, fruit, and milk, and eating too many high-calorie snacks play a role in childhood obesity. Educating parents, caregivers, and all those in charge of guiding the future generation on the importance of proper exercise and eating healthy will in the long run make a better and healthier society. As the Surgeon General (2007) stated, “Risk factors for heart disease, such as high cholesterol and high blood pressure occur with increased frequency in overweight children compared with children with healthy weight.” As mentioned, the consequences associated with childhood overweight or obesity are numerous and eating a healthy school lunch can be beneficial to children. Children who are overweight or obese suffer biologically, emotionally, and socially. Serious health conditions may affect these children later in life, which can also have a crippling effect on health care and society.

### **Is the National School Lunch Program a Contributory Factor to Childhood Over-Weight and Obesity?**

A study was conducted by Ledford (2011) using parents of children ages 5 to 11 years old in two after school centers in an urban section of the United States, and participants throughout the United States via Facebook, to find out whether or not the NSLP is a contributory factor in childhood overweight or obesity in elementary school children. The YRBSS questionnaire from the Centers for Disease Control and Prevention (CDC) was modified and used. This survey, according to the new data from CDC, monitors priority health-risk behaviors and the prevalence of obesity and asthma among youth and young adults was modified to include the parents. The YRBSS is a reputable survey, and includes a national school-based survey

which is conducted by the Centers for Disease Control and Prevention (CDC). This survey is periodically conducted in each state, territorial, and local education and health agencies, and tribal governments (CDC, 2010).

From the study, the data showed school lunches show a higher rate of overweight or obesity compared to home prepared lunch. In fact, of the 297 children that parents reported ate school lunch, the data showed that 219 or 73.7% of them were overweight or obese, compared to 59 or 57.8% of 102 children who brought their lunch to school. Studies have shown that home-prepared lunch was not a contributory factor to childhood obesity; however, no one is certain what children who bring their lunch to school are really eating. On the other hand, school lunch, which seeks to supply a nutritious, well-balanced lunch for children, so as to encourage good eating habits, has shown a significant association with obesity ( $p$ -value = 0.00). This shows that the food contents of school lunch should be greatly improved so that it does not promote overweight or obesity. The study also shows that in order to control childhood overweight or obesity, children need to be exposed to physical activity and physical education at least three times per week (Ledford, 2011).

Researchers Warren et al (2003), examined the development, implementation, and evaluation of a school and family-based intervention for children aged 5-7 years, and later compared the effectiveness of three different intervention programs. Children aged 5-7 years ( $n = 213$ ) were recruited from three primary schools in Oxford and randomly allocated to a control group or to one of three intervention groups, namely, nutrition group, physical activity group, or a combined nutrition and physical activity group. Lunchtime clubs were set up for children to be educated on nutrition and/or physical activity. The children's growth, diet, physical activity, and nutrition knowledge were assessed after four school semesters. The researchers affirmed that

there were statistically significant improvements in nutrition knowledge in all children between baseline and post-intervention, where the consumption of vegetables increased significantly, ( $p \leq 0.05$ ), and fruit was ( $p \leq 0.01$ ). The consumption of fresh fruits for the males also increased significantly, ( $p \leq 0.01$ ). There was a statistical significant increase in the fruit and vegetable intake as well as changes in the fruit consumption of nutrition, the combined nutritional and the physical active group. The researchers confirmed that schools play a vital role in the health and promotion of healthy behaviors in children and it is therefore an essential place to begin.

Condon, Crepinsek, & Fox (2009) confirmed that students who take part in the NSLP receive a significant amount of nutrients vital to their diets. The authors conducted a cross-sectional survey in 2005 with 398 schools and 2,314 students in grades 1-12, using a two-tailed t-test to assess the difference between children who eat school lunch and those who do not participate in the school lunch program. It was affirmed that most school menus offered daily, consist of nonfat or 1% milk, fruit or 100% juice, and vegetables, but there were more starchy vegetables than dark green/orange vegetables or legumes. Moreover, the students who took part in the NSLP were more likely to consume milk, fruits, and vegetables, and less likely to have desserts, snack items and sugared beverages in their daily intake. The authors concluded that, since children are exposed to the foods offered through the NSLP, it is very likely that they are achieving nutrients beneficial for a healthy living. Since children who bring supposedly home-prepared lunches to school are often getting fast foods instead, are not exposed to the daily nutrients that they need, and are more susceptible to risk factors contributing to overweight and obesity. Also, although the NSLP is supplying the nutrients necessary for growth, there seem to be too much caloric intake thereby promoting overweight/obesity.

Thompson, et al (2006) conducted a longitudinal study where they investigated whether or not dietary patterns were predictors for change in BMI z-scores of 101 girls between the ages of 8-12 years old, with a follow-up at age 11-19 years. The baseline for their age and weight was below the 85<sup>th</sup> percentile. The BMI z-scores and waist circumference were the dependent variables, while food diaries, which included seven-day self-reported dietary intake, were the independent variable. The food diaries, height, and weight of participants were reported and taken at baseline and at follow-up. Also, parents' weight, education and BMI were taken at baseline. The researchers concluded that, on average, girls ate about 4-5 times per day and consumed most energy in the afternoon and in the evening/night, rather than in the morning.

Once the baseline BMI was controlled, the mean percentage of daily energy consumed in the evening/night was positively associated with change in BMI z-score ( $p \leq 0.039$ ). Eating between 4.0 and 5.9 times per day overall, and no more than 1.9 times in the evening/night daily, were negatively associated with change in BMI z-score ( $p \leq 0.002$  and  $0.047$ , respectively), after controlling for baseline BMI z-score. In addition, parents who were less educated and had a higher BMI contributed to a positive increase in BMI z-score at the follow-up than previously noted at baseline.

From this study, the researchers confirmed that the National School Lunch Program (NSLP) was associated with childhood overweight or obesity. Thus, there is evident that the school lunch program is a contributing factor of childhood overweight or obesity. Consequently, this study has shown that there continues to be mixed reviews on the impact of the NSLP and home prepared lunches. Therefore, more in-depth study should be done in this area.

Students participating in physical education classes two or more times a week at school will undoubtedly help to decrease the risk of overweight and obesity in elementary school

children. Furthermore, from this study it is indicated that health education should begin with elementary school children, and therefore educating school administrators, teachers, school nurses, cafeteria workers, and parents, effective programs can be designed to begin the prevention of obesity in elementary school children. Overweight or obese children are not only at risk for greater medical problems in childhood, but they also have a 70% chance of becoming an obese adult with similar health problems.

### **Implication for Social Change**

Childhood overweight or obesity is a global concern, and its risks are many. Findings from this study can prove imperative to the prevention and management of this disease. This study provides evidences of overweight or obesity, such as the lack of physical activity, proper nutrition, and how it affects young children. Also, it has been determined that males are more susceptible to overweight or obesity. Usually the prevention approaches for overweight or obesity takes place during adolescence or adulthood. Hopefully, from the results outlined here, the public health sector will now be able to find future prevention strategies and intervention focusing on environmental and behavioral changes earlier in the child's life and at the elementary school level. With the utilization of the socioecological model (SEM) of change, which considers the influence of the individual's environment on his or her behavior, this disease can be addressed properly. This is a very effective model which encourages the planning of interventions to prevent childhood overweight or obesity by employing changes in the environment that positively influence behaviors (Glanz, Rimer & Lewis, 2002).

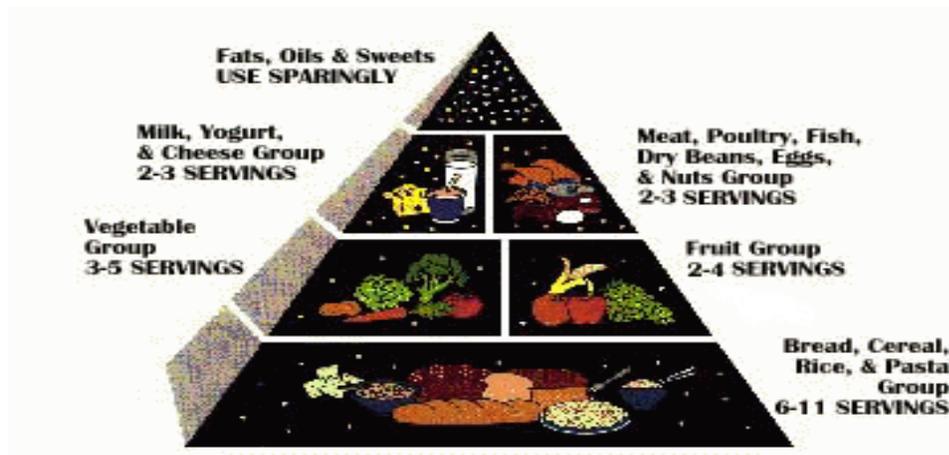
Since socioeconomic status is also a grave risk factor for most children who eat school lunch it is important that more effort is made in making sure that the lunch provided through the NSLP meets the daily nutritional requirements for all children, as this might be the only

nutritious meals some children have each day. Regardless, one cannot determine whether children who bring their lunch to school nowadays are properly nourished, but one can be certain that the NSLP could provide good nutrition, and possibly make an impact on their health. This can, in the long run help in the prevention of childhood overweight or obesity. Receiving school lunch can also help schools to reach their educational goals, and even encourage students to attend school. It is hopeful that the information gained from this research will be the foundation for a more effective nutritional planning on the part of the USDA, the United States Board of Education, school administrators, school nurses, PE teachers, cafeteria managers, and most importantly, the parents. The CDC will continue its monitoring of childhood obesity of middle and high schools, but hopefully they will determine the importance of monitoring elementary school children, and make this a part of the process.

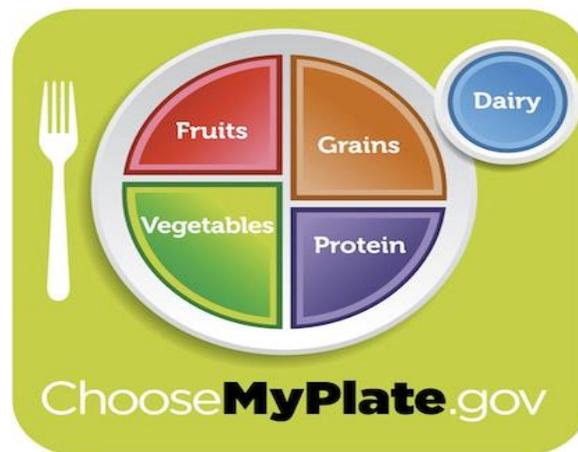
Education of proper nutrition begins in the home, but since children are in school most of their waking hours (185 days per school year), it is imperative that it begins at school. Findings from the study indicate that, in comparison to kindergarten children, as the child ages, he or she becomes more overweight and obese. As a school system, the role is not solely to teach the three R's, but also to educate the children on being healthy. Once the risk factors of overweight and obesity of our children are assessed, it should be the responsibility of the school systems to put in place programs through nutrition and physical activities to promote good health habits. Furthermore, through the Parents Teachers' Association, parents can be educated on the nutritional well-being of their children. The home, childcare, school, and community environments can certainly influence children's behaviors, in order for them to live longer and healthier lives. A major advancement in the fight against overweight or obesity is the replacement of the Food Pyramid (Figure 1) with a food plate symbol (Figure 2) by the

government. According to the United Department of Agriculture 2011, the food plate, which replaces the Food pyramid, is part of a healthy-eating program that will convey seven key messages from the dietary guidelines, namely, enjoy food but eat less; make half your plate fruits and vegetables; drink water instead of sugary drinks; and switch to fat-free or low-fat (1%) milk. In fighting childhood overweight or obesity, this is a great way for the children to learn, as the plate is something that the children use every day, and they can easily understand the messages it conveys.

**Figure 1: USDA Food Pyramid**



(USDA, 2011)

**Figure 2: USDA Food Plate**

### Summary

The outcome of this study by Ledford (2011) confirmed that there is an association between school lunch (NSLP) and childhood overweight or obesity. Although school lunch contains all the nutritious ingredients necessary for a healthy diet, there seems to be a large intake of sweets and foods high in calories. The school lunch program needs to be reexamined. The USDA should make it more nutritious and at the same time tasty with less sugar and high caloric ingredients. This will certainly help in the prevention and management of overweight or obesity. Later, encouraging 100% of participation in the NSLP would help to prevent obesity. Parents, school officials, members of the public health sector, physicians, and the community can significantly impact childhood obesity through healthier environments, food choices, and encouraging physical activity. Therefore, it is imperative that society and community, such as the government, food producers and retailers, employers, schools, families, and individuals become work cohesively to successfully foster this kind of change. Because health promotion, leadership, communication, collaboration, and education are critical components in addressing childhood

overweight or obesity and developing effective methods of prevention, it would be effectual if health promotion programs were designed to prevent obesity. Such programs should be then be evaluated and monitored regularly to ensure effectiveness. Most importantly, such programs should begin in the schools. Parents should also be made aware of such programs through PTA, and weekly correspondence from the schools (Ledford, 2011).

Other findings in the study indicated that students who are a part of a team tend to be less likely to be overweight or obese than their counterparts who are not a part of a team. It is, therefore, important to make sure that children are exposed to different afterschool activities, as it is also identified that the students who take part in Physical Education (PE) or Physical Activity (PA) at least three days per week were less likely to be overweight or obese than those who took part in PA or PE none or one time per week. As a result, it is advisable for children to be exposed to these activities, which should be made part of the school curriculum (Ledford 2012). The amount of time children spent in sedentary positions contributes tremendously to overweight or obesity. Consequently, children should be encouraged to play more. According to the Centers for Disease Control and Prevention (CDC) (2011), parents should be encouraged to reduce the time their children spend watching television, playing video games, and in other sedentary behaviors, but instead, incorporate physical activity into regular routines. Schools should make certain that the school lunch program meets nutrition standards, provide food options that are low in fat, calories, and sugars, and make sure that daily quality physical education is available to all children from prekindergarten through to grade 12. Since the community plays a very important role in the health and well-being of its citizens, there should be ways to promote healthier choices such as having at least five servings of fruits and vegetables, and encourage reasonable portion sizes. It should be the community that encourages the food

industries to provide reasonable food and beverage portions sizes, encourages the food outlets to increase the availability of low calorie, nutritious food items, and makes it available for areas in the communities for physical activity (CDC, 2011).

Childhood overweight or obesity has become a global epidemic and is partially due to lack of exercise and poor nutrition. There are many factors that contribute to overweight or obesity, such as genetics, food choices, economics, social status, physical activity levels, and sedentary behaviors. Other factors are caused from the lack of community involvement in creating safe and accessible sidewalks, parks, bike paths, or food markets where healthy foods are sold (CDC, 2008a). Most importantly, health promotion programs designed to prevent overweight or obesity should be evaluated and monitored regularly to ensure effectiveness. Overall, health promotion, leadership, communication, collaboration, and education are crucial components in addressing childhood obesity and developing effective methods of prevention. Putting them in practice can be effective not only to the children, but also to the school, community, the nation, and the world (Ledford 2011).

Childhood obesity is a rising epidemic in this nation and globally, and efforts to curb this problem have become more and more challenging. Whether or not the National School Lunch Program (NSLP) reduces or increases the risk of overweight or obesity in children is unknown. However, over the last 30 years childhood obesity has tripled, and the prevalence of obesity among children aged 6 to 11 years have increased from 6.5% in 1980 to 19.6% in 2008, and is recognized as a public health concern, with over nine million obese children in the United States (CDC, 2009, Nat'l Journal of Pediatrics, 2007, U.S. Department of Health, n.d.). Overweight or obesity is a continuous epidemic that begins from childhood through to adulthood and is the leading cause of various health problems. It has also been averred that an overweight or obese

child will eventually grow into an overweight or obese adult, coupled with the many complications of hypertension, asthma, high cholesterol, type 2 diabetes, certain cancers, and sleep disorders. Researchers have had mixed reviews on studies on home prepared lunches versus school lunch (NSLP) and childhood obesity, and this study has provided important findings on these two variables and childhood obesity (Ledford, 2012).

The NSLP plays a vital role in the prevention and management of childhood obesity, and thus the purpose of this study. This was a very insightful study, and from the many answers from the participants, it can be determined that most parents are in denial about their children's weight. Many parents prefer to prepare a lunch from home for their children, which often times are not nutritiously comparable to the school lunch (NSLP), yet the school lunch tends to be a contributory risk factor of childhood obesity. This study confirmed the negative impact of school lunch on childhood overweight or obesity. The researchers Fioriani and Kennedy affirmed that promotion of physical activities continues to be recommended as an essential component of *obesity* treatment and prevention interventions, and Robin avers that poor eating habits, including inadequate intake of vegetables, fruit, and milk, and eating too many high-calorie snacks, play a role in childhood obesity (2010). Educating parents, caregivers, and all those in charge of guiding the future generation on the importance of proper exercise and eating healthy will in the long run make a better and healthier society.

It is quite reassuring to know that, "A healthy child will grow into a healthy adult." Hopefully, the information gained through this study will help to find ways to promote healthy living, beginning in the schools, and hopefully in the next 2-3 years, school lunch will be available to all school children. While we hope for the availability of school lunch to every child, we also hope that through the reexamination of the ingredients present in school lunch, the

USDA will lower the calories and sugar, and not only make the food more nutritious but also tasty. Most importantly, parents should be better educated to understand the benefits of a healthy school lunch. With this in mind, we will then be able to rest assured that our children will not die before their parents (Ledford, 2012).

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