OBESITY, FOOD INSECURITY

AND THE FEDERAL CHILD NUTRITION PROGRAMS:

UNDERSTANDING THE LINKAGES

An analysis of the dual impacts of food insecurity and obesity on low-income individuals, households, and communities, and the current and future positive role federal child nutrition programs can play in the prevention of these two public health problems.

Food Research and Action Center

October 2005

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Acknowledgements

The Food Research and Action Center (FRAC) gratefully acknowledges the support of the Robert Wood Johnson Foundation.

Lynn Parker, FRAC's Director of Child Nutrition Programs and Nutrition Policy, is the author of this white paper.

Obesity, Food Insecurity and the Federal Child Nutrition Programs: Understanding the Linkages

Introduction

In the United States we find ourselves at a challenging crossroads in our efforts to improve the nation's nutrition and health. At the same time that we face an epidemic of obesity in the U.S., food insecurity continues to be a significant (and in recent years growing) public health problem as well.

Obesity, according to the most current National Health and Nutrition Examination Survey (NHANES)* data, affects 30 percent of adults, 16 percent of children 6 through 19 years, and 10 percent of children 2 to 5 years. Overweight affects another 35 percent of adults, 31 percent of children 6 through 19 years, and 22 percent of children 2 to 5 years. (Hedley et al., 2004) The period between 1960 and 1980 showed little change in rates of overweight and obesity for adults and children, but in the next 20 years these rates rose dramatically, for all genders and ages. (Crawford, 2005)

In general, food insecurity showed a gradual downtrend from 1995, when it was first measured nationally through the Bureau of Census Current Population Survey* (CPS), until 2000, when it began to move up again. Food insecurity climbed from a low of 10.1 percent of households in 1999, to 10.5 in 2000, 10.7 in 2001, 11.1 in 2002, 11.2 in 2003 and 11.9 in 2004. Particularly for children, large proportions of people live in food insecure households. In 2004, the 13.5 million households that were food insecure included 24.3 million adults (11.3 percent of all adults) and 13.9 million children (19 percent of all children), a total of 38.2 million individuals, or 13.2 percent of the total population. (Nord et al., 2005)

Food insecurity, by definition, is a condition related to lack of resources, i.e., the survey questions used to determine food insecurity in the annual CPS module all include words like "because there wasn't enough money for food. For example, CPS asks: "In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food?" Over one-third of households with incomes below the poverty line (36.8 percent) were food insecure, while 5.4 percent of households with incomes at or above 185 percent of poverty were food insecure. (Nord et al., 2005)

As in the case of food insecurity, overall rates of overweight and obesity are highest for low-income people, but the differences by income are much more modest than in the case of food insecurity. Moreover, a recent analysis of NHANES data over three decades shows that it is not the poor who have shown the largest increases in obesity. There also is a great deal of variation among subgroups in how income affects obesity rates. (Chang & Lauderdale, 2005) For example, adult men with incomes below the poverty level are

* NHANES is conducted on an annual basis under the auspices of the Centers of Disease Control, US Department of Health and Human Services. It is the most comprehensive nationally representative nutrition survey carried out in the United States. CPS is a nationally representative monthly survey conducted by the Bureau of Census in approximately 58,000 households throughout the U.S. Food security questions are asked once a year.

slightly less likely than men in the highest income group to be overweight, although they are slightly more likely to be obese. Poor women, on the other hand, are much more likely to be overweight and obese than women with the highest incomes. Among children the differences are not clear cut and vary a great deal by age, gender and income. When disaggregated by race and ethnicity, in some cases low-income children are more likely to be overweight or obese, and in other instances less likely. (Crawford, 2005[*])

What has surprised many is that food insecurity and obesity can affect the same individuals and households, as well as communities. In fact, a number of studies have demonstrated a strong association between food insecurity and obesity among low-income women. (Olson, 1999; Frongillo et al., 1997; Townsend et al, 2001; Adams, et al., 2001); Crawford, et al., 2004)

There are serious consequences that grow out of both of these conditions. For poor people and communities, food insecurity and obesity, especially in the context of poverty, are a kind of negative "double whammy." Either of the problems alone is terribly damaging to poor people, and the solutions have to be synergistic, rather than work at cross purposes. This dual nutrition problem thus is an enormous challenge for policy-makers, communities, and practitioners. How can these two public health problems be dealt with simultaneously, in an effective and sensitive manner?

In order to tackle this challenging and important issue, it is essential to gain a deeper understanding of the current status and trends in obesity and food insecurity in the United States, and how they may especially affect the lives of low-income individuals.

What are obesity and overweight?

Whether an adult is obese, overweight, normal weight, or underweight is determined by calculating his or her BMI, or Body Mass Index. BMI is calculated by dividing the weight in pounds by the height in inches squared (i.e., multiplied by itself) and then multiplying the answer by 703. In mathematical form, it looks like this:
BMI = (weight in pounds/height in inches x height in inches) (703). If the final answer is between 25 and 29.9, the individual is classified as overweight, and if it is 30 or above, the person is obese.

For children from 2 to 19 years of age, the final answer (BMI) is compared to growth charts that show children's BMIs for different ages and genders. Where a child's BMI falls on the growth chart for his or her age and gender determines weight status. Using the terminology developed by the National Center for Health Statistics, if his or her BMI falls between the 85th and 95th percentiles on the appropriate age/gender chart, his or her weight status is "at risk of overweight" (equivalent in meaning to the word "overweight" in adults). If his or her BMI is at or above the 95th percentile for his or her age and gender, then the classification will be "overweight," equivalent to the word "obese" being applied to an adult. This is designed to avoid stigmatizing children, but also creates some confusion when writing about "obese" adults and "overweight" children. Since the Institute of Medicine's *Preventing Childhood Obesity: Health in the Balance*

[*] This paper and several others on topics related to food insecurity and obesity are available on FRAC's website, www.frac.org, in *Proceedings of the Roundtable on Understanding the Paradox of Hunger and Obesity*.

(IOM, 2005), much of the non-academic literature, and media reporting classify children as overweight and obese, like adults, we will use those terms in the remainder of this paper.

Who is overweight and obese?

According to the most current NHANES data (1999-2002), 35 percent of adults were overweight and 30 percent were obese, meaning that almost two-thirds (65 percent) of the adult population is overweight or obese. Among children 6 through 19 years, 31 percent were overweight and 16 percent were obese, making almost half (47 percent) of school-age children overweight or obese. Among 2 to 5 year olds, 12 percent were overweight and 10 percent were obese. This amounts to one in five preschool children being overweight or obese. (Hedley et al., 2004)

Ethnic and racial disparities are apparent when obesity and overweight rates are examined further. The prevalence of adult overweight and obesity is higher among Hispanics and Blacks than among Whites. However, when rates are broken down by gender for each group, it becomes clear that it is the women's rates that are determining these differences. Men in each of the groups have very similar obesity rates - - White men at 28.2 percent, Black men at 27.9 percent, and Mexican American men at 27.3 percent. When women's rates are examined, there are disparities. White women have a 33.2 percent obesity rate, Black women a 49 percent rate, and Mexican American women 38.4 percent. (Hedley et al., 2004)

As with adults, national data show that the prevalence of obesity is higher among African American and Hispanic children than it is among white children. However, among children disparities in rates apply for both boys and girls. Obesity in White boys is 14.3 percent and in White girls is 12.9 percent; the rates for Black boys and girls are 17.9 percent and 23.2 percent, respectively; and for Mexican-American boys and girls, 25.5 percent and 18.5 percent. (Hedley et al., 2004) There are no national data for Native American children, but smaller studies show even higher rates for Native American boys and girls - - 32.6 percent and 31.7 percent. (Crawford, 2005)

As mentioned in the introduction, low income is associated with higher rates of overweight and obesity. However, the overall numbers hide differences by gender, age, and race and ethnicity that make the associations more complicated and difficult to understand and explain. For example, men with incomes below the poverty line are slightly less likely than men in the highest income group to be overweight, although they are slightly more likely to be obese. But the association with income among women is clear and quite strong - - women living below the poverty line are much more likely to be overweight and obese than women with the highest incomes. (Crawford, 2005)

Among children, the differences are not as clear cut. Among White boys and girls, as income increases the risk of obesity decreases, but among other racial and ethnic groups, higher income does not necessarily predict lower levels of obesity. For example, obesity is higher among Hispanic boys in middle and high-income families than in low-income families. Asian boys have lower rates of obesity at low and high income, compared to those with middle-level incomes. The rate of obesity among African-American boys varies very little by family income. The prevalence of obesity among African-American girls is lowest for those from middle income families and highest for girls from families with low and high incomes. Asian girls have lower obesity prevalence overall, while Hispanic girls

at all incomes have high rates of obesity. (Crawford, 2005) These differences point out the need to evaluate carefully simple assumptions about obesity and the poor, and focus on better understanding of its causes and potential solutions.

The causes of obesity and overweight- - What do we know?

Until fairly recently, the primary and sometimes only cause of obesity in the minds of many people was lack of personal responsibility. It was the fault of the obese person, or, in the case of the child, the fault of the parents and the child. According to this belief, what was lacking was "will power" and, maybe, lack of information. The prescription for change was individual—nutrition education, improved parental responsibility, and increased strength of character.

While not losing sight of the important role of individual parental and child responsibility, researchers have identified a range of environmental, or external causes and changes in recent decades that have contributed to the obesity epidemic - - by contributing to increased food intake (and especially intake of less healthful foods) and to decreased physical activity.

Some of these causes are changes in American society that affect all of us—a more sedentary lifestyle that includes less walking, longer working hours, longer commutes, and less physical activity among children. Children have less physical education at school and face the temptations of vending machines and high-fat snack sales in schools at all hours. Entertainment, for both children and adults, as well as children's schooling and adults' work experience, tend to be more sedentary, with multi-channel televisions, computers and other engaging electronic gadgets. Many communities are laid out in ways that discourage physical activity, and parents are often fearful about children walking home from school or playing outside for safety reasons and because parents are not home after school. Large amounts of super-sized tempting high fat foods are readily accessible all around us—at every shopping mall, in many public buildings, and, it sometimes seems, on every street corner—and are advertised to both children and adults on television and in many other venues. (Samuels, 2003; Boyle et al., 2005)

Low-income families and neighborhoods face all of these challenges and more. Low-income neighborhoods lack full-service grocery stores, and those stores which are in the community are less likely to have healthful foods. Food choices often are limited to small neighborhood convenience stores, liquor stores or fast food outlets, where high-fat, high-calorie foods are more common, and fruits, vegetables, and non- and low-fat milk and low-fat snacks are not. The price of healthy foods is also a factor for many low-income households - - healthy foods are often significantly more expensive, when they are available. (Samuels, 2003; Drewnowski & Specter, 2004; Boyle et al., 2005; Neault et al., 2005)

Low-income communities often have few safe or attractive places to play or be physically active. Open space is at a minimum, and recreational facilities often are inadequate. Afterschool and summertime recreational activities and sports are typically less available to low-income children. High rates of crime or fear of crime limit the ability to play safely and be physically active outdoors. Less pleasant "street scenery" in low-income neighborhoods discourages recreational walking. (Samuels, 2003; Boyle et al., 2005)

School districts in low-income neighborhoods often are underfunded. As a result, even more than in other schools, physical education and sports may see cutbacks in order to focus resources on academic improvement. This means less physical activity during the school day. (Samuels, 2003; Boyle et al., 2005)

Underfunded schools in low-income neighborhoods also are likely to be more crowded, making it harder to accommodate comfortably all the children who want to eat school lunches and breakfasts. Overcrowded, aesthetically unpleasant cafeterias, especially those that have not been remodeled in recent years, can discourage participation in the nutrition programs. Lack of space for consuming meals can lead to long lines, insufficient time to eat, very early or late lunch hours, and overly noisy mealtimes.

Many school districts have entered into contracts with food and beverage companies for the sale of certain products in vending machines that end up bringing cash resources to the school at the expense of children's nutrition. Low-income schools may be under even greater pressure to do so. Schools may also choose for financial reasons to sell profitable items in cafeteria "a la carte" lunch lines (additional lines that sell individual foods, sometimes of questionable healthfulness, in competition with the school lunch program) from which students seldom choose good lunches. The foods on these a la carte lines, like the contents of school vending machines, are not controlled by strong nutritional standards. The combination of vending machines and a la carte lines full of items that are high in fat, salt and sugar may be too great a temptation for any age student. Low-income schools also may lack the equipment necessary to prepare any food items on site and lack the resources to purchase or prepare high quality frozen, packaged, or precooked meals.

Social and emotional factors may be potential causes of obesity among children. Several studies have shown an association between depression in children and the development of obesity. Moreover, some researchers are beginning to suggest that the brain's response to stress may lead to central fat deposition and insulin resistance in adults. Stress could also affect children in similar ways. (Institute of Medicine, 2005) Low-income families also may face the additional financial and emotional pressures of low-wage work, inadequate and long-distance transportation, poor housing, and neighborhood violence. (Samuels, 2003; Boyle et al., 2005)

Recent research is also pointing to causes of obesity in children that are related to their mothers' nutritional status. Maternal obesity is one of the strongest predictors of obesity in children (Olson, 2005), and low-income women are more likely to be overweight and obese. This may put poor children at increased risk of obesity as they age. Several studies also have found that socioeconomic disadvantages in early life are positively associated with increased obesity in young adulthood. Thus, poor children, even if normal in weight or underweight in childhood, can have an increased propensity to be obese as adults. (Olson, 2005)

In addition, recent research points to another consequence of food insecurity - - obesity. A number of studies have shown a strong association between food insecurity and obesity among low-income women. The reasons are unclear, but appear to be related to how they manage limited resources for food - - sacrificing, on a cyclical basis, the quality and quantity of the food they eat in order to protect their children. This "feast or famine"

situation may expose women to an increased risk of obesity. (See “Food Insecurity and Obesity: The Linkages.”)

Finally, many low-income people lack access to basic health care, or, if health care is available, it is lower quality. (Samuels,2003; Boyle et al., 2005) This translates into less effective preventive care and lack of diagnosis and treatment of emerging chronic health problems like obesity.

What are the consequences of obesity and overweight?

The high and increasing rates of obesity are extremely disturbing from personal health and public health standpoints. We know that obesity begins to have negative effects in childhood. Overweight children are stigmatized by their peers and sometimes even by parents and teachers, leading to low self-esteem, negative body image and depression. (Institute of Medicine, 2005) This can affect their ability to socialize well with others and to feel comfortable in a classroom setting. Children who are overweight or at risk of overweight are also at greater risk of developing type 2 diabetes, pulmonary complications such as asthma and sleep apnea (a breathing problem during sleep), and hypertension. (Crawford, 2005)

Hypertension and type 2 diabetes, once considered adult diseases, are now much more common among children and adolescents. These conditions, once triggered, can become lifetime problems that are difficult to manage and can be associated with a lower quality of life and premature mortality due to related medical problems and complications. The Centers for Disease Control and Prevention predicts that one in three children born in the United States in the year 2000 (and one half of Hispanic children and close to one half of Black children) will develop diabetes at some point in their lives. (Crawford, 2005)

Another serious problem that is a complication of childhood and adult obesity is the “metabolic syndrome” - - diagnosed when a person has at least three out of five metabolic abnormalities: glucose intolerance, abdominal obesity, hypertriglyceridemia, low high-density lipoprotein (HDL) cholesterol, and high blood pressure. This syndrome is now present in one-quarter of adults in the U.S., and in nearly 30 percent of the children and youth who are obese. Among children who are obese, the metabolic syndrome appears to contribute to the development of atherosclerosis. (Institute of Medicine, 2005)

Even if these conditions do not show up in childhood, obese children are more likely to become obese adults, increasing the chances that they will suffer from these conditions as adults, along with cardiovascular disease, some cancers, and arthritis, among others. (Surgeon General, 2001)

What are hunger and food insecurity?

At the same time that overweight and obesity are hurting millions of poor as well as other Americans, food insecurity and hunger also damage the quality of lives and health. It is sometimes difficult for people to believe that hunger exists in the United States in the twenty-first century. Food or images of food are everywhere we look, and obesity is the major nutrition concern being discussed. Our country is extraordinarily wealthy. Yet hunger persists.

While hunger and food insecurity still are far too widespread, they have been reduced in recent decades by economic growth and a growing federal commitment to nutrition. The nation has slowly built a nutrition program safety net, starting in the 1930's with the commodity program for school lunches. Much of the growth of this safety net occurred in the 1970's in response to media and public health community attention to nutrition problems in the poorest areas of the U.S.— in Appalachia, the Southeast and the Southwest — where physicians and emerging political leaders in the late 1960s and early 1970s saw nutrition problems they would have expected to find only in developing nations. School Lunch and Breakfast Programs became more widespread and more available to poor children, Head Start Programs with a nutritional component began and expanded in many poor communities, and the Food Stamp and WIC Programs began. After these developments, a group of physicians sent by the Field Foundation in 1977 to examine the impact of these programs reported to Congress that there were "far fewer grossly malnourished people in this country," but that "malnutrition has become a subtler problem." (Kotz, 1979) The 1970s had dramatically reduced the worst incidence of hunger in the U.S.

The early 1980's saw both a recession and cutbacks in public assistance programs. The relatively small numbers of food pantries and soup kitchens at that time experienced precipitous increases in demand for emergency food, with increasing numbers of women and families with children showing up to obtain help. Community-based organizations, local government officials, and academic researchers working in communities struggled to find credible ways to document the growing problem they were seeing, so that local jurisdictions could be motivated to respond. (Nestle & Guttmacher, 1992)

In response, the Reagan Administration created a President's Task Force on Food Assistance, which reported that, "While we found evidence of hunger … we have also found that it is at present impossible to estimate the extent of hunger. We cannot report on any indicator that will tell us by how much hunger has gone up in recent years." (Report of the President's Task Force on Food Assistance, 1984)

The kind of hunger that these groups and individuals were observing was not as often the nutritional deficiency diseases physicians saw in the 1960's, but rather a chronic, cyclical, poverty-related inadequacy in household food supplies. In response to requests from local and state anti-hunger organizations across the country, the Food Research and Action Center (FRAC) took on the challenge of developing and implementing the first national survey of this kind of hunger among families with at least one child below the age of 12.

FRAC researchers and their technical advisory committee developed a series of eight questions to measure hunger, which were part of a longer survey that asked questions about spending on food, employment, children's health, participation in federal nutrition programs, and other relevant issues. The project was called the Community Childhood Hunger Identification Project (CCHIP). The results of the surveys, released in 1991 and 1995, raised public awareness and concern about hunger and contributed to positive policies in nutrition program funding and operations at the local, state and national levels. The survey also was later used to develop the questions for the U.S. government's survey of hunger and food insecurity. (Food Research and Action Center, 1991 & 1995).

The words and concepts we use to describe the hunger we see today come from the work of the Life Sciences Research Office of the Federation of American Societies for Experimental Biology (LSRO/FASEB). (Anderson, 1990) In response to a clamor for definitions of the food problems people were seeing around them, LSRO researchers began by defining the positive state of **food security**: "Access by all people at all times to enough food for an active, healthy life [which] includes at a minimum: a) the ready availability of nutritionally adequate and safe foods; and b) the assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, and other coping strategies)." In order to incorporate the most common kind of hunger found in the United States, they used the word **food insecurity** to mean "the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain." They defined the word **hunger** as "the uneasy or painful sensation caused by lack of food."

In 1990 Congress passed comprehensive nutrition monitoring legislation which, inter alia, required the development of a measure of food insufficiency as part of the national nutrition monitoring system. This food security measurement was developed by the Bureau of Census and the Departments of Agriculture and Health and Human Services in the form of a module of questions to be included in the Current Population Survey (CPS). This module was first included in the CPS in 1995, and has been a part of it every year since.

The module contains 18 questions used to develop a scale for determining the level of food security/insecurity. Households are classified into three categories. **Food secure** households show no or minimal evidence of food insecurity, although they may express concerns about the availability of food due to lack of financial resources. **Food insecure households without hunger** have adults skipping meals or cutting the size of meals and making other adjustments, including reducing the quality of diets for themselves and their children. **Food insecure households with hunger** are households in which food intake for both adults and children in the household is reduced to the extent that they are likely to have repeatedly experienced the physical sensation of hunger. (Hamilton et al., 1995)

This measure tends to be conservative - - households have to be suffering to quite an extent to be classified as food insecure or hungry. Also, many adults are reluctant to state that they don't have enough money to buy food, and are especially reluctant to admit to interviewers that their children are hungry.

This measure is widely respected and used by diverse audiences to characterize and quantify the current food sufficiency problems in the U.S. In fact, reducing food insecurity by 6 percentage points (a 50 percent decrease), based on the annual CPS survey results, is one of the "national health objectives designed to identify the most significant preventable threats to health" in *Healthy People 2010*. *Healthy People 2010*, a comprehensive, nationwide health promotion and disease prevention agenda that contains 467 objectives, is the federal government's roadmap for improving health in the U.S. during the first decade of the 21st century. (U.S. Department of Health and Human Services, 2000)

Who is affected by food insecurity and hunger?

Low-income (due to low wage jobs, involuntary part-time or part-year work, job loss, unemployment, illness, inadequate public income supports, etc.) often leaves

households with insufficient money or other resources to obtain enough food. Food insecurity and, eventually, outright hunger result when people, due to economic constraints, lack access to enough food to fully meet basic needs at all times. (Hamilton et al., 1995)

In the U.S., according to the latest data available (2004), 11.9 percent of households (13.5 million households) were food insecure (with or without hunger) [*], and 3.9 percent (4.4 million) were food insecure with hunger. Food insecure households included 24.3 million adults and 13.9 million children, a total of 38.2 million individuals. Households with hunger, a segment of all food insecure households, included 7.4 million adults and 3.3 million children. (Nord et al., 2005) In general food insecurity showed a consistent downward trend from 1995 to 1999, but began to rise again by 2000, and has risen each year since.

Rates of food insecurity and hunger are higher for households below the poverty line, (36.8 percent and 13.6 percent); households with children which are headed by a single woman (33 percent and 9.2 percent); Black households (23.7 percent and 8.1 percent); and Hispanic households (21.7 percent and 5.9 percent). Households with children are twice as likely as households without children to be food insecure (17.6 percent vs. 8.9 percent). Food insecurity is more prevalent in central cities (15.4 percent) than in other areas, and in the South and West versus the Northeast and Midwest. (Nord et al., 2005)

Food insecure households spend less money on food than food secure households. According to 2004 data, the typical U.S. household spends $40 per person each week for food, which is 25 percent more than the cost of the Thrifty Food Plan (TFP). The Thrifty Food Plan (TFP) is a market basket of particular foods and quantities of foods upon which the food stamp allotment is based. It was originally developed during the Depression to meet short-term emergency needs. Food secure households spend 28 percent more than the TFP, whereas food insecure households spend 2 percent less than the TFP. (Nord et al., 2005)

What are the consequences of hunger and food insecurity?

Research shows that households which fear running out of food, or cannot buy enough to meet their needs, manage their food insufficiency problems in such a way as to stave off hunger, especially for their children, as long as possible. First they reduce the quality of their diets, and eventually they reduce the quantity of the food they consume, adults making the adjustments in their diets first before they reduce the quality and quantity of their children's food intake. (Hamilton et al., 1995) As a result, children typically are the last ones in the household to experience hunger.

Over the last decade, researchers have been examining the impact of food insecurity on other aspects of quality of life, including food habits, dietary intake, child and adult health, obesity, mental health, pregnancy, and educational achievement. They are finding that even children who are not "hungry" are affected negatively by living in a food insecure household. Parents are reducing the quality of the food their family eats, or feeding their children unbalanced diets, or skipping meals so their children can eat. When parents do not know where the next meal will come from, these stresses and changes can affect the

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[*] In this paper, unless otherwise specified, "food insecure" is used to mean with or without hunger.

behavior and mental health of children. Researchers are finding that when children live in food insecure households, their health status can be impaired, making them less able to resist illness and more likely to become sick or hospitalized. Iron deficiency anemia among very young children also has been associated with household food insecurity. Children from food insecure households have problems with learning, resulting in lower grades and test scores. They also are more likely to be anxious and irritable in the classroom, and more likely to be tardy, or absent from school. Adolescents from food insecure households appear to be more likely to have psychological problems. (Center on Hunger and Poverty, 2002)

Food insecurity and obesity: Linkages

Recent research has uncovered another potential consequence of food insecurity - - obesity. It is at first blush counterintuitive that hunger and food insecurity can co-exist with obesity in the same individual. However, a number of recent studies have shown strong associations between food insecurity and obesity among women. One study looked at a random sample of women in a rural county in New York State and found that the BMI for women in food insecure households was significantly higher than that of women in food secure households, controlling for height, income, education, single parent status and employment. (Olson, 1999) Another study analyzed data on women's weight and food security status from USDA's nationally representative 1994-1996 Continuing Survey of Food Intakes by Individuals, and found that an increased prevalence of overweight was associated with food insecurity. (Townsend et al., 2001)

Analysis of NHANES data showed similar results - - the prevalence of overweight was significantly higher in women from food insufficient households than in food sufficient households. (Basiotis & Lino, 2003) An examination of data collected in the 1998-1999 California Women's Health Study found that food insecurity without hunger was associated with an increased obesity rate in all women, and that food insecurity with hunger was associated with increased obesity in Asians, Blacks, and Hispanics, but not among Whites. (Adams et al., 2001) In addition, another study in California, among Latina mothers of preschoolers, demonstrated an association between food insecurity with hunger and obesity. (Crawford et al., 2004)

The reasons for these associations between food insecurity and obesity among women (there is little evidence of this association among men or children) are unclear. Researchers have suggested a number of mechanisms, most having to do with how low-income mothers manage limited resources for food - - sacrificing their own nutrition in order to protect their children from hunger. Researchers believe that something about inadequate resources and putting the children's needs first can create a chronic "feast or famine" situation which appears to contribute to maternal obesity. Research also shows that food deprivation can cause a preoccupation with food that has the potential to cause obesity. Some researchers have found an association between food insecurity and a binge-like pattern of eating. Thus, women who are food insecure on a regular basis may overeat at those times during which they have adequate amounts of food. (Olson, 2005)

Some also have suggested that the kinds of food consumed by food insecure women may make a difference. Because refined grains, sugar, and fat cost less per calorie than fruits and vegetables, women lacking adequate resources may be purchasing the less

expensive energy-dense foods in order to stave off hunger, or they may be avoiding fruits and vegetables because of their increased cost per calorie. (Drewnowski & Specter, 2004)

Some suggest that food insecurity and obesity appear to be associated with each other because they both may result from poverty. In particular, poverty in childhood may play this role. Two recent studies, from New Zealand and Britain, demonstrate that poverty in childhood is associated with obesity in young adulthood. Hunger and food insecurity related to that early poverty may contribute to poverty's impact on adult obesity. (Olson, 2005)

In addition, food insecurity may be a stressor that results in a stress response that leads to disordered eating, reduced physical activity, and depression, all of which may be related to weight gain (Jones, 2005), or food insecurity and/or poverty may cause a stress response that is hormonal, causing central patterning of fat deposition. (Olson, 2005)

There is a limited amount of research that focuses on the relationship between obesity and food insecurity among children, and it does not paint a consistent or clear picture. Two recent studies, using nationally representative data from different data sets, have found positive relationships between food insecurity and obesity among some groups of children studied, but not among all groups. Another study, using a third nationally representative data set, did not find such a relationship. A fourth study of a sample of preschool Mexican-American children in California found a trend toward such a relationship, but it was not statistically significant. The research in this area is just beginning, and no clear pattern has emerged to explain which children may be affected by this relationship and why. (Alaimo et al., 2005; Casey et al., 2001; Jones et al., 2003; Kaiser et al., 2002; Frongillo et al., 2003)

The effects of the coping strategies food insecure households employ to stave off hunger and make it through each month are likely to affect adults more often, and more profoundly, than they do children. However, they will affect children - - directly in food intake, indirectly in learned food patterns, and potentially indirectly in ways not yet understood - - with lifelong consequences. The first mention in the scientific literature that obesity and food insufficiency might be causally related was a case reported in the journal *Pediatrics* by Dietz in 1995, in which he described a 7-year-old girl in a weight control program who weighed 180 pounds. Her mother was a low-income single parent, and the family was short of food on a regular basis. The first bill that was paid each month was rent, and the family had no resources by the middle of the month. To cope with this situation, the mother fixed large meals that were inexpensive but high in calories. Dietz suggests that, if obesity is linked to hunger and food insecurity, as it appeared to be in this child's case, the solution to obesity in impoverished populations may be an increased food supply "to achieve a more uniform pattern of food consumption." (Dietz, 1995; U.S. Department of Agriculture & U.S. Department of Health and Human Services, 1994) More recently, a researcher who has focused on low-income Mexican-American children has suggested that, among the population she has studied, food insufficiency and anxiety about past food supply may lead to less optimal parenting around food choices, and less desirable food habits in children, even when food is more available. (Kaiser et al., 2002)

Child nutrition programs, food insecurity and obesity:
What role can the programs play?

Child Nutrition Programs

There are five basic federally-funded child nutrition programs that provide meals, snacks, or individual foods to children. Four of them provide help at sites where children are likely to be and where food service is essential; the fifth, WIC, helps children at home. The five are the School Breakfast and National School Lunch Program, the Summer Food Service Program, the Child and Adult Care Food Program and the WIC[*] Program. (Food stamps, another critical program, is not usually considered a "child nutrition program" and is beyond the scope of this paper. However, half (51 percent) of food stamp beneficiaries are children, and its role also is critical.)

From the very beginning of the child nutrition programs, several important principles have placed these programs in a strong position to play a crucial role in obesity prevention. First of all, except for WIC, all of these programs are entitlement programs. "Entitlement" means that, within the parameters set by the law, all eligible schools or sponsors which wish to operate these programs may, and all eligible children under their auspices may participate in the nutrition programs they operate. There are no specific funding ceilings for these programs. This entitlement status means that these programs can grow with need - - i.e., if there is an economic recession or a national disaster in a community, and more children become needy, or if outreach and improved practices bring in more local sponsors or schools or children, these programs are financially ready to expand to accommodate their basic food needs.

Another important principle that has evolved is uniform national eligibility requirements based on income. All children can participate in School Breakfast or Lunch, for example (although some children pay some of the cost depending on income), and income eligibility levels are universal within the 48 contiguous United States - - i.e., whether a child lives in Oregon or Georgia, he or she must fit within the same income standards to receive a free or reduce price meal. (Alaska and Hawaii have higher maximum income limits.)

The third and fourth principles pertain to nutrition. The foods, meals and snacks provided by these programs must meet specific nutrition standards developed by the U.S. Department of Agriculture based on scientific research. However, the fourth principle - - decentralization and flexibility - - allows schools to serve a variety of foods within these guidelines that reflect their community's food habits, products, and cuisine.

These principles mean that child nutrition programs can and should model the best nutrition for children, that these meals and foods can reach children who need them everywhere in this country, and that these programs can play a crucial role in contributing to food security among low-income families. By increasing access to these programs so that even more children are reached, and by working to further improve the nutritional quality and appeal of program benefits, the full potential of these principles can be reached.

[*] Officially, WIC is called the Special Supplemental Food Program for Women, Infants and Children.

School Lunch and Breakfast

The National School Lunch Program is operated by approximately 95 percent of public schools, and 28 million children receive a federally subsidized school lunch every day, over half of whom (16.5 million) are from low-income families (with family incomes below 185 percent of the federal poverty level). Children receive these meals for free if their family income is at or below 130 percent of the federal poverty level, and they pay up to 40 cents for a "reduced price" lunch if family income is higher than 130 percent of the poverty level, but no more than 185 percent. If household incomes are higher than 185 percent, children pay close to the full cost of the meal, which varies from school to school, and the federal government pays a small amount.

Schools receive cash reimbursements for each meal served, the amount depending on whether the meal was free, reduced price, or what is referred to as a "paid" meal. In addition, schools receive commodity foods from the government, to some extent based on their choices among the surplus foods available at the time. The commodities are a significant contributor to the school lunches that are served each day. Finally, some states supplement federal reimbursements with state funds, which can make an enormous difference to schools' nutrition programs.

The Lunch Program has been the flagship of child nutrition, serving as a model for program operations. This is especially true in the area of nutrition standards. Currently, lunches must provide one-third of the Recommended Dietary Allowances for key nutrients. In addition, relatively recent additional standards that comply with the 2000 Dietary Guidelines for Americans require no more than 30 percent of calories from fat and less than 10 percent of calories from saturated fat. Lunches also are supposed to have reduced sodium and cholesterol and increased fiber.

The actual lunches served to children can be developed by a school or school district using: special computer programs that develop lunch menus while ensuring that nutritional standards are met; a food-based meal pattern, i.e., a certain amount of milk, a certain amount of fruits and vegetables, etc.; or any other method that ensures that all nutrition standards and meal pattern rules are met. The majority of schools use a food-based pattern, but the number of schools turning to computer-based menus is increasing over time.

The flexibility provided to schools allows many creative responses to student and community preferences. Vegetarian options are possible, cuisines from across the globe fit in, and popular meal delivery options, e.g., salad bars, soup bars, taco bars, and grab-and-go bag meals, are all possible.

Nevertheless, the most recent review by the U.S. Department of Agriculture on how well schools are doing (in 2001) in meeting nutritional standards regarding fat content shows progress, but much room for improvement. On average, elementary schools are serving lunches with 33.1 percent of their calories from fat, and 11.9 percent from saturated fat, and secondary schools, on average, are at 34.5 percent and 12.1 percent respectively. In other words, the average school lunch exceeds the guidelines (30 percent and 10 percent, respectively.) Overall, only 19 percent of schools are at no more than 30 percent calories from fat, although 39 percent are between 30.1 and 34 percent.

While there is an urgent need to improve school meals, it is also true that they already improve students' nutrition in important ways. Because there are nutrition standards governing what is served in the lunch program, it is not surprising that participants consume more milk and vegetables at lunch and fewer sweets and snack foods than non-participants. Also, participants consume more grain products at lunch than non-participants. (Fox et al., 2004)

The positive impacts of the nutrition standards, along with the large numbers of current and potential participants in the Lunch Program, highlight the possibilities for enlisting the lunch program as an even more effective tool for obesity prevention - - both in terms of the food served and the nutrition lessons that can be taught. This is particularly important to recognize in light of recent research that demonstrates the difficulties many low-income people face when they try to purchase the foods that health professionals prescribe as an obesity-fighting, heart-healthy diet. They have to spend a great deal more than food stamps and/or their budgets allow, and many cannot afford to do this without jeopardizing other family financial needs. (Neault et al., 2005; American Heart Association, 2004) The child nutrition programs can play an important role in providing these foods to children and freeing up resources for families to purchase more healthful foods for meals not covered in school.

The School Breakfast Program is operated in more than 78,000 schools, and reaches 8.7 million children every day, 82 percent of whom are from low-income (below 185 percent of poverty) families. The program reaches about 43 percent of low-income children who receive free or reduced price school lunches. Schools are reimbursed by the federal government based on whether the meals are free, reduced-price (up to 30 cents charge to the student) or "paid" (students pay most of the cost). There are no federal commodities in breakfast, but lower-income ("severe need") schools get extra reimbursements. Some states also have added an additional state reimbursement for each breakfast served. Breakfasts, like lunches, are based on nutrition standards - - they must provide children with one fourth of their Recommended Dietary Allowances, and have the same limitations on calories from fat and saturated fat as lunches do.

School breakfasts do better than lunches at meeting the guidelines for fat content - - on average they meet both the fat calories and saturated fat calories standards, coming in at less than 30 percent for calories from fat. Seventy-one percent of all schools serving breakfast average no more than 30 percent fat, and 52 percent average less than 10 percent saturated fat, with 27 percent between 10.1 and 12 percent. Overall, the fat content of school lunch and breakfast greatly improved from when it was measured in 1991-92. (Fox et al., 2001) However, there is still a long way to go to lower the fat content of school lunches.

School Breakfast, like School Lunch, can play an important role in obesity prevention. Children and adolescents who are breakfast eaters (whether school breakfast or breakfast elsewhere) are less likely to be overweight. (Rampersaud et al., 2005; Afenito et al., 2005) Skipping breakfast is more prevalent among girls, low-income children, older children and adolescents, and among some Black and Hispanic adolescents. (Rampersaud et al., 2005) Participation in the School Breakfast Program reduces breakfast skipping. School Breakfast participation also increases scores on the Healthy Eating Index, a measure of overall dietary quality, and reduces the percentage of calories from fat in children's diets. (Basiotis & Lino, 1999)

In addition, the availability of the School Breakfast Program affects the quality of the diets of other members of the family. The School Breakfast Program is associated with better scores on the Healthy Eating Index and fewer calories from fat among preschool children and adults in the families of school-age children. (Bhattacharya, 2004)

Summer Food Service Program

When school lets out, millions of low-income children lose access to the nutritious school breakfasts, lunches, and afterschool snacks they receive during the regular school year, as well as the daily physical activity programs in schools or afterschool programs. The Summer Food Service Program (SFSP) and the National School Lunch Program (NSLP) both can fill this gap by providing nutritious summer snacks and meals to children up to age 18, particularly in schools and programs in low-income areas.

Like all the other child nutrition programs, these snacks and meals must meet specific nutrition standards. In addition, research has shown that 93 percent of sites with the Summer Food Service Program provide activities as well. (Gordon et al., 2003) Thus, the Summer Food Service Program (and the National School Lunch Program during the summer months) contribute to children's healthy growth and development, substituting recreational programming for sedentary television program watching, and fruits and milk for chips and sugary fruit drinks.

Local government agencies, school districts, nonprofits (including recreation centers, migrant centers, YMCAs and YWCAs, Boys and Girls Clubs, and faith-based charities) and summer camps are all places that can sponsor this summer nutrition program. Unfortunately, out of 15 million low-income children who depend on free or low cost meals during the school year, only about 3 million are receiving summer meals through NSLP or SFSP. Thus, the full nutrition and anti-obesity potential of these programs is not being achieved in many low-income communities across the country.

Afterschool Snacks and Meals

Afterschool snacks and suppers also are offered through the federal child nutrition programs. Afterschool programs have become important places for children to receive nutritious snacks, and often suppers, when their parents are working long hours, as well as providing children an opportunity to be physically active.

Schools and community-based organizations can be reimbursed for providing these snacks and suppers through the National School Lunch Program or the Child and Adult Care Food Program. The snacks and meals must meet specific nutrition requirements, and are comprised of milk, fruits and vegetables, grains, and meats or "meat alternates" (i.e., other protein sources). The kinds of foods offered and the reasonable portion sizes can be models for good nutrition, and provide alternatives to less healthful items available to many children. In addition, meals and snacks in the afterschool programs often draw children to the positive activities and safe environments offered by the programs.

These nutrition programs also act as a dependable base of funding for afterschool programs and provide financial support for food costs so that their limited resources can be spent on other aspects of afterschool care. In order for an afterschool program to be

eligible for federal funds for snacks and meals, it must provide educational or enrichment activities in a regularly scheduled, structured and supervised setting. This can include arts and crafts, athletic activities that do not limit participation to certain children, mentoring, tutoring, or homework clubs. Unfortunately, many afterschool programs are unaware of this nutrition program or do not know how to apply, leaving children less well-nourished and activity programs underfunded.[*]

Child and Adult Care Food Program for Preschoolers

Along with providing nutrition to children in afterschool programs, the Child and Adult Care Food Program (CACFP) also provides nutritious meals and snacks to close to three million young children in family child care homes, child care centers and Head Start programs. Just as in all the other child nutrition programs, these snacks and meals must meet nutrition standards.

Studies show that children in CACFP receive meals that are nutritionally superior to those served to children in child care settings without the Child and Adult Care Food Program. (Bruening et al., 1999; U.S. Department of Agriculture, 1983) Thus, CACFP can help start good nutrition habits early in life. In addition, CACFP provides opportunities for the training of providers in child development, nutrition education, food preparation, and the importance of encouraging physical activity in children.

WIC

The Special Supplemental Food Program for Women, Infants and Children (WIC), which typically is operated at the local level through the public health department, is a preventive nutrition program that provides nutritious foods, nutrition education and referrals and access to health care to low-income pregnant women, new mothers, and infants and children at nutritional risk. WIC enhances the nutritional quality of the diet of participants through its prescription "food package," a specific set of important foods which includes milk, cheese, juice, eggs, iron-fortified cereal, infant formula, and beans. It is likely that the WIC food package will be revised in the coming year, and will include fruits and vegetables as a result of that revision.

Participants receive nutrition education, breast-feeding instruction, and nutrition counseling at WIC clinics, all of which can provide an important foundation for good nutrition and healthy physical activity habits among young mothers and their children. WIC clinics are at county health departments, hospitals, mobile clinics, community centers, schools, public housing sites, migrant health centers and camps, and Indian health service facilities. Screening and referrals to health care and welfare and social services can lead mothers and children to preventive health services and programs that, along with the food and nutrition services WIC provides, can provide their families with increased food security, more nutritious food, good nutrition and health advice, and increased economic security. This combination of services and programs can help low-income mothers and their families avoid the difficulties brought on by the development of obesity. Researchers

[*] For more details on individual site eligibility and how to determine the rates that will be paid for children's snacks and suppers (i.e., in qualifying low-income areas all children can receive free snacks and suppers), see FRAC's guide to afterschool snacks, Nourish Their Bodies, Feed Their Minds: Funding Opportunities and Nutrition Resources for Afterschool Programs, at: http://www.frac.org/Afterschool_Guide.pdf.

at the Institute for Policy Research, for example, report that WIC participation prevents overweight in young children. (Bitler & Currie, 2004)

The unique role nutrition programs play in obesity prevention

As discussed earlier, researchers are beginning to demonstrate that the coexistence of obesity and food insecurity in low-income households and individuals likely is related to their inability to purchase sufficient nutrient-dense foods on a consistent basis and the behavioral impacts of some household members regularly not having enough to eat. The prevention of obesity and food insecurity - - each a public health problem that is harmful to the health and quality of life for low-income families - - requires regular access to nutritionally adequate foods.

One key way to gain that access for more families is to take full advantage of the child nutrition programs. These programs play a dual role of fighting hunger and food insecurity and providing nutritious foods on a regular basis. For example, the child nutrition programs provide more than half of the nutrition a school-aged child receives each week day if s/he participates in both breakfast and lunch, and this food must meet nutrition standards. In afterschool and summer programs, the added benefit is that food attracts the children to programs that offer them opportunities for physical activity.

A recent expert panel appointed by the U.S. Department of Agriculture reviewed the current scientific literature and found no evidence of a relationship between participation in the nutrition programs and increased obesity. (Linz et al., 2005) Similarly, a recently published analysis of data from the nationally representative 1997 Panel Study of Income Dynamics Child Development supplement showed no evidence that the Food Stamp Program, National School Lunch Program, or School Breakfast Program contributes to overweight among poor children. (Hofferth & Curtin, 2005) In fact, emerging research is showing that participation in nutrition programs has the potential of protecting children from excess weight gain. An analysis of nationally representative survey data shows that school-age food insecure girls are less likely to be overweight or at risk of overweight if they participate in the School Breakfast Program, School Lunch Program or Food Stamp Program or any combination of these programs. (Jones et al., 2003) Another study showed that WIC participation prevents overweight in young children. (Bitler & Currie, 2004) Increasing access to the nutrition programs is essential.

There are still many children who are not receiving the benefits of these programs. There are numerous reasons for this, including: lack of availability of programs in certain schools or geographic areas; difficulty in accessing programs even when they are available; lack of knowledge or misconceptions about the programs or who is eligible for them; the competition of unhealthy food and beverage offerings in vending machines and a la carte lines in schools; lack of universal school breakfast programs (i.e., school breakfast without a charge, for all children in school); inability to understand application forms due to literacy or language problems; and, in some cases, perceived stigma associated with participation in the nutrition programs. Barriers to participation must be overcome to ensure that all children and especially low-income children can take full advantage of the nutritious meals and snacks offered by these programs. If seen and utilized as important allies in the battles against obesity and food insecurity, the child nutrition programs can help lead many low-income households onto a healthier path. (See FRAC's website,

www.frac.org for more information on the federal nutrition programs and how to increase children's access.)

In addition to increasing access to the child nutrition programs, it is important to examine how the programs themselves can be further improved and how the environment in which the meals and snacks are served can foster good nutrition and increased physical activity. These two sets of actions can lead to the full development of the potential that nutrition programs offer in the battle to prevent obesity. The remainder of this paper addresses this potential.

New policy approaches: Improving the ways child nutrition programs combat obesity, improve diet, and foster physical activity

One of the key recommendations of the Institute of Medicine's ground-breaking and comprehensive study of what should be done in the U.S. to prevent childhood obesity (Institute of Medicine, 2005) is: "Schools should provide a consistent environment that is conducive to healthful eating behaviors and regular physical activity." To implement this recommendation, they suggest that local and state authorities and the U.S. Department of Agriculture should: implement nutrition standards for competitive foods and beverages sold or served in schools; ensure that school meals meet the Dietary Guidelines for Americans; and implement pilot programs to increase school meal funding in schools with a large percentage of children at risk of obesity.

The IOM report also suggests that state and local education authorities and schools should ensure, among other things, that: children and youth participate in 30 minutes of physical activity every school day; opportunities for physical activity be expanded (through physical education classes, traditional sports programs, afterschool use of school facilities, use of schools as community centers, and walking and biking-to school programs); and health curricula devote adequate attention to nutrition, physical activity, and reducing sedentary behaviors.

Ensuing sections of this paper give an overview of strategies to achieve these goals through the federal child nutrition programs.

Local wellness policies

Almost all of these goals can be advanced at the local level by the development and implementation of school district wellness policies, which are required to be in place in every school district participating in federal nutrition programs by the beginning of the 2006-2007 school year. In the Child Nutrition and WIC Reauthorization Act of 2004, Congress provided that the local policy must include goals for "nutrition education, physical activity, and other school-based activities that are designed to promote school wellness." The local wellness policy also must include nutrition guidelines "for all foods available on each school campus…during the school day" in order to promote student health and reduce childhood obesity. The policy development process must involve parents, students, representatives of the school food authority, the school board, school administrators, and the public.

Low-resource schools or schools with many low-income children may face special challenges in the development and implementation of local wellness policies because of

underfunding and more pressing fundamental priorities related to achievement test scores, meeting state and federal education standards and working within limited budgets. To ensure that these schools see the wellness policy as a key priority, the connection between the optimum nutritional and physical health of students and the educational goals of school officials has to be effectively made. The case must be made in a compelling way, as many low-income schools face ongoing fiscal constraints, high staff turnover, low academic achievement, and a frequent lack of parental and community involvement. It is only natural that these very real problems could impede the effectiveness of a local wellness policy in both its development and implementation. At the same time, it is the low income students in these schools that could benefit the most from a comprehensive wellness policy. (FRAC has developed a guide, "Developing a Local Wellness Policy: A Resource for Schools Serving Low-Income Communities," to assist communities in this process. See FRAC's website, www.frac.org for more information.)

School officials need to be reminded that, while the obesity epidemic is being felt in all communities, the environment in low income neighborhoods can exacerbate this problem. As mentioned earlier in this paper, many ethnic minority and lower income communities lack access to affordable and high quality healthy foods, such as whole grains, low fat dairy products and lean meats, and a variety of fresh fruits and vegetables, because there aren't many supermarkets in these neighborhoods and because healthier foods tend to be less affordable. In addition, low-income children and adults have fewer opportunities to be physically active due to neighborhood characteristics and limited financial resources. Thus, schools in low-income neighborhoods can play a uniquely central role in children's health by providing a source of healthy and nutritious food and opportunities for physical activity.

Part of the compelling case for addressing nutrition issues in schools is the direct cost to a low-income school district of not doing so. Though not often discussed, there are enormous costs to local districts when children are undernourished and consume diets and live sedentary lives that lead to obesity. A great deal of literature describes the negative cognitive impacts of undernutrition, including inability to concentrate in class, lower achievement test scores, and poor grades. (Alaimo et al., 2001b; Murphy et al., 1998; Center on Hunger, Poverty and Nutrition Policy, 1995) The scientific literature also demonstrates a link between physical activity and increased cognitive function and academic performance. (Action for Healthy Kids, 2004) In addition, being undernourished or overweight may increase school absences - - because of related health problems - - and absenteeism is directly related to academic performance. Increased absenteeism also translates into reduced state funding for the affected schools. (Action for Healthy Kids, 2004)

Poor nutrition, physical inactivity and overweight also can increase schools' costs if special programs must be designed for children who suffer academically or behaviorally because of these conditions. In addition, the physical and emotional problems that poor nutrition and physical inactivity cause place an increased burden on teachers and other school staff who must provide students affected by these problems with additional services. (Action for Healthy Kids, 2004)

Changing competitive foods

One of the key aspects of local wellness policies is the development of standards for "competitive foods." "Competitive foods" is a term used to refer to foods sold in the schools that are not part of the federally funded (and regulated) nutrition programs but rather "compete" with the School Breakfast and Lunch Programs. Competitive foods include those sold in "a la carte lines" in the cafeteria, snack bars, vending machines and student stores.

Currently, the only federal restriction on the sale of competitive foods applies to so-called "foods of minimal nutritional value" - - foods containing less than five percent of the Reference Daily Intakes for all of several key nutrients, which includes such foods as carbonated beverages (i.e., soft drinks), water ices, chewing gum, hard candy, licorice, and candy coated popcorn. Moreover, this restriction against sale applies only during school lunch and breakfast periods and only in the school food service area. In other words, a vending machine serving sodas can sit just outside the school cafeteria, and need only be shut off during meal periods, or can be left on elsewhere in the school.

Research shows that access to competitive foods in school reduces the consumption of school meals (the only food programs in schools that must meet nutrition standards) and the quality of students' diets. (Cullen & Zakeri, 2004; Templeton et al., 2005) In addition, the presence of competitive foods may lead to increased stigma for children who eat free and reduced price meals and who may not be able to afford the a la carte items. Alternatively, the competitive foods lure kids to spend money their families can ill afford on vending machines and a la carte lines. Finally, the sale of less healthy competitive food sends students a very mixed message about nutrition from the central institution in their lives - - selling one thing in the cafeteria or outside the gym or the auditorium, and saying something very different in the classroom about what should make up a healthy person's diet.

In spite of all the reasons why competitive foods don't make sense for low-income students, or any students, most schools still sell them. According to a study by the Centers for Disease Control released in 2000, 80 percent of American school districts sold competitive foods, including 98 percent of high schools, 74 percent of middle schools and 43 percent of elementary schools. (Action for Healthy Kids, 2004) A 2003-2004 study by the Government Accountability Office (U.S. Government Accountability Office, 2005) shows that this situation has not changed appreciably.

One reason schools sell competitive foods is the resources these sales bring. The revenue often is used for computers, sports equipment, the funding of school programs or activities, field trips, or other activities and items that are not funded in the school budget. (Institute of Medicine, 2005) This means that they can be an especially sensitive issue in low-resource schools and school districts.

Most of these activities should be part of the regular school budget, of course. And there are other ways schools can raise funds that do not compromise their students' nutritional health, or highlight economic disparities between low-income students and those who can afford competitive foods. Non-food items can be sold, or fund-raising activities such as walkathons or fun runs can be held. (Institute of Medicine, 2005)

If schools decide to continue selling competitive foods, however, there are steps they can take to switch to healthier products and, at the same time, prevent a loss of revenue. Schools switching to a combination of healthier foods, such as 100 percent juice, low fat milk, water, yogurt, string cheese, fruits and vegetables generally have not lost revenue if the prices are reasonable. The nation's nutrition environment is changing and, as a result, many of the snack food and beverage companies that supply foods to schools have healthier items they can offer instead of soft drinks and candy. Holding taste tests for students and letting them participate in the choices helps ease acceptance.

Improving school meals

There is still a long way to go to improve the overall nutritional quality and attractiveness of meals in many schools (and in many child care, afterschool and summer programs). Increasing fresh fruits and vegetables and fruit and vegetable consumption, providing lean meats and low and nonfat dairy products, and increasing the availability of whole grains are all challenges that face those who want to improve school meals.

Many food service directors must wrestle with obstacles such as the expense of fresh fruits and vegetables; outdated or poorly maintained food preparation facilities; limited storage; and overall education budget issues in the community, which put increased pressure on the school meals budget.

These barriers do not relieve schools of the obligation - - legal, moral, and educational - - of improving their meals. Schools must implement practices that ensure that children are choosing and consuming meals that meet USDA's nutrition standards, including reducing fat and saturated fat, increasing fiber and reducing sodium. School districts and states must seek ways to improve the healthfulness of the commodities they order and receive, and the products that are manufactured with these commodities. School districts must re-evaluate the specifications they use to order food for school meals. If large, they need to use their buying power to demand the most attractive and healthful foods possible, and if small, they need to work together with other districts on collective buying to obtain the good nutrition their students deserve. School districts also must explore alternatives for obtaining appealing and high quality food - - including "farm-to-school" programs. School food service personnel and farmers need to learn how to speak each other's language, or find others who can help them work together, such as staff from local and state Cooperative Extension offices that are part of their states' land grant universities.

Along with providing high quality child nutrition, schools also can improve other aspects of the "nutrition environment" in which their students spend each day. Strategies like attractiveness, positive atmosphere and appeal of the cafeteria, enough room to be comfortable while eating, enough time for children to eat, scheduling at reasonable times (not too early or too late), keeping lines at reasonable lengths, scheduling recess before (and not during) lunch, and making sure the cafeteria is an educational environment (about nutrition and health) for children and youth are all important aspects of the nutrition environment. These can be special challenges for older and overcrowded schools with limited eating, waiting and cooking space, lack of food service equipment, and limited resources for making capital improvements. However, creativity can be applied to these challenges to make important improvements if they are seen as a priority issue for the health of low-income children. In addition, when schools are remodeled or rebuilt, the

cafeteria is often the least considered aspect. School staff, school boards, and members of the community need to raise the importance of sufficient space and equipment and attractive facilities for the improved health and nutrition of children.

Physical activity and nutrition education

Many forces in our society encourage sedentary lives and many aspects of living with low family income add to and exacerbate these forces as they affect children and youth. Low-income schools must maintain and expand physical education and activity available to their students in spite of budget and time constraints.

The federal government and states have to provide resources to support, rather than cut, funding for physical education. States should require adequate periods of physical education in schools even though there is relentless pressure on the implementation of measures for academic achievement. Unhealthy children, even if they gain higher scores, do not make for a fully successful school. Moreover, cutting back on physical education is academically counter-productive: increased physical activity in schools has been shown to have a positive impact on improving overall achievement.

Again, creative thinking is required, including the incorporation of physical activity into classroom activities and afterschool programs to ensure that students are active every day. Recess of some kind, even if a traditional school playground is not available, is an essential aspect of ensuring time for physical activity. Community-based programs that are provided access to school facilities after school and during the summer can provide afterschool and summer activity programs that schools might not be able to afford. Local transportation agencies might be able to subsidize transportation to and from some physical activity programs.

With all the different kinds of foods that surround children these days - - from the school lunch to the fast food special to rows and rows of grocery store shelves - - children must be equipped with the motivation and knowledge to make healthy food choices. This is a challenge for schools that are strapped for time and resources, and are fighting hard to succeed in teaching the basics. Integrating nutrition information into standard subjects is one answer. Other solutions include: involving key stakeholders such as the school nurse, community physicians, local dietitians and college students studying nutrition to assist with the development of nutrition education programs; coordinating with the cafeteria staff to develop nutrition education activities and programs; and offering afterschool and summer programs with hands-on activities, such as cooking clubs, school gardens or bringing in local farmers and visiting their farms.

Programs that target the nutritional status of preschool children - - WIC and the Child and Adult Care Food Program - - also can make important contributions in the areas of physical activity and nutrition education.

WIC already offers nutrition education for pregnant and postpartum women. However, there are many challenges for the WIC program in doing this well, including limited staff, lack of resources for nutrition education and often inadequate facilities. Many WIC programs have been inventive in their efforts to make the most of their staff and facilities to reach low-income young families with nutrition education.

One important element in ensuring that more time and staff are available for nutrition education is the quality and efficiency of the systems, including computer technologies, used to enroll and monitor the benefits provided to participants. If paperwork tasks can be reduced, more nutrition staff resources are available for nutrition education.

A strategy for freeing up funds at the local level for nutrition services to the non-school population is for states to print WIC nutrition education materials that can be used by WIC clinics statewide, thereby reducing the local burden of materials-related costs. One tactic WIC programs have used to maximize the impact of limited staff is to encourage common nutrition messages from all the staff with whom a WIC client interacts. This comprehensive reinforcement of nutrition education messages takes full advantage of available staff. In addition, the use of trained paraprofessionals in the WIC clinic, many of whom were formerly participants in the WIC Program and are "nutritionally successful" mothers, can extend the reach of staff nutritionists. The WIC staff also can incorporate the encouragement of increased physical activity into their nutrition services. For example, WIC "activity kits" have been developed in some states that parents can take home and use to encourage their children to play in more physically active ways.

In CACFP, nutrition education and the encouragement of preschool children's natural inclination to be physically active are key elements. CACFP is operated by child care centers and by family child care providers who are sponsored by non-profit groups, called "sponsoring organizations," which monitor family child care homes and are intermediaries for the federal nutrition funds. Child care operations that participate in the Child Care Food Program are more likely to be connected to the broader child care arena, receiving training and technical assistance on food preparation, nutrition education for very young children and their parents, and ways to encourage physical activity among the children for whom they provide care. However, changes in the funding formula and increases in paperwork requirements for CACFP in family child care have reduced the ability of some sponsoring organizations to provide nutrition education services to the extent that they were previously able.

State and national level actions

In many states a wide variety of legislative initiatives have been introduced, and many enacted, to make the kinds of changes in schools that have been described in the previous pages. A large number of state education agencies and state boards of education are working through administrative action on similar kinds of policies to encourage or mandate these kinds of changes state-wide. If successful, these efforts can reach more children and faster than school-district-by-school-district change. Such policies can include: requiring recess; requiring a certain amount of physical education per week; creating nutrition standards for competitive foods to apply throughout the school day; mandating that schools must provide a School Breakfast Program; and requiring a specific level of nutrition education at each grade level.

At the national level, some of the key policy issues are: the inadequacy of the reimbursement for school meals; the need for the development and dissemination of creative solutions and additional resources for low-income schools which are struggling to implement effective wellness policies; improving the kinds of commodities available to schools; and creating national nutritional standards for foods that are sold in competition with school meals.

The Institute of Medicine (IOM) points out in Preventing Childhood Obesity: Health in the Balance (Institute of Medicine, 2005) that "federal reimbursements [for school lunches] at their present levels are insufficient to cover the remainder of the meals' actual costs," even taking into account some states' supplemental contributions and donated USDA commodity foods. Schools often sell competitive foods and beverages to raise funds that they need to support the school nutrition programs. Full funding for school meal programs, IOM suggests, could reduce the need to sell competitive foods and focus schools' attention on high quality nutritious meals and maximum participation, "and may also help alleviate any perceptions among students that only low-income individuals eat school meals." IOM suggests the development of "pilot programs to extend school meal funding in schools with a large percentage of children at risk of obesity."

This is an important concept. However, because of their increased challenges in trying to make change, low resource schools with a large percentage of children at increased obesity risk should be first in line for this assistance. With extra resources they could serve more attractive meals, full of the food nutritionists recommend, buttressed by school-wide promotions, and linked with nutrition education and physical activity opportunities. A combination of increased reimbursement and technical assistance in making effective changes and additions in the school environment could make an enormous difference in many low-income schools. If successful, this assistance program could be expanded, and taken up as well by state legislatures and the federal government.

A national school lunch budget increase to improve menu quality is not unprecedented. In England, in response to a recent national media campaign led by a celebrity chef, the government increased the nation's school lunch budget by approximately 530 million dollars. England, of course, has only a fraction of the children the U.S. does, so the equivalent increase here would be considerably larger. Schools in England are supposed to use these funds to improve the quality of meals served. According to England's Education Secretary, food high in fat, salt and sugar will be banned. (Reuters News Service, 2005)

In the United States, the school lunch reimbursement was cut by Congress in 1981, and that reduction has never been restored, even as fiscal pressures on school budgets and moves to serve more healthful lunches have increased. In that same year Congress also eliminated a very useful program that assisted low income schools in purchasing and repairing food service equipment. At a time when local school budgets are tighter than ever, and expectations for educational achievement are very high, school districts now expect the school lunch reimbursement to carry the full burden of the cost of food, food service staff, salaries and fringe benefits, equipment purchase and repair, and custodial services, lights and heat in the cafeteria. It is incumbent upon states and the federal government to ensure that reimbursements are sufficient to pay for the real costs of school lunches so that schools can serve meals that are nutritious, healthful and appealing in pleasant and positive nutrition environments.

Another very important element of change at the national level is the need for a clearinghouse of programs, strategies and policies that are possible for low-income schools to operate effectively, and affordable technical assistance on how to make these changes.

In addition, it is often overlooked that commodities make up about one-fifth of the resources schools have to work with in producing their school lunches. In general, the decisions about which commodities are available or purchased are not driven by concerns about children's well-being. These programs and the ways in which they operate at the state and local levels need to be reviewed to incorporate new strategies for making them more responsive to current concerns about children's health. Also, the very popular, but limited, Department of Defense fresh produce delivery program to schools should be examined for broader replication.

Finally, schools and states are struggling to develop nutrition standards for competitive foods. The Institute of Medicine has received funding to develop suggestions for such standards. The broad dissemination of good IOM standards, given its reputation for objective scientific consensus that is evidence-based, should be very helpful to schools and states in their efforts to improve the foods students are exposed to during the school day. If USDA were to make these standards, or some version of them, into required national standards, this would be very helpful. Moreover, Congress could change the law covering competitive foods to extend the Secretary of Agriculture's authority over these food items to the total school campus and the entire school day, rather than the current limitation to the cafeteria and the breakfast and lunch periods.

Conclusion

Both food insecurity and obesity tend to affect low-income people more than those with higher incomes (although the relationship between obesity and poverty does not hold for all gender, age racial, and ethnic sub-groups). In addition, racial and ethnic minorities are considerably more likely to be food insecure, and tend to be more at risk for obesity than non-Hispanic Whites. What has surprised many is that food insecurity and obesity can affect the same individuals, households, and communities. In fact, a number of studies have demonstrated a strong association between food insecurity and obesity among low-income women.

Both food insecurity and obesity have negative consequences for the children, adults, and families they affect. Food insecurity results in poorer quality diets, compromised child and adult health, mental health problems, and educational deficits among children. Obesity increases the risks for low self-esteem and depression, type 2 diabetes, pulmonary complications such as asthma and sleep apnea, and hypertension among children and adults, and also increases adult risk for a number of diseases and conditions, including cardiovascular disease, some cancers, and arthritis.

The federal child nutrition programs can play a crucial role in preventing both food insecurity and obesity, as well as in increasing economic security and improving nutritional intake. When the full potential of the nutrition programs is achieved, they also can contribute to improvements in the general nutrition environment in schools and students' physical activity levels. Thus, it is of paramount importance to protect and increase broad access to federal nutrition programs, to assure that the nutrition programs provide optimal benefits, and to maintain and strengthen the programs' national nutrition standards.

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