

Co-Recipient of the 2009 Abell Award in Urban Policy

**A LIGHTER FUTURE FOR BALTIMORE CITY:
USING SCHOOLS IN THE FIGHT AGAINST CHILDHOOD OBESITY**

Natalie Draisin
Johns Hopkins University
Public Health Studies

The Abell Award in Urban Policy is presented annually to the student who writes the most compelling paper on a pressing problem facing the City of Baltimore and feasible strategies for addressing it. This award is co-sponsored by The Abell Foundation and the Johns Hopkins Institute for Policy Studies.

Executive Summary

This paper explores the reasons why Baltimore City is suffering from a high rate of childhood obesity, and how this problem can be overcome through school programs and policies. Childhood obesity must be targeted because of its adverse educational, social, and health consequences. Additionally, childhood obesity places financial burden not only on the individual and his or her family, but also on the rest of society. Baltimore City has several factors which make the population particularly susceptible to high rates of childhood obesity. For example, the city has a high number of African American and low-income residents, two populations that are subject to high obesity rates. Many Baltimore City neighborhoods are deteriorating and do not provide physical environments in which to exercise, or convenient grocery stores where one can buy healthy food.

Many studies have shown the efficacy of school programs targeted at reducing childhood obesity through nutritional education, physical education, and family-reinforced programs and policies. Factors which contribute to childhood obesity, such as an unhealthy lifestyle and the impact of corporate advertisements in the media, can be counteracted through school-sponsored programs. Because schools are controllable factors that have the most contact with children during a consistent period of time, they should indubitably be enlisted in the fight against childhood obesity. Given that a large number of African American and low-income students are enrolled in the Baltimore City Public School System (BCPSS), school-based policy efforts to reduce childhood obesity would have significant impacts on the obesity rates of Baltimore City as a whole.

A policy that would successfully reduce childhood obesity rates must first create a committee to serve as a liaison between the Baltimore City Health Department and the Baltimore City Public School System, since a lack of collaboration between these two bodies has previously

hindered the city's anti-obesity efforts. This committee must find funding for, and enforce the universal implementation of the already developed Local Wellness Policy, the realization of which is pending. Additionally, it must synthesize nutritional education programs, in-school breakfast and lunch programs, physical education, family-focused reinforcement, and mentoring programs. This can be achieved through several policy efforts, including banning junk food sales in schools, implementing a time requirement for health classes for elementary and middle schools, creating and enforcing a universal curriculum targeted at obesity prevention, mandating teacher workshops and training, enrolling every student in a school health clinic, scheduling recess before lunch, increasing physical activity time requirements, and educating parents as to their child's health status and ways to lead healthier lifestyles.

Introduction

The rate of childhood obesity is on the rise. Baltimore City has a high rate of overweight and obesity, when compared to the rest of the state and the country. Through universally enforced policies in schools, the obesity trend can be stopped and even reversed. Schools must implement several policies, which include monitoring the health of their students, training faculty to recognize and respond to childhood obesity, and implementing a universal curriculum which incorporates nutrition education, physical education, and family-based reinforcement programs.

The Weightiness of the Issue: Prevalence

The world-wide rate of obesity has reached epidemic proportions. Of the world population, one billion adults are overweight, and 300 million of them are obese.¹ Approximately a third of the current U.S. population is obese, compared with a quarter of the population in 1998.² In 2007, the number of overweight and obese adults in the country totaled 60 percent.³ The number of overweight and obese children has skyrocketed in the past couple of decades, and is estimated to have reached 23 million.⁴ A child's status as obese or overweight can be determined through

their Body Mass Index (BMI), which is calculated using the child's weight and height, and is a reliable measure of body fat. BMI is compared through percentiles, which represent the normal size and growth patterns of children according to their gender and age. Overweight children are between the 85th and 95th BMI percentiles of their age, and obese children are above the 95th BMI percentile for their age.⁵ From 1971-1974, 5 percent of 2-5 year olds were estimated to be obese, doubling to 13.9 percent from 2003-2004. Between 1971-1974, 4 percent of children age 6-11 were obese. This statistic increased four-fold, soaring to 19 percent between 2003-2004. From 1971-1974, 6.1 percent of 12-19 year-olds were estimated to be obese, increasing to 17 percent in 2003-2004.⁶ If a child is obese at age 4, there is a 20 percent chance he will be obese as an adult.⁷ If childhood obesity carries into adulthood, there is a 70 percent chance the adult will remain obese for the rest of his life.⁸ Therefore, as today's children get older, the obesity rate will grow.

Baltimore City, Maryland

Maryland is the 27th most obese state in the country, with an obesity rate of 25.2.⁹ In Maryland, 60 percent of adults were overweight or obese in 2007, rising from 34 percent from 1995-2003.¹⁰ A 2005 study showed that 27.5 percent of Maryland students described themselves as overweight, and 42.6 percent were trying to lose weight.¹¹

Baltimore City's obesity rate of 35 percent is higher than that of Maryland and of the U.S. (Appendix Figure A).¹² In 2007, 13 percent of children ages 2-5 receiving services from the Maryland Women, Infants, & Children Program were obese.¹³ Additionally, 37 percent of Baltimore City high school students are overweight or at-risk compared to 29 percent of their counterparts in Maryland and the U.S.¹⁴ Females in high school were 48 percent more likely to be overweight than males. Childhood obesity and overweight is a problem in Baltimore City.¹⁵

Impacts: Extending Beyond the Waistline

Physical

In 2005, the U.S. Centers for Disease Control and Prevention (CDC) estimated that each year, 112,000 deaths in the U.S. are associated with obesity, making it the second highest contributor to premature death. Moreover, it is predicted that life expectancy among Americans will decline as a result of increasing childhood obesity rates.¹⁶ It is estimated that in 2000, childhood obesity placed 30 percent of boys and 40 percent of girls at risk for developing type two diabetes.¹⁷ Obesity places a person at risk for heart disease, and 61 percent of obese children have at least one additional risk factor for heart disease. Childhood obesity can also cause hypertension, polycystic ovarian syndrome, non alcoholic fatty liver disease, orthopedic complications, and sleep apnea.¹⁸

Social

In addition to causing health problems, childhood obesity also affects social life. Overweight adolescent females report being negatively affected by intentional name calling and teasing, and unintentional comments by those around them. Some overweight children and adolescents also claim that others view them as lazy, unhygienic, and without feelings.¹⁹ Clearly, childhood and adult obesity can result in low self esteem, which can lead to depression, psychosocial issues, and can subject a person to social stigmatization. Childhood obesity which translates into adult obesity may lead to job discrimination later in life.²⁰

Academic

Childhood obesity can negatively impact education as well. Certain medical consequences of obesity and related illnesses, such as sleep apnea or decreased learning and memory skills, can hinder a child's ability to learn. This can affect a child into adulthood, as shown in a study reporting that obese women attain lower levels of education than non-obese women.²¹

Financial

According to the U.S. Department of Health and Human Services, direct and indirect costs associated with obesity amounted to about \$117 billion in 2000. Obesity related inpatient and ambulatory costs have risen by \$395 per year, which is more than smoking or drinking related costs.²² In 2000, it was estimated that the prevalence of childhood obesity linked type two diabetes caused annual hospital costs to triple over the past two decades.²³ In 1979, \$35 million was spent on treating childhood obesity related diseases, and in 1999, that cost amounted to \$127 million.²⁴

If childhood obesity continues to translate into adult obesity, the cost incurred to our society will only become greater. In 2004, it was estimated that \$98 billion to \$129 billion was spent on health expenditures for obesity and overweight related issues in adults. Certainly, that number has grown to represent the increasing obesity trend. If the childhood obesity trend continues to permeate into adulthood, employers will also experience significant increases in insurance costs. For example, health care costs of General Motors employees have already increased from \$2,225 to \$3,735 per year as employee BMI increased. The United States Department of Agriculture (USDA) claims that healthier diets could save \$71 of that cost. According to the Centers for Disease Control (CDC), if all physically inactive Americans became active, \$77 billion would be saved in medical costs annually.²⁵

What Causes Childhood Obesity?

In order to reverse the growing obesity trend for the future, it is necessary to target obesity in the young population. This section discusses most causal factors, except for the family, which is discussed later in order to illustrate the importance of family interaction with schools. All of the factors below may interact with each other to exacerbate a child's risk of obesity.

Genes Making Jeans Too Tight

Nutritionally, obesity is caused by excessive consumption of calories, usually laden with fat, saturated fat, and sugars.²⁶ Even if a child receives adequate nutrition, he can still be obese. Studies performed on twins, adopted children, and families have concluded that genetics can increase a child's risk for obesity between five to 40 percent, and 50 to 70 percent of a person's body fat and BMI is determined by their genes. These studies also showed that a child has a 25 to 50 percent chance of being overweight if one parent is obese, and a 75 percent chance of being overweight if both parents are obese.²⁷

Race and Socioeconomic Status: Increasing the Chances

Race and socioeconomic status play a role in both childhood obesity, and the feasibility of obesity prevention. Race is correlated with the likelihood of childhood obesity, and Caucasian children are particularly less likely to be obese than their African American, Latino, or Native American counterparts. In 1998 for example, 12.3 percent of Caucasian children were overweight, almost half of the 21.5 percent of overweight African American children and 21.8 percent of Latino children.²⁸

Those of low socioeconomic status are more affected by childhood obesity for several reasons. One reason lies in the fact that it is cheaper to buy large meals, replete with processed sugar and fat, than healthy meals. This contributes to excessive consumption of added sugar and saturated fat, as well as a deficiency of fruits, vegetables, and fiber, leading to an increased risk of obesity.²⁹ One study offered an explanation for this discrepancy, finding that areas afflicted with poverty have less fruits and vegetables available to them than areas of higher socioeconomic status. The same study also depicted the interaction of race, finding that regardless of income, African Americans had less access to fruits and vegetables than other races.³⁰ Even if fruits and vegetables were available, families of low socioeconomic status would

probably choose cheaper, unhealthier foods, in lieu of paying the bills rather than providing healthy meals.

Baltimore City

In 2000, Baltimore City was 64.2 percent African American, compared to 29.5 percent of Maryland, and 12.3 percent of the nation.³¹ African American women have the highest prevalence of obesity in Maryland.³² In 2007, the rate of obesity among African Americans was almost double that of Caucasians.³³

Baltimore City also has high rates of poverty. In 2007, 20 percent of the population was below the poverty level, and 28.2 percent of this population was under 18 years of age.³⁴ The comparatively high numbers of children in Baltimore City who are constrained by poverty are therefore at a greater risk for childhood obesity.³⁵

Urban Structure: Restricting the Options

Poverty stricken areas are often unsafe, therefore restricting a child's ability to engage in outdoor activities. City layout and lack of green space may also restrict the opportunity for outdoor activity. Some neighborhoods do not have sidewalks, bike paths, playgrounds, or parks.³⁶ This translates into less physical activity, increasing a child's risk of obesity.³⁷

Baltimore City

Richard Matens, Assistant Commissioner of Chronic Disease Prevention for the Baltimore City Health Department, cited the lack of green space as a contributor to obesity, since this restricts the availability of areas in which to exercise.³⁸ Additionally, Baltimore City is ridden with deteriorating neighborhoods, which do not provide safe streets for children to play in or engage in physical activities.³⁹ Deteriorating neighborhoods also do not provide enough healthy food choices. As per Matens, in the beginning of the 21st century, Baltimore City lost approximately 19 percent of its supermarkets, taking a great toll on areas afflicted with poverty.

Corner markets and stores arose, limiting the food availability to such areas. Such stores sell mostly perishable and unhealthy items, and have a small selection of fresh fruits and vegetables, which are generally expensive. As a result, those living in poor areas have about one third of the food and vegetable choices of those in more affluent areas.⁴⁰

Mass Media: Bombarding Children with Unhealthy Ideas

Popular culture and the mass media also play roles in childhood obesity. Business interests spend a disproportionate amount of money on advertising and promoting unhealthy food choices and lifestyles in the media. Approximately \$12.7 billion is spent in advertising targeting children and their parents, compared with the \$1.1 million spent on the U.S. National Cancer Institute's "5-A-Day" advertising campaign to promote consumption of fruits and vegetables.⁴¹

Even if children live in neighborhoods with areas conducive to outdoor activities, they may still choose not to take advantage of such opportunities. A child may prefer to engage in more sedentary activities such as television viewing, which is directly related to obesity rates. As many children spend more time watching television, using the computer, or playing videogames than doing anything else other than sleeping, their levels of exposure to advertisements for unhealthy, highly processed and energy dense foods, are growing.⁴²

Lifestyle and Culture: the Sedentary Overconsumer

American culture constructs a breeding ground for childhood obesity. Over time, work has become less physically demanding, and our society is inclined to exert low amounts of energy in everyday activities.⁴³ American children spend 75 percent of their waking hours being inactive, and it is estimated that they spend approximately 12 minutes per day engaging in vigorous physical activity. In terms of transportation, people often prefer cars to walking, and elevators to stairs, so the least possible energy is exerted.⁴⁴ Children ages 5-15 walk to school less than they used to, as 20.2 percent used to walk to school in 1977, declining to 12.5 percent in 2001.⁴⁵

Also, as portion sizes have grown, Americans are consuming more calories than they used to. Calorie consumption by 12-19 year-old boys increased by 243 calories from 1977-1996. Girls of the same age ate 123 more calories in 1996 than their counterparts in 1977.⁴⁶ The consumption of soft drinks, which has been linked to obesity, rose from 179 grams to 520 grams for 11-18 year-old boys from 1965 to 1996, per capita. For girls in the same age bracket, soft drink consumption rose from 148 grams to 337 grams in the same timeframe.⁴⁷ Children also eat more fast food than they used to, which is linked to childhood obesity. In the late 1970s, 17 percent of the meals children ate were consumed away from home, and 2 percent of their diets consisted of fast food. These numbers soared in the late 1990's, when 30 percent of meals were eaten away from home, and 10 percent of children's diets were fast food.⁴⁸ This increase and change in lifestyle can also be attributed in part to mass media.

How Can the Impact of These Factors be Reduced?

It would be incredibly difficult to fully eradicate poverty, ban unhealthy food advertisements, or install green spaces in every neighborhood. However, it is possible to teach children the importance of making healthy food choices, engaging in physical activity, and provide them with the opportunity to do so. Schools are uniquely positioned to do this. They are the only aspect of society that has continuous contact with children during nearly two decades of their lives, and can therefore make a sustainable impact on the fight against childhood obesity.

Schools have, in fact, been used effectively in the fight against obesity in children. For example, the Boston Public School System has experienced success with a program called Planet Health. The program targets childhood obesity, and has been reviewed as most effective by several sources.^{49, 50, 51} This interdisciplinary program targeted sixth and seventh graders by combining physical, nutritional, and behavioral education into already existing middle school curriculums. Children were taught cognitive and behavioral skills as a method of change, and

provided with practice and support. Females exhibited the most significant increases in fruits and vegetable intake, as well as a 3.3 percent decrease in obesity rates, whereas control schools found a 2.2 percent increase in obesity rates. Both males and females reported decreased time spent watching television.^{52, 53}

The results were so encouraging that the Boston Public School System joined with Harvard and the National Institute of Health to conduct further research into the program's cost effectiveness, feasibility, and sustainability. This study showed that 76 percent to 100 percent of teachers deemed the program highly acceptable, 78 percent to 100 percent planned to continue using the program, and over 90 percent found the curriculum to be an effective and positive addition to their classes. The U.S. Department of Education's Physical Education for Progress funded the expansion of the program to 12 schools in 2002-2003. Later, financial support was granted from the Boston Public Health Commission, through the U.S. Department of Health and Human Services. The program is used in over 120 Massachusetts schools. Additionally, over 2,000 copies of the curriculum have been purchased in 48 states and 20 countries.⁵⁴

Planet Health has been deemed cost effective by an independent economic analysis, which showed that it cost approximately \$14 per student per year and successfully reduced obesity rates. This would save money in long term medical costs, and improve a child's future quality of life.⁵⁵

As shown by the success of Planet Health, schools can help in the fight against childhood obesity. It is important to utilize schools in the fight against obesity because 95 percent of American children between the ages of five and seven are enrolled in the school system.⁵⁶ Since children spend approximately seven hours or more per day in school, a large number of children can be affected in a short period of time through school programs.⁵⁷

A study of seven school-based interventions that involved the family in the programs cites

that school intervention is successful in decreasing energy and fat intake, as well as sedentary activity. In this study, school-based interventions reduced student BMI by 42.9 percent. Another study of 24 school-based interventions which combined nutrition education, physical activity and/or the family indicated that childhood obesity is preventable. The study reported that 41 percent of the schools noted a reduction in the prevalence of overweight among students. One analysis of 21 school-based studies showed that 54.5 percent of studies reported BMI reduction, and 75 percent of studies which incorporated parental involvement reported BMI reduction.⁵⁸

Another study in Germany utilized school and family based intervention programs on children five to seven years of age. The program was centered on creating lifestyle changes through educating children, promoting self monitoring, self esteem, and feelings of personal autonomy. The educational component was implemented through eight hours of classroom time, and included messages to increase fruit and vegetable intake, reduce consumption of fatty foods, increase physical activity to at least one hour each day. Meetings were also conducted with parents, and supportive counseling programs and supplementary sports programs were offered to overweight children and their families. The preliminary results of this study have shown a significant improvement on the median triceps skin-fold measurements, a means of pinching a fatty area of the arm to assess body fat, of obese children: 10.9-11.3 mm in intervention schools, and 10.7-13.0 mm in control schools. Additionally, the study showed significant reductions of fat mass in children.⁵⁹ These studies indicate the importance of combining strong elements of nutritional, physical, and family elements into obesity prevention programs.

The role of schools in the battle against obesity is particularly important for children of low socioeconomic status, because such children have limited access to health care, resources, and health care utilization, which is not conducive to fighting or preventing obesity. Children from families with incomes that are too high to meet the criteria for Medicaid, but too low to provide

quality health care may only be able to depend on the school system for health care attention, since they are typically uninsured.⁶⁰

Schools can do more than merely teach children about nutrition. Through the use of well-funded and implemented government programs, schools can actually provide healthy, nutritious food to children. Since schools are already a factor of children's lives that represent education, the implementation of a nutritional education program would be facilitated. These programs could influence a child's food choice outside of school, further impacting the fight against childhood obesity. Essentially, schools present a triple threat to obesity because they are complete with classrooms, gymnasiums, and cafeterias.⁶¹

Additionally, schools can not only provide healthy food to children, but also allow families to buy healthier food. Many low-income families are eligible for food stamps, which often are used for unhealthy foods, either because that is all that food stamps will afford, or because unhealthy foods are the only kind of food available.^{62, 63} If the schools were to provide meals for children, it would result in one or two less meals per day that the family had to supply. Since the meals would be provided through a government program, they would most likely be more nutritious than the meals the family could afford. Additionally, if the family desired to buy healthier meals, they would be able to do so with the extra food stamps they would have as a result of the school providing some meals for their children.⁶⁴

Why Use Schools in the Fight Against Childhood Obesity in Baltimore?

Considering the disproportionate prevalence of both childhood and adult obesity in Baltimore City, paired with factors which contribute to such level, schools are integral in reducing and preventing childhood obesity.⁶⁵ Several demographics of the Baltimore City Public School System (BCPSS) make it possible for school programs to have great impacts on childhood obesity. For example, there are 78,104 African Americans enrolled, 7,123 Caucasians, and 1,629

Hispanics.⁶⁶ If the large number of African Americans in public schools were affected by school programs, a reduction in childhood obesity would result, especially since the rate of obesity among this race is disproportionately high. Additionally, 13.5 percent of the population in Baltimore City is nine years old or younger, and 14.8 percent is 14-19 years-old. Therefore, an effective obesity prevention program in the school system will have a significant impact on the obesity rates of Baltimore City as a whole.⁶⁷ Moreover, 78 percent of students are eligible for free breakfasts and lunches under federal poverty guidelines. It is projected that this number will climb to 100 percent next year, enabling the school to greatly affect child nutrition if meals were provided.⁶⁸ Regardless of the status of each individual student, the schools are categorized as title two, meaning that they may all partake in school breakfast programs. The classification of schools as title two is based upon their level of students who qualify for free and reduced meals. In Baltimore City, over 73% of students qualify for such meals.⁶⁹

Problems with Using Schools

Once children leave school, they will be affected by outside factors which may be conducive to childhood obesity. However, if school-based obesity prevention programs are strong enough, even children's habits beyond the school gates can be affected. Ideally, the effects of obesity prevention programs must transcend into the rest of a child's life.

One could argue that the BCPSS would be ineffective in preventing childhood obesity because of the high dropout rate, which would decrease the long term impact of prevention policies and programs. In 2007, 5,871 of the 8,918 high school freshman returned as sophomores, a loss of 3,000 students. However, there is hope for improvement. This year, for example, 2,115 students dropped out. With the intervention of the schools Chief Andres Alonso, and his emphasis on community effort in trying to keep students in school, the number of dropouts will certainly fall even further. Moreover, the number of kindergarten enrollments

increased from 3,642 in 2007, to 4,110 in 2008, adding to the number of children who can be positively affected by obesity prevention programs.⁷⁰

Types of Interventions at the School Level and Recommendations for Baltimore City

There are different types of obesity programs at the school level, which focus mostly on three main components: nutrition, physical education, and family-based intervention. The most successful programs combine these elements. In order to recommend appropriate policies for Baltimore City, it is necessary to: describe these components, the importance of integrating them, prove the effectiveness of policies which enforce them, and discuss the challenges of implementation.

Based upon the research presented in this paper, the BCPSS has the power to combat childhood obesity if only the correct, recommended steps are taken. There are several elements which are necessary for the success of obesity prevention policy at the school level. The policies, which will be mentioned throughout this paper, must address multiple causation factors of childhood obesity. Additionally, the policies must be long term, lasting over six months, and must be well funded and sustainable.⁷¹

Nutritional

Nutritional programs focus on educating students about daily recommended caloric intake, the components of a well balanced diet, and the health advantages of proper nutrition. Nutrition programs which contribute most to intervention include ways to expose students to healthy food, through promoting healthy food choices in the cafeteria, and food preparation classes. Such programs can also teach behavioral interventions, such as the recognition of healthy and unhealthy habits, and methods of curtailing unhealthy habits. School counseling, if affordable and available, can help teach behavior modification, as well as provide a supportive environment for students. Many nutrition programs have successfully impacted students' behaviors toward

food, and resulted in increased fruit and vegetable intake.⁷²

The government's School Breakfast Program is one example of a nutritional program which provides nutritious breakfasts to students. Such programs are important, because it has been proven that eating breakfast is tied to lower rates of childhood obesity. These programs are particularly important for children who are structurally limited by race, gender, and socioeconomic status in their fight against obesity. For example, girls, children of low socioeconomic status, and African American or Hispanic adolescents are among the most likely to skip breakfast, and therefore are at a higher risk for obesity. Considering the high numbers of African American and Hispanic children in the BCPSS, a school breakfast program would certainly have a significant impact.

It has been shown that participation in the School Breakfast Program helped children consume fewer calories from fat, and also increased scores on the Healthy Eating Index, which measures dietary quality. This serves as an example of how schools can prevent obesity by providing meals, so that children who are already suffering from negative contributing factors such as low socioeconomic status will eat fewer meals at home and more meals in a controlled environment. One major benefit of the School Breakfast Program is that it does not simply impact children. Studies show that adults in the families of schoolchildren enrolled in such programs also consumed less fat, and scored higher on the Healthy Eating Index.⁷³

Issues with Nutritional Programs

Some underfunded school systems may not have cafeterias large enough to house all students during lunch time, leading to long lines. Therefore, although nutritious meals may be available, students may not have enough time to eat them.⁷⁴

Although the school may offer healthy meals, the presence of vending machines may hinder the success of meal programs. It has been proven that the junk foods available in vending

machines are not healthy, and are conducive to childhood obesity.⁷⁵

Children's parents may have healthy food choices available, but may not understand the importance of choosing healthier foods. Additionally, as previously mentioned, children may not be able to exert any physical activity at home, and physical activity needs to be paired with nutritional education to reduce obesity.⁷⁶ For these reasons, nutritional education programs alone have not proven to cause significant impacts on childhood obesity.⁷⁷

Baltimore City

A study performed in 2005 reported that Maryland neither recommends nor requires that schools be prohibited from offering junk foods, and only recommends, but does not require schools to prohibit the sales of junk foods in vending machines. It was also reported that Maryland neither recommends nor requires that schools make fruits, vegetable, and healthful beverages available whenever other foods and beverages are sold.⁷⁸ Clearly, these policies must be changed to ban junk foods, and make fruits, vegetables, and healthy beverages available.

The BCPSS has some helpful policies in place, but can go further in the fight against childhood obesity. According to Matens, schools have already made healthy choices available in vending machines. Pepsi Cola, Coca-Cola, and Cadbury Schweppes will remove high calorie laden drinks from the BCPSS by 2009, which will help in the fight against childhood obesity.⁷⁹ Ideally, vending machines should be removed.⁸⁰ At the very least, vending machine owners can continue promoting healthy choices in lieu of unhealthy ones.

Baltimore City has hired a new school chef and food director, Tony Geraci, who claims he "will introduce Baltimore schoolchildren to a new way of healthy eating in a system that, because of the city's high poverty rate and large number of homeless students, offers many their only meal of the day." He believes that students make unhealthy choices because that is all they know, but that if they are taught the value of healthy, locally produced food, they will change

their habits for the better. He vows to eliminate pre-packaged frozen lunches, and replace chicken nuggets with roasted poultry, and fries with baked herbed potatoes. Even pizza will now be made with whole-grain crust, and served with a garden salad and fruit. USDA guidelines will be adhered to, and local food sources will be used. Kitchens will be built, and students will help in food production and preparation from start to finish. Geraci suggested that lunch time be extended, to remedy the aforementioned issue of not having enough time to eat.⁸¹

As incentive to work for the BCPSS, Geraci was offered his very own farm. He brings students to the farm, to teach them the process of growing food locally and transporting it in an environmentally friendly manner to the schools. Once the food arrives at school, students help prepare it. Geraci hopes that this will teach students a new way of obtaining and eating food, leading students to change their unhealthy habits.⁸²

When Geraci began working in July 2008, only 8,800 of the 83,000 schoolchildren were receiving breakfast although they were all eligible. Already, Geraci has increased that number to 30,000, and at such a rate of increase, all 83,000 schoolchildren will soon have breakfast. He has a program called “Breakfast in the Classroom,” which he developed through partnering with the Baltimore Orioles and Ravens, to provide attractive, healthy meals to students. The breakfast, which consists of the lowest sugar cereal on the market, milk, 100 percent juice, and a whole grain and high protein snack, is served in orange and purple boxes, symbolic of the Ravens and Orioles. One in 20 boxes contains a prize, such as tickets to an Orioles or Ravens game, free music downloads, or an mp3 player. Geraci believes that his breakfast program is a Pavlovian approach to changing the food habits of students.

Additionally, the breakfast program is the single most cost effective way to not only fix childhood obesity, but also to increase test scores, improve behavioral issues, and eradicate tardiness.⁸³ It would be useful, however, to do a study on whether or not each student takes

advantage of the breakfast program, to better monitor its effectiveness and modify the program accordingly. Although the breakfast program will eventually be available to each and every one of the 83,000 students in the BCPSS, if it is not available already, it should be made available immediately. The school board has already taken a step in the right direction by approving the supply of some meals through the school, so that the effects of unhealthy meals provided at home will be reduced. Geraci has already gained the approval of the State, Federal, and School Boards to provide free breakfast, lunch, afternoon snack, and dinner to all Baltimore City schoolchildren, working towards a policy to become the first school system in the nation to offer a Universal Free System.⁸⁴

Healthy eating habits will clearly be promoted through the efforts of the new school chef, but may not be enough to affect children's habits at home. Often, healthy habits are often confused with dieting, which may not only bring opposition from children and their parents, but also may result in unhealthy weight loss and regain.⁸⁵ If children are taught to have a healthy relationship with food, they can learn to make healthy food choices not only at school, but at home as well. Therefore, mandatory weekly health and nutrition classes are also necessary in order to teach children the importance of making healthy food choices. According to a 2006 study, Maryland does require schools to teach these classes, but only requires high schools to spend a specific amount of time teaching such classes. Elementary and middle schools should also have time requirements.

Additionally, there is no universally mandated nutrition curriculum. Such a curriculum should be developed, and implemented throughout the BCPSS. Maryland neither provides a list of recommended curricula, nor recommended textbooks for such a course. Although the state requires elementary and middle school health education teachers to be certified, licensed, or endorsed by the state, it does not require health education teachers to have undergraduate or

graduate training in health education in elementary, middle, or high schools.⁸⁶ If teachers are not taught to correctly conduct programs, the programs will be ineffective and fail.

Maryland also does not provide funding for staff development, nor offers staff development on any health education topics, including nutrition and dietary behavior.⁸⁷ This must be remedied through a much needed policy, so that a student's health is in the hands of professionals. Such a policy, when coupled with a program like Planet Health, would be cost effective, helping develop healthier behaviors and providing for a healthier future for students.⁸⁸

Schools can help improve food choices in the surrounding community as well. In impoverished neighborhoods of Baltimore City, healthy food may not be available or affordable outside of school. As an entrepreneurial project or a work-study opportunity, high school students could investigate and implement means of transporting locally produced foods to corner markets, in order to offer healthier options at a lower price. The students could apply for the Community Food Projects Competitive Grants Program, which focuses on low-income areas in need of healthier food. This grant would provide \$10,000-\$250,000 for students to develop a system of transporting locally produced food from the grower to the market.⁸⁹ The students would receive credit, recognition, and possibly earn money, and would create a liaison between the community and the school in the fight against childhood obesity. Although it is plausible that students could take initiative in bringing healthy, locally grown food to the markets in their area, it is important to remember that adults still need to advocate for such measures and take responsibility, especially since younger children would need adult supervision in such a grant program.

Physical

Unless accompanied by physical exercise, nutritional programs alone are unlikely to save susceptible children from obesity. Fortunately, because schools encompass not only classrooms

and cafeterias, but also gymnasiums, they can serve as a launchpad for a complete, three-pronged attack upon obesity: one including the provision of nutritional education; the provision of healthy foods, through programs like the school breakfast program; and the provision of physical exercise.

High school students are not meeting the recommended levels of physical activity, however.⁹⁰ Most physical activity programs which target childhood obesity are implemented by increasing school requirements for a certain amount of hours a student will spend in physical education classes per week. The most successful programs also affect the behaviors of students by promoting more physical activities outside of school, engaging families in the promotion of increased physical activities, and encouraging a decrease in sedentary activities such as television watching and computer games.⁹¹ It is estimated that for every hour of reduction in television viewing time, there is about a 15 percent reduction in the risk of obesity.⁹²

Issues with Physical Education Program

Some schools are overcrowded, so physical education programs may be ineffective.⁹³ Additionally, although such programs exhibit short term success, they do not have lasting, long term effects if they are not paired with other programs such as behavior modification. Physical education programs at the school level are only mandatory and may not have any impact on the students' lifestyle choices regarding exercise habits.⁹⁴ Therefore, they must be paired with health classes.

A study conducted in 2002 reflected the necessity of developing programs to affect a child's exercise habits outside of the school. It revealed that approximately 61.5 percent of children ages nine to 13 do not engage in physical activities outside of school.⁹⁵ For this reason, it is important to incorporate other aspects of a child's life into obesity prevention programs, such as the family, which can help turn mandatory physical education requirements into healthy habits.

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According to a 2005 study, Maryland neither requires nor recommends that elementary schools provide students with regularly scheduled recess, which is one way to offer students the opportunity to engage in physical activity. A policy therefore must be created to mandate recess in every school. Geraci believes that recess should be offered before lunch, so that students can increase their metabolism and expend energy before eating.⁹⁶

Maryland law requires kindergarteners through eighth graders to participate in physical education, but the high school physical education policy does not specify the grade or year of participation during the students' high school career.⁹⁷ According to the studies which prove the necessity of physical education programs, coupled with the high prevalence of obesity among high school students, physical education should be required in every high school grade.

The CDC recommends that schoolchildren should engage in at least 60 minutes of moderate to vigorous physical activity every day.⁹⁸ However, the National Association for Sport and Physical Education claims that elementary school students should engage in 150 minutes of physical activity per week, and middle and high school children should be required to participate in 225 minutes per week, a more reasonable goal for schools.⁹⁹ Physical education programs must help develop basic motor and manipulative skills so that students are able to engage in physical activities. Ideally, if these skills were sufficiently developed, and physical activity outside of the school system was promoted, children would be engaging in the CDC recommended 60 minutes of physical activity daily anyway.

Physical education can be combined with health education in order to increase the effects of both programs. Maryland law does not require schools to test students on health education topics, but in order to promote the impact of the program, students' knowledge of the course should be tested, and reflected in their grades.^{100, 101} The state also does not require the schools to use one

particular curriculum for physical education, a problem which should be remedied by a universally enforced policy. Additionally, the state does not provide funding or offer staff development for physical education teachers to learn about ways in which to recognize and respond to chronic health conditions, such as childhood obesity.¹⁰² In order for obesity to be fought successfully, a policy must make such training mandatory.

Many schools in the BCPSS have difficulty implementing physical education programs. Not every school has gymnasiums or playgrounds to allow for physical activity. Many schools are landlocked, so there are no green areas in which to conduct physical education programs.¹⁰³ Perhaps these schools could establish a shuttle system to transport students to parks or other schools where they could use the facilities for physical activity. Ideally, such facilities would be within walking distance to cut costs. If there were no such option, a classroom could be turned into an exercise room by simply pushing desks against the walls, therefore allowing for some form of physical education within the classroom. Additionally, if the building was newer and funds were available, a fenced in area for physical activity could be built on the roof. However, schools built from this point on should be required to have a gymnasium and playground.¹⁰⁴

Family

Matens (2008) stressed the importance of involving families in childhood obesity prevention. Given that a child belongs to a functional, normal, and supportive family, the involvement of parents is integral in successfully preventing childhood obesity.¹⁰⁵ Some school programs offer preventative screenings, to alert parents to their child's risk of obesity so that they may intervene. Parents often act as role models to their children, so teaching parents to exhibit healthy food behaviors can heavily impact their children. They also choose what to feed their children, and can make healthy choices when provided with nutritional education. When taught the importance of physical activity, parents can influence their children by exercising together, or walking places

instead of driving. Many successful programs have utilized parents to increase their children's level of physical activity by decreasing the amount of time they allow their child to watch television or play videogames.¹⁰⁶

A small-scale, semi-randomized controlled trial study carried out in Rome, Italy analyzed different ways of involving the family in obesity prevention programs for four-year-olds to nine-year-olds. The 52 week study, carried out in three schools, showed that the most effective way to integrate obesity prevention programs into family life is through distributing printed material, audiovisuals, and holding discussions and meetings between teachers, families, and students. This resulted in a decrease of obesity prevalence from 13.3 percent to 11.7 percent, and overweight prevalence from 27 percent to 23.7 percent.¹⁰⁷

Issues with Family Programs

The extent of the effects of school programs on the family is largely dependent upon socioeconomic status. One example of this can be seen through Hip Hop to Health, a program that strives to reduce television viewing and increase fruit and vegetable intake. This program involved parents by educating them about the detrimental impact that television can have on their child, and asked them to limit their child's television viewing. The children in the experimental group exhibited decreased BMI, and an increased level of physical activity.¹⁰⁸ However, it is likely that such a program is successful due to the high socioeconomic status of the participating families. Not only can wealthier parents afford to take time off of work to attend such programs, but they can also provide their children with an activity alternative to watching television.

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Children who live in deteriorating neighborhoods, like many in Baltimore City, may have difficulty benefiting from Hip Hop to Health because they generally do not have the privilege of playing outside.¹⁰⁹ Those of lower socioeconomic status also would have difficulty partaking in

such a program because healthier foods such as fruits and vegetables are less available to them, as previously evidenced. However, several of the policy recommendations throughout this paper would address these issues, such as students developing programs to bring fruits and vegetables to corner markets.

One way in which families can be incorporated into an obesity prevention policy is through school health clinics. Clinics can consistently monitor a student's health and weight during their enrollment in school. A clinician should be required to meet with the family and make suggestions to the family as to how to promote a healthier lifestyle. Baltimore City has about 12 to 14 school based health clinics, but parents have to approve of their child's enrollment.¹¹⁰ Due to the high prevalence of poverty, many Baltimore City schoolchildren do not receive adequate medical attention, contributing to obesity. A policy which would increase the number of school based clinics and mandate enrollment could therefore help solve this problem. As previously mentioned, it is crucial to address the issue of childhood obesity while children are in school, and especially while their weight can be monitored by free clinics within the school system.

Families should also sit in on health classes at back to school night, so that they may be educated about ways in which to prevent obesity, and the importance of healthy eating habits and physical activity. Information about obesity prevention policies should be mailed home to the parents, so that they may reinforce the efforts of the school at home.

Additionally, students and families should be taught to limit television viewing in favor of physical activity through Hip Hop to Health. This would also limit the negative effects of the mass media. Such initiatives would follow the suggestions of the study performed in Italy, bringing obesity prevention programs past the school, and to the home.

Local Wellness Policy

A Local Wellness Policy was developed in 2006, in compliance with Congress's 2004

passing of the Child Nutrition and WIC Reauthorization Act. However, the extent to which the policy has been implemented is unclear. This policy includes many of the successful aforementioned components. It would provide the following to students: nutrition and health education delivered by highly qualified teachers, linkages between school meal programs and community resources, structured physical education, health education and school meals programs, encouragement and opportunities to be regularly physically active, food which meets or exceeds USDA recommendations, child nutrition professionals who provide access to affordable, nutritious, and appealing foods, participation in federal school meal programs to the greatest extent possible, and school-based wellness programs such as after school cooking clubs which practice and promote healthy food preparation.¹¹¹

Collaboration: The Foundation of Successful Policy Implementation

If Baltimore City has already recognized its childhood obesity problem, and has a plan to fight it, why has it not been implemented? There is not enough collaboration between the Baltimore City Health Department and the BCPSS.^{112, 113} This lack of coordination contributes to the failed implementation of childhood obesity prevention policies. Additionally, if each principal yielded control over his or her own budget to an outside force such as an overseeing and steering committee, funds could be allocated to school budgets effectively accordingly.¹¹⁴ Therefore, first and foremost, a policy must create a budget to be used for the implementation of childhood obesity programs, and allocate that budget to each school.

Additionally, the policy must create a separate committee to allocate and universally implement this budget, centralizing the power so that the committee would control the coordination between the budget and those of the schools it serves. The budget needs to be distributed to schools according to their needs for additional funds. This committee would not only act as a liaison between the BCPSS and the Health Department, but also as a responsible

force for the universal implementation of preventative policies within the entire BCPSS. It should include Geraci, Alonso, members of the BCPSS, the Health Department, and the Baltimore City Council Task Force on Childhood Obesity to devise and implement a universal curriculum. The committee would have to meet on a regular basis and have supportive relationships with the schools. The problem of decentralization would therefore be resolved, so that all Baltimore City schoolchildren could be positively affected by such preventative policies.

Funding

Funding, however, would be a major challenge facing the responsible committee. Too often, it is necessary to spend money on meeting requirements for No Child Left Behind, instead of physical and nutrition education programs to fight childhood obesity. There is therefore a dearth of financial resources for efforts to fight childhood obesity. Even if schools had the money needed to fund programs such as physical education, increasing the amount of time spent on physical education would also increase the length of the school day, which could be met with resistance.¹¹⁵ If families and community members were taught the importance of increasing time spent on physical education and health and nutrition classes, the school would become more receptive to change. Funding would still be required though, and it would neither be fair nor feasible to take it away from efforts to meet No Child Left Behind requirements.

Therefore, the responsible committee should apply for grants, which could be helpful.¹¹⁶ One grant, entitled “Project Health Design: Rethinking the Power and Potential of Personal Health Records,” would make \$480,000 available to 5 counties or neighborhoods to begin a more consistent record-keeping program for children’s health, as monitored by school clinics. The aim of this grant is to promote healthier decision-making over a period of 24 months. Applications for the grant are to be submitted to the Robert Wood Johnson Foundation on June 3, 2009.¹¹⁷ Another source of funding could come from the “Robert Wood Johnson Foundation Local

Funding Partnerships 2009-2010,” which would provide \$200,000-\$500,000 to a vulnerable population, as defined by the grant writer, to fund original projects that can improve the health of the community.¹¹⁸ The application to this grant is due on July 7, 2009. Another grant, the “Active Living Research and Healthy Eating Research Rapid Response Grants Round 2,” supports research to identify policies and environmental strategies to increase physical activity, promote healthy eating, and prevent childhood obesity in those at the highest risk, such as African American children in low-income neighborhoods with limited access to healthy food and physical activity. This grant, which is perfectly suited to preventing childhood obesity in Baltimore City, is due on July 17, 2009, and provides up to \$1.675 million to award in grant increments of \$150,000 for 12 months of funding.¹¹⁹

Through these grants and others, Baltimore City would be able to implement prevention programs, school health and nutrition education programs, and increase the amount of time spent on physical education. If these grants have expired by the time policy initiatives take place, the Robert Wood Johnson Foundation website should be checked at rwjf.org to find more grant opportunities.

Additionally, the responsible committee should apply for funding from the U.S. Department of Education’s Physical Education for Progress, which funded Planet Health in the Boston Public School System. The Boston Public School System also obtained funds from the Boston Public Health Commission, and in a similar fashion, the committee could apply for funds from the Maryland Public Health Commission. The committee could also seek financial support from the U.S. Department of Health and Human Services, as the Boston Public School System did.¹²⁰

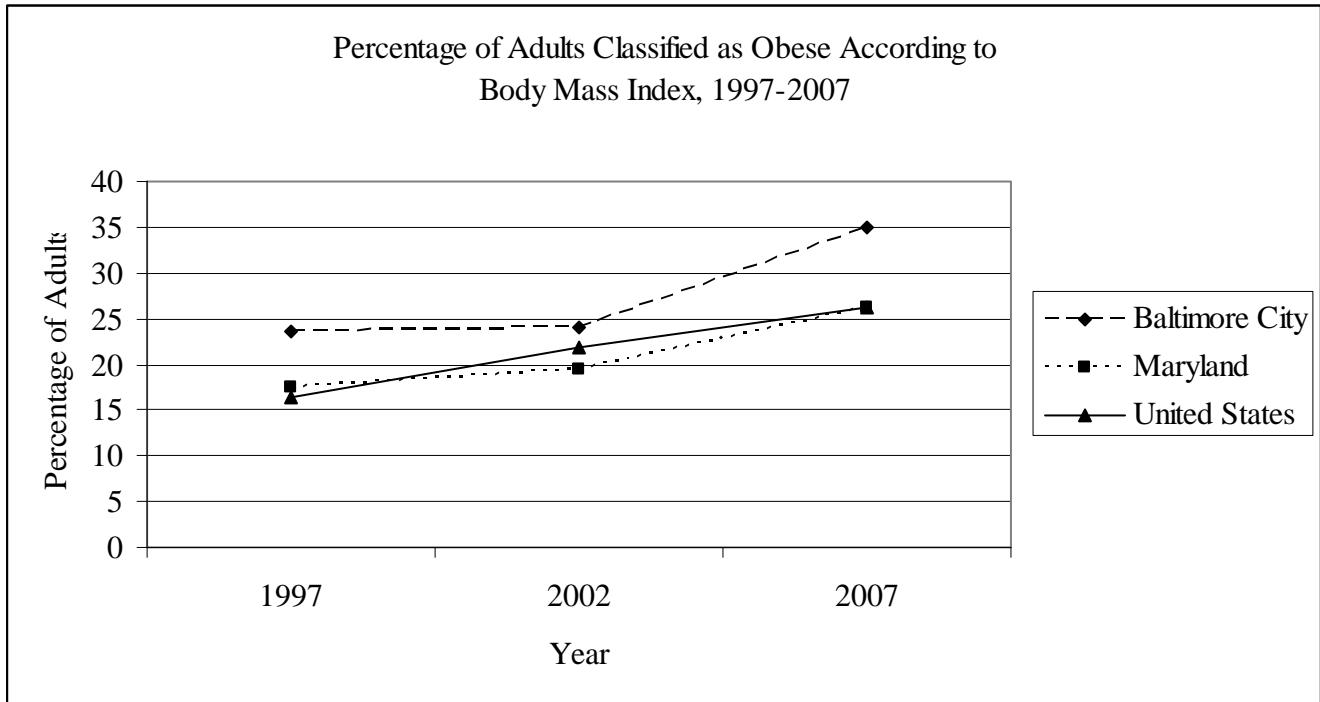
A Lighter Future for Baltimore City

The policies recommended in this paper, which are summarized in Appendix Figure B, can only be successfully implemented through funding and teacher training. The success of Planet

Health in the Boston Public School System proves the importance of these two factors.

“Baltimore is ready to change for the better,” says Geraci. “We’ve lost an entire generation of children to obesity and poor nutrition, and we’re about to lose another one if we don’t reach our hands into the fire, pull them back out and start doing the right thing,” he said.¹²¹ If the recommended policies are adopted, the BCPSS can reverse the growing obesity trend.

**Appendix
Figure A**



Source: Baltimore City Health Department (BCHD) (2008). "Fact Sheet: Overweight and Obesity in Baltimore City, 1997-2007," obtained from the Baltimore City Health Department website at http://www.baltimorehealth.org/info/2008_07_22.ObesityFactSheet.pdf on December 2, 2008.

Figure B: Recap of Policy Recommendations

A party linking the BCPSS with the BCHD must enforce and find funding for the universal implementation of the Local Wellness Policy and the following in all Baltimore City schools:

Nutrition

- Ban junk food, make fruits, vegetables, healthy beverages available
- Remove vending machines
- School breakfast program
- Time requirements for health classes for elementary and middle schools
- Universal curriculum for health classes, modeled after Planet Health
- Undergraduate and graduate training requirements for teachers
- Grants and funding to make healthy food available in the surrounding community
- Teacher workshops, training, and education requirements
- Enroll every child in school health clinic
- Monitor child's health over school career, work to improve outcomes

Physical Education

- Physical education in elementary schools
- Schedule recess before lunch
- Assessments in all physical, health, and nutrition education classes
- 150 minutes of physical activity per week for elementary schoolchildren
- 225 minutes of physical activity per week for middle and high schoolchildren
- Universal physical education curriculum
- Train physical education teachers to recognize and respond to chronic disease
- Require gyms and playgrounds to be built and maintained
- Teacher workshops, training, and education requirements

Family

- Use printed materials, audiovisuals, and discussions to involve parents
- Implement Hip Hop to Health
- Require health clinician to meet with parents

References

1. World Health Organization (WHO) (2008). "Obesity and overweight," obtained from the World Health Organization website at <http://www.who.int/dietphysicalactivity/publications/facts/obesity/en/> on December 7, 2008.
2. Baltimore City Health Department (BCHD) (2008). "Fact Sheet: Overweight and Obesity in Baltimore City, 1997-2007," obtained from the Baltimore City Health Department website at http://www.baltimorehealth.org/info/2008_07_22.ObesityFactSheet.pdf on December 2, 2008.
3. Kaiser Family Foundation (2007). "Maryland: Health Status," obtained from the Kaiser Family Foundation website at statefacts.org on December 9, 2008
4. Trust for America's Health (2008). "New Report: Maryland Ranks 27th Most Obese State in the Nation; Rates Rose for the Third Year in a Row," obtained from the Trust for America's Health website at www.healthycarroll.org/09_2008/Release%20TAH-RWJF%20Obesity%20Report%202008.pdf
5. Department of Health and Human Services (2008). "Healthy Weight: Assessing Your Weight: BMI: About BMI for Children and Teens," obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/nccdphp/dnpa/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.htm#how%20can%20i%20tell%20if%20my%20child%20is%20overweight on October 16, 2008.
6. Department of Health and Human Services (2008). "Healthy Weight: Assessing Your Weight: BMI: About BMI for Children and Teens," obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/nccdphp/dnpa/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.htm#how%20can%20i%20tell%20if%20my%20child%20is%20overweight on October 16, 2008.
7. DeMattia, Laure, and Shannon Lee Denney (2008). "Childhood Obesity Prevention: Successful Community Based Efforts," The Annals of the American Academy of Political and Social Science, Vol. 615, No. 1, pp. 83-99.
8. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
9. Trust for America's Health (2008). "New Report: Maryland Ranks 27th Most Obese State in the Nation; Rates Rose for the Third Year in a Row," obtained from the Trust for America's Health website at www.healthycarroll.org/09_2008/Release%20TAH-RWJF%20Obesity%20Report%202008.pdf

10. Kaiser Family Foundation (2007). "Maryland: Health Status," obtained from the Kaiser Family Foundation website at statefacts.org on December 9, 2008.
11. Council of Chief State School Officers (2005). "Action for Healthy Kids -- State Profile on Nutrition and Fitness," obtained from the Action for Healthy Kids website at <http://actionforhealthkids.org/filelib/stateaction/profiles/Maryland.pdf> on December 8, 2008.
12. Baltimore City Health Department (BCHD) (2008). "Fact Sheet: Overweight and Obesity in Baltimore City, 1997-2007," obtained from the Baltimore City Health Department website at http://www.baltimorehealth.org/info/2008_07_22.ObesityFactSheet.pdf on December 2, 2008.
13. Baltimore City Health Department (BCHD) (2008). "Fact Sheet: Overweight and Obesity in Baltimore City, 1997-2007," obtained from the Baltimore City Health Department website at http://www.baltimorehealth.org/info/2008_07_22.ObesityFactSheet.pdf on December 2, 2008.
14. Maryland Department of Human Resources (MDHR) (2005). "DHR Snap Shot 2005: Baltimore city," obtained from the MDHR website at <http://www.dhr.state.md.us/pi/pdf/bcity.pdf> on October 18, 2008.
15. Jehn, Megan L., Joel Gittelsohn, Margarita S. Treuth, and Benjamin Caballero (2006). "Prevalence of Overweight among Baltimore City Schoolchildren and its Associations with Nutrition and Physical Activity," Obesity, Vol. 14, No. 6, pp. 989-993.
16. Gittelsohn, Joel, and Mohan B Kumar (2007). "Preventing childhood obesity and diabetes: is it time to move out of the school?" Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.
17. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
18. DeMattia, Laure, and Shannon Lee Denney (2008). "Childhood Obesity Prevention: Successful Community Based Efforts," The Annals of the American Academy of Political and Social Science, Vol. 615, No. 1, pp. 83-99.
19. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
20. Kumanyika, S, RW Jeffery, A Morabia, C Ritenbaugh, and Vj Antipatis (2002). "Obesity Prevention: the Case for Action," obtained from the International Journal of Obesity, Vol. 26, pp. 425-436 at <http://www.nature.com/ijo/journal/v26/n3/pdf/0801938a.pdf> on October 16, 2008.

21. Pyle, Sara A., Jill Sharkey, Georgette Yetter, Erika Felix, Michael J. Furlong, and W.S. Carlos Poston (2006). "Fighting an Epidemic: The Role of Schools in Reducing Childhood Obesity," Psychology in the Schools, Vol 43, No. 3, pp. 361-376.
22. Parsons, Peter, and Kenna Lowe (2006). "Childhood Obesity Projected to Increase Dramatically by 2010," obtained from the Johns Hopkins Bloomberg School of Public Health, Public Health News Center at http://www.jhsph.edu/publichealthnews/articles/2006/wang_obesity.html on October 17, 2008.
23. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
24. National Alliance for Nutrition and Activity (NANA) (2008). "Strengthen the Centers for Disease Control and Prevention's Division of Nutrition, Physical Activity, and Obesity. National Health Priorities: Reducing Obesity, Heart disease, Cancer, Diabetes and Other Diet – and Inactivity-Related Diseases, Costs and Disabilities," obtained from the Center for Science in the Public Interest website at <http://www.cspinet.org/nutritionpolicy/CDC%20briefing%20book%20FY09.pdf> on October 16, 2008.
25. National Alliance for Nutrition and Activity (NANA) (2008). "Strengthen the Centers for Disease Control and Prevention's Division of Nutrition, Physical Activity, and Obesity. National Health Priorities: Reducing Obesity, Heart disease, Cancer, Diabetes and Other Diet – and Inactivity-Related Diseases, Costs and Disabilities," obtained from the Center for Science in the Public Interest website at <http://www.cspinet.org/nutritionpolicy/CDC%20briefing%20book%20FY09.pdf> on October 16, 2008.
26. World Health Organization (WHO) (2008). "Obesity and overweight," obtained from the World Health Organization website at <http://www.who.int/dietphysicalactivity/publications/facts/obesity/en/> on December 7, 2008.
27. U.S. Department of Health & Human Services. "Childhood Obesity," obtained from the United States Department of Health & Human Services website at http://aspe.hhs.gov/health/reports/child_obesity/ on December 5, 2008.
28. U.S. Department of Health & Human Services. "Childhood Obesity," obtained from the United States Department of Health & Human Services website at http://aspe.hhs.gov/health/reports/child_obesity/ on December 5, 2008.
29. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). "Childhood Obesity: Public-Health Crisis, Common Sense Cure," Lancet, Vol. 360, No. 9331, pp. 473-483.
30. DeMattia, Laure, and Shannon Lee Denney (2008). "Childhood Obesity Prevention:

Successful Community Based Efforts,” The Annals of the American Academy of Political and Social Science, Vol. 615, No. 1, pp. 83-99.

31. U.S. Department of Health & Human Services. “Childhood Obesity,” obtained from the United States Department of Health & Human Services website at http://aspe.hhs.gov/health/reports/child_obesity/ on December 5, 2008.

32. Healthy Baltimore Children: Addressing Childhood Obesity (2008). “Baltimore Facts,” obtained from the Healthy Baltimore Children website at http://www.healthybaltimorechildren.org/info-url4834/info-url_show.htm?doc_id=478376&cat_id=1672 on October 16, 2008.

33. Baltimore City Health Department (BCHD) (2008). “Fact Sheet: Overweight and Obesity in Baltimore City, 1997-2007,” obtained from the Baltimore City Health Department website at http://www.baltimorehealth.org/info/2008_07_22.ObesityFactSheet.pdf on December 2, 2008.

34. U.S. Census Bureau (2007). “Baltimore City, Maryland: S1701. Poverty Status in the Past 12 Months,” obtained from the U.S. Census Bureau website at http://factfinder.census.gov/servlet/STTable?_bm=y&-geo_id=05000US24510&qr_name=ACS_2007_1YR_G00_S1701_&-ds_name=ACS_2007_1YR_G00_&-_lang=en&-redoLog=false on October 16, 2008.

35. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). “Report of the Baltimore city Council Task Force on Childhood Obesity,” obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.

36. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). “Childhood Obesity: Public-Health Crisis, Common Sense Cure,” Lancet, Vol. 360, No. 9331, pp. 473-483.

37. Parzikova, Jana and Andrew P. Hills (2000). Childhood obesity: Prevention and Treatment, Boca Raton, FL: CRC Press LLC.

38. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.

39. Healthy Baltimore Children: Addressing Childhood Obesity (2008). “Baltimore Facts,” obtained from the Healthy Baltimore Children website at http://www.healthybaltimorechild.org/info-url4834/info-url_show.htm?doc_id=478376&cat_id=1672 on October 16, 2008.

40. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.

41. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). “Childhood Obesity: Public-Health Crisis, Common Sense Cure,” Lancet, Vol. 360, No. 9331, pp. 473-483.

42. Parzikova, Jana and Andrew P. Hills (2000). Childhood obesity: Prevention and Treatment, Boca Raton, FL: CRC Press LLC.
43. World Health Organization (WHO) (2008). "Obesity and overweight," obtained from the World Health Organization website at <http://www.who.int/dietphysicalactivity/publications/facts/obesity/en/> on December 7, 2008.
44. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). "Childhood Obesity: Public-Health Crisis, Common Sense Cure," Lancet, Vol. 360, No. 9331, pp. 473-483.
45. National Institute of Medicine (2005). Preventing Childhood Obesity: Health in the Balance. Washington, DC: The National Academies Press.
46. National Institute of Medicine (2005). Preventing Childhood Obesity: Health in the Balance. Washington, DC: The National Academies Press.
47. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). "Childhood Obesity: Public-Health Crisis, Common Sense Cure," Lancet, Vol. 360, No. 9331, pp. 473-483.
48. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). "Childhood Obesity: Public-Health Crisis, Common Sense Cure," Lancet, Vol. 360, No. 9331, pp. 473-483.
49. Prevention Research Centers (PRC) (2007). "Planet Health for Obesity Reduction in School Children – Readily Accepted and Cost-Effective," obtained from the Centers for Disease Control and Prevention website at <http://www.cdc.gov/prc/selected-interventions/adoptable-intervention/planet-health-obesity-reduction-school-children.htm> on October 22, 2008.
50. Doak, C.M., T.L.S. Visscher, C.M. Renders, and J.C. Seidell (2006). "The Prevention of Overweight and Obesity in Children and Adolescents: A Review of Interventions and Programmes," Obesity Reviews, No. 7, pp. 111-136.
51. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). "Childhood Obesity: Public-Health Crisis, Common Sense Cure," Lancet, Vol. 360, No. 9331, pp. 473-483.
52. Prevention Research Centers (PRC) (2007). "Planet Health for Obesity Reduction in School Children – Readily Accepted and Cost-Effective," obtained from the Centers for Disease Control and Prevention website at <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm> on October 22, 2008.
53. Doak, C.M., T.L.S. Visscher, C.M. Renders, and J.C. Seidell (2006). "The Prevention of Overweight and Obesity in Children and Adolescents: A Review of Interventions and Programmes," Obesity Reviews, No. 7, pp. 111-136.
54. Prevention Research Centers (PRC) (2007). "Planet Health for Obesity Reduction in School

Children – Readily Accepted and Cost-Effective,” obtained from the Centers for Disease Control and Prevention website at <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm> on October 22, 2008.

55. Prevention Research Centers (PRC) (2007). “Planet Health for Obesity Reduction in School Children – Readily Accepted and Cost-Effective,” obtained from the Centers for Disease Control and Prevention website at <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm> on October 22, 2008.

56. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). “Report of the Baltimore city Council Task Force on Childhood Obesity,” obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.

57. Gittelsohn, Joel, and Mohan B Kumar (2007). “Preventing childhood obesity and diabetes: is it time to move out of the school?” Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.

58. Gittelsohn, Joel, and Mohan B Kumar (2007). “Preventing childhood obesity and diabetes: is it time to move out of the school?” Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.

59. Muller, M.J., I. Asbeck, A. Grund, K. Langnase, M. Mast (2001). “Prevention of Obesity – More than an Intention. Concept and First Results of the Kiel Obesity Prevention Study (KOPS),” International Journal of Obesity and Related Metabolic Disorders, No. 25, pp. S66-S74.

60. Story, Mary, Karen M. Kaphingst, and Simone French (2006). “The Role of Schools in Obesity Prevention,” obtained from the Future of Children website at http://www.futureofchildren.org/usr_doc/06_5562_Story_2006-school.pdf on October 17, 2008.

61. DeMattia, Laure, and Shannon Lee Denney (2008). “Childhood Obesity Prevention: Successful Community Based Efforts,” The Annals of the American Academy of Political and Social Science, Vol. 615, No. 1, pp. 83-99.

62. Cassady, Diana L., and Karen M. Jetter (2006). “The Availability and Cost of Healthier Food Alternatives,” The American Journal of Preventive Medicine, Vol 30. No. 1, pp. 38-44.

63. Bhargava, Alok (2004). “Socio-economic and Behavioural Factors are Predictors of Food Use in the National Food Stamp Program Survey,” The British Journal of Nutrition, Vol. 92, pp. 497-506.

64. Parker, Lynn (2005). “Obesity, Food Insecurity and the Federal Child Nutrition Programs: Understanding the Linkages,” obtained from The Food Research and Action Center website at http://www.frac.org/pdf/obesity05_paper.pdf on October 16, 2008.

65. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City

Health Department (2008). Personal interview, December 5.

66. Maryland Department of Human Resources (MDHR) (2005). "DHR Snap Shot 2005: Baltimore city," obtained from the MDHR website at <http://www.dhr.state.md.us/pi/pdf/bcity.pdf> on October 18, 2008.

67. Maryland Department of Human Resources (MDHR) (2005). "DHR Snap Shot 2005: Baltimore city," obtained from the MDHR website at <http://www.dhr.state.md.us/pi/pdf/bcity.pdf> on October 18, 2008.

68. Simmons, Melody (2008). "Baltimore's New School Chef," obtained from Gourmet, August 25, website at <http://www.gourmet.com/foodpolitics/2008/08/baltimore-school-chef?currentPage=2> on October 15, 2008.

69. Geraci, Anthony, Food Services Director and Chef, Baltimore City Public School System (2008). Personal interview, December 8.

70. Baltimore Sun (2008). "A Growth Enterprise" November 13.

71. Gittelsohn, Joel, and Mohan B Kumar (2007). "Preventing childhood obesity and diabetes: is it time to move out of the school?" Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.

72. Story, Mary, Karen M. Kaphingst, and Simone French (2006). "The Role of Schools in Obesity Prevention," obtained from the Future of Children website at http://www.futureofchildren.org/usr_doc/06_5562_Story_2006-school.pdf on October 17, 2008.

73. Parker, Lynn (2005). "Obesity, Food Insecurity and the Federal Child Nutrition Programs: Understanding the Linkages," obtained from The Food Research and Action Center website at http://www.frac.org/pdf/obesity05_paper.pdf on October 15, 2008.

74. Parzikova, Jana and Andrew P. Hills (2000). Childhood obesity: Prevention and Treatment, Boca Raton, FL: CRC Press LLC.

75. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.

76. Gittelsohn, Joel, and Mohan B Kumar (2007). "Preventing Childhood Obesity and Diabetes: is it Time to Move Out of the School?" Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.

77. Pyle, Sara A., Jill Sharkey, Georgette Yetter, Erika Felix, Michael J. Furlong, and W.S. Carlos Poston (2006). "Fighting an Epidemic: The Role of Schools in Reducing Childhood Obesity," Psychology in the Schools, Vol 43, No. 3, pp. 361-376.

78. Council of Chief State School Officers (2005). "Action for Healthy Kids -- State Profile on Nutrition and Fitness," obtained from the Action for Healthy Kids website at <http://actionforhealthykids.org/filelib/stateaction/profiles/Maryland.pdf> on December 8, 2008.
79. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
80. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
81. Geraci, Anthony, Food Services Director and Chef, Baltimore City Public School System (2008). Personal interview, December 8.
82. Geraci, Anthony, Food Services Director and Chef, Baltimore City Public School System (2008). Personal interview, December 8.
83. Geraci, Anthony, Food Services Director and Chef, Baltimore City Public School System (2008). Personal interview, December 8.
84. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
85. Parzikova, Jana and Andrew P. Hills (2000). Childhood obesity: Prevention and Treatment, Boca Raton, FL: CRC Press LLC.
86. School Health Policies and Programs Study (SHPPS) (2006). "State-Level School Health Policies and Practices," obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/State_Level_Summaries_SHPPS2006.pdf on December 8, 2008.
87. School Health Policies and Programs Study (SHPPS) (2006). "State-Level School Health Policies and Practices," obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/State_Level_Summaries_SHPPS2006.pdf on December 8, 2008.
88. Prevention Research Centers (PRC) (2007). "Planet Health for Obesity Reduction in School Children – Readily Accepted and Cost-Effective," obtained from the Centers for Disease Control and Prevention website at <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm> on October 22, 2008.

89. U.S. Department of Agriculture. "Community Food Projects Competitive Grants Program," obtained from the United States Department of Agriculture website at http://attra.ncat.org/guide/a_m/community_food.html on December 7, 2008.
90. National Institute of Medicine (2005). Preventing Childhood Obesity: Health in the Balance. Washington, DC: The National Academies Press.
91. Gittelsohn, Joel, and Mohan B Kumar (2007). "Preventing childhood obesity and diabetes: is it time to move out of the school?" Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.
92. President and Fellows of Harvard College (2000). "Planet Health Program Reduces Obesity in Middle-School Girls," obtained from the Harvard School of Public Health website at <http://www.hsph.harvard.edu/ats/Apr9/> on December 7, 2008.
93. Ebbeling, Cara B., David S. Ludwig, Dorota B. Pawlak, (2002). "Childhood Obesity: Public-Health Crisis, Common Sense Cure," Lancet, Vol. 360, No. 9331, pp. 473-483.
94. Pyle, Sara A., Jill Sharkey, Georgette Yetter, Erika Felix, Michael J. Furlong, and W.S. Carlos Poston (2006). "Fighting an Epidemic: The Role of Schools in Reducing Childhood Obesity," Psychology in the Schools, Vol 43, No. 3, pp. 361-376.
95. National Institute of Medicine (2005). Preventing Childhood Obesity: Health in the Balance. Washington, DC: The National Academies Press.
96. Geraci, Anthony, Food Services Director and Chef, Baltimore City Public School System (2008). Personal interview, December 8.
97. Council of Chief State School Officers (2005). "Action for Healthy Kids -- State Profile on Nutrition and Fitness," obtained from the Action for Healthy Kids website at <http://actionforhealthykids.org/filelib/stateaction/profiles/Maryland.pdf> on December 8, 2008.
98. New York State Department of Health (2005). "New York State School Nutrition and Physical Activity Best Practices Toolkit: Activ8 Kids!" obtained from the New York State Department of Health website at <http://www.nyhealth.gov/prevention/obesity/activ8kids/toolkit/docs/toolkit.pdf> on December 5, 2008.
99. New York State Department of Health (2005). "New York State School Nutrition and Physical Activity Best Practices Toolkit: Activ8 Kids!" obtained from the New York State Department of Health website at <http://www.nyhealth.gov/prevention/obesity/activ8kids/toolkit/docs/toolkit.pdf> on December 5, 2008.
100. Council of Chief State School Officers (2005). "Action for Healthy Kids -- State Profile on Nutrition and Fitness," obtained from the Action for Healthy Kids website at <http://actionforhealthykids.org/filelib/stateaction/profiles/Maryland.pdf> on December 8, 2008.

101. New York State Department of Health (2005). "New York State School Nutrition and Physical Activity Best Practices Toolkit: Activ8 Kids!" obtained from the New York State Department of Health website at <http://www.nyhealth.gov/prevention/obesity/activ8kids/toolkit/docs/toolkit.pdf> on December 5, 2008.
102. School Health Policies and Programs Study (SHPPS) (2006). "State-Level School Health Policies and Practices," obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/State_Level_Summaries_SHPPS2006.pdf on December 8, 2008.
103. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
104. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
105. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
106. Gittelsohn, Joel, and Mohan B Kumar (2007). "Preventing childhood obesity and diabetes: is it time to move out of the school?" Pediatric Diabetes, Vol. 8, No. 9, pp. 55-69.
107. Doak, C.M., T.L.S. Visscher, C.M. Renders, and J.C. Seidell (2006). "The Prevention of Overweight and Obesity in Children and Adolescents: A Review of Interventions and Programmes," Obesity Reviews, No. 7, pp. 111-136.
108. DeMattia, Laure, and Shannon Lee Denney (2008). "Childhood Obesity Prevention: Successful Community Based Efforts," The Annals of the American Academy of Political and Social Science, Vol. 615, No. 1, pp. 83-99.
109. Parker, Lynn (2005). "Obesity, Food Insecurity and the Federal Child Nutrition Programs: Understanding the Linkages," obtained from The Food Research and Action Center website at http://www.frac.org/pdf/obesity05_paper.pdf on October 15, 2008.
110. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
111. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.

112. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
113. Baltimore City Council Task Force on Childhood Obesity (BCCTFCO) (2007). "Report of the Baltimore city Council Task Force on Childhood Obesity," obtained from the Baltimore city Council website at http://www.baltimorecitycouncil.com/ChildhoodObesity_Report.pdf on October 15, 2008.
114. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
115. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
116. Matens, Richard, Assistant Commissioner of Chronic Disease Prevention, Baltimore City Health Department (2008). Personal interview, December 5.
117. Academic Network, LLC (2009). "Project Health Design: Rethinking the Power and Potential of Personal Health Records," obtained from the Robert Wood Johnson Foundation website at <http://www.rwjf.org/applications/solicited/cfp.jsp?ID=20762> on May 6.
118. Academic Network, LLC (2009). "Robert Wood Johnson Foundation Local Funding Partnerships 2009-2010," obtained from the Robert Wood Johnson Foundation website at <http://www.rwjf.org/applications/solicited/cfp.jsp?ID=20605> on May 6.
119. Academic Network, LLC (2009). "Robert Wood Johnson Foundation Local Funding Partnerships 2009-2010," obtained from the Robert Wood Johnson Foundation website at <http://www.rwjf.org/applications/solicited/cfp.jsp?ID=20605> on May 6.
120. Prevention Research Centers (PRC) (2007). "Planet Health for Obesity Reduction in School Children – Readily Accepted and Cost-Effective," obtained from the Centers for Disease Control and Prevention website at <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm> on October 22, 2008.
121. Simmons, Melody (2008). "Baltimore's New School Chef," obtained from Gourmet, August 25, website at <http://www.gourmet.com/foodpolitics/2008/08/baltimore-school-chef?currentPage=2> on October 15.