



Research Brief

Center for Policy Studies, Education Research, and Community Development

A Consortium Serving Idaho, Montana, Utah, and Wyoming

Obesity in schools

Introduction

Obesity and growing waistlines in the United States have become insidious epidemics attacking all Americans, but is mostly on the rise among children (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2002; Goran, Reynolds, & Lindquist, 1999; Neumark-Sztainer & Story, 1997; Vail, 2004). Obesity is a severe health problem with known risks such as high blood pressure, high cholesterol, heart diseases, diabetes, and cancer (Twedell, 2003; Improved Nutrition and Physical Activity Act, 2003; United States Food and Drug Administration [FDA], 2004). More than half of the American population is overweight, 61% of adults and 13% of children and adolescents (Improved Nutrition and Physical Activity Act, 2003). Research revealed that obesity is linked to race, gender and ethnicity (Lowry, Weshcler, Galuska, Fulton, & Kann 2002; Hershey's website, n.d). Schools in particular have become nutrition disaster areas due in part to their lucrative and exclusive deals with commercial fast food companies, revenue generating vending machines, and the availability of nutritionally empty soft drinks (Wallis, 2004).

As of 2000, 15.3% of school aged children between 6 and 11 years of age were obese, while 15.5% of American adolescents between 12 and 19 years of age were obese (The Center for Health Care in Schools, 2004). *This trend needs to be reversed.* The nation will face serious health issues and associated costs if interventions are not put in place. Obesity is now a problem that needs to be addressed with dietary control, physical activity, education, and medical intervention (FDA, 2004). Appropriate intervention programs have to be designed to tackle such issues. Schools should be asking how food, diet, and weight are interlinked to developmental aspects of children and adolescents, such as body image and self esteem. What and how much children eat should be part of a school's mission and curriculum because children who are either undernourished or overfed do not perform well academically (Vail, 2004).

Purpose of the Research Brief

The purpose of this research brief is fourfold. The first is to provide a general overview about the obesity pandemic, particularly in American schools. Second, this brief is intended to help school leadership develop alternative interventions that could help in curbing the problem. Third, this brief is intended to estimate the extent of obesity in schools, and help policy makers and educators make informed research based

decisions regarding allocation of financial and material resources in schools. Fourth, this brief may help schools formulate nutrition policies and programs that mitigate overweight and obesity.

What is Obesity?

Obesity is defined as body weight that is more than twice the ideal body weight, or a body mass index of greater than 40 according to Goodell (as cited in Twedell, 2003). Obesity is also defined as a BMI (Body Mass Index) over 30 kg/ m² relative to age: This latter formula considers the age, weight, and height of an individual (Harris, 2001). Patients with a BMI between 25 and 29.9 are considered overweight, but not obese (US National Library of Medicine, 2004). According to the Center for Disease Control (2004), obesity in children or adolescents is defined as those individuals with a body mass index (BMI) at or above the 95th percentile on the revised Centers for Disease Control and Prevention growth charts. Obesity represents an imbalance between energy intake and energy output (FDA, 2004). People who have morbid obesity are also referred to as bariatrics (Twedell, 2003). An adult male is considered obese when his weight is 20% or more over the maximum desirable weight for his height; a woman is considered obese at 25% or more than the maximum desirable weight. Anyone more than 100 pounds overweight is considered morbidly obese (US National Library of Medicine, 2004). A host of medical problems that require extra care affect bariatrics. These problems range from breathing, circulation, mobility, body waste elimination, to gastrointestinal problems (Twedell, 2003). People who are obese have 50% higher chance of a premature death.

Causes of Obesity

There are four common causes of obesity.

1. Sedentary lifestyle.

Kaiser Family Foundation revealed the most frightening statistics about youth interaction with the media. On average, a typical child is exposed to 40,000 fast food advertisements annually (Kaiser Family Foundation, 2004a). Such advertisements inevitably influence the food choices of children and adolescents, and the food is likely consumed excessively when watching television. Children and adolescents spend an average of five and a half hours a day using media that includes TV, video games, computer activities, and the Internet (Kaiser Family Foundation, 2004b). They also spend a considerable amount of time talking on the phone or reading books. Such activities replace rigorous physical activities and can lead to overweight and obesity.

Research associates a link between the amount of time children interact with media and obesity (Kaiser Family Foundation, 2004a). Watching television for more than four hours a day was associated with greater body fat and BMI than children who watched less than two hours a day according to the National Health Examination Survey (NHANES) III study (as cited in Treuth, Butte, Adolph, & Puyau, 2004). "Television viewing may be related to reduced physical activity in children and the onset of obesity" (Goran, Reynolds & Lindquist, 1999, p. 23). In

addition, most of the advertisements contain food items such as candy, sodas, fast foods, and cereal. These foods are high in calories, fat, and sugar.

Children live in an environment that involves less and less physical activity because of technological advances (Goran, Reynolds, & Lindquist, 1999). Children do not walk or cycle to school. The entertainment provided by technological gadgets does not promote the expenditure of energy (Dietz & Gortmaker, 2001). The availability of fatty high carbohydrate foods, high calorie drinks, and over exposure to television and other media could in fact be construed as an endorsement by adults that these things are okay for children (Vail, 2004).

2. Over-consumption.

Youth normally buy food that is convenient but not healthy.

“Consumption of fast food among children in the United States seems to have an adverse effect on dietary quality in ways that plausibly could increase risk for obesity” (Bowman et al, 2004, p. 112). For instance, children aged 9 and older are the heaviest consumers of sodas with an average consumption of three sodas a day. Boys tend to drink more sodas (52%) than girls (32%) (The Center for Health Care in Schools, 2004). Swinburn and Egger (2002) stated that there are some food-based vectors that could be attributed to overweight and obesity. These are energy dense foods which are usually high in fat and low in water and fiber; energy dense drinks which are usually high in sugar; and having large portion sizes of food and drink. High fat diets provide excessive calories which in turn require increased physical activity to burn away (Swinburn & Egger, 2002). If an individual is training for a marathon, increased calorie consumption, as provided by fats and carbohydrates, is necessary. Yet if the same individual is involved in little to no physical activity, then calorie consumption must decrease as well.

3. Genetics

Some studies point to a connection between obesity and genetics. Loewy (1998) cited several pieces of research that indicated a strong relationship between obesity and genetics. Children of obese parents became obese later in life; and they tend to be less fit (Treuth, Butte, Adolph & Puyau, 2004).

Health and Social Consequences of Childhood Obesity

There are a number of negative health consequences related to childhood obesity. These are:

- Asthma
- Type 2 diabetes
- High blood pressure
- Sleep apnea
- Mental health problems

There are several social and psychological consequences related to overweight and obesity. The Center for Health and Health Care in Schools (2004) stated that approximately 50% of children and adolescents who are obese will become obese adults.

The problem of obesity affects mainly girls because they increasingly become preoccupied with their body image and their developing body during adolescence; body image and self esteem tend to be intertwined. Obese girls may resort to drinking, smoking, and getting drunk and trying to lose weight through dieting (Dixey, 1998). Obese children are also subjected to stereotypes and size prejudices. They are not considered best friends; are described as dirty, sloppy, lazy, and stupid by other children according to Levine (as cited in Loewy, 1998); and are subjected to name calling and teasing (Neumark-Sztainer, Falkner, Story, Perry, & Hannan, 2002).

Obese children are generally subjected to ridicule and torment by other children. Obese girls reported higher incidents of weight teasing in comparison to boys (Neumark-Szteiner, Falkner, Story, Perry, Hannan, & Mulert, 2002). The problem is exacerbated by the fact that overweight children internalize these stereotypes and believe that others view them as grotesque and loathsome, leading to internalized self hatred (Loewy, 1998). Obese adolescents tend to binge and also resort to unhealthy weight control behaviors. The teasing is more poignant when it is done by family members leading to greater body dissatisfaction in adolescents. These biases, prejudices, and stereotypes affect the mental health of obese children. The plight of obese children is worsened by the current emphasis on thinness promoted by some aspects of the media.

Teachers, counselors, and parents do not make it any better for the children as they subject obese children to the same stereotypes according to a study by Loewy (1998). Obese children are perceived with disgust by teachers and counselors, while parents tend to favor non-obese children in things like college funding and are generally irritated by their obese children in comparison to average weight children (Loewy, 1998). Poor body image is a result of cultural preferences of the ideal body size and results in accumulative criticism by parents, peers and teachers. Parents sometimes project their body image on the obese child causing further mental torture of the obese child. In general, obese people are exposed to weight related stigmatization (Neumark-Sztainer, Falker, Story, Perry, Hannan & Mulert, 2002).

Later in adult life, overweight and obese children are more likely to remain single and receive lower incomes in comparison with non-overweight counterparts, regardless of socioeconomic origins and aptitude test scores (Loewy, 1998).

National Trends

Obesity is a crisis that is threatening the gains made by modern medicine in life expectancy of Americans as the pandemic is highly associated with morbidity and mortality (FDA, 2004). An estimated 58 million people in the United States have serious health risks from obesity (Dietz, Groves-Bland, Gortmaker, Molloy & Schmid, 2002). About 400,000 people die annually due to obesity, and the total economic cost of obesity in the United States is estimated at \$117 billion annually (FDA, 2004; Improved Nutrition and Physical Activity Act, 2003). It is associated with heart disease, which is the leading cause of death in America (Improved Nutrition and Physical Activity Act, 2003). Businesses have been affected due to lower productivity of obese employees and high cost of insurance premiums.

The disease is affecting all races, but some races seem more affected than others. Obesity also varies depending on gender and age group. Also, obesity is closely associated with the socio-economic status. Children who come from families that are two

levels above the poverty threshold tend to be less obese compared to children who come from families with incomes that are two levels below the poverty threshold. Children coming from parents with low levels of education are more often affected by obesity (Health Policy Tracking Service, 2004). Children of Mexican and African-American descent are mostly affected: Four in ten Mexican American and African American youth ages 6 to 19 are considered overweight or at risk of being overweight (Kaiser Family Foundation, 2004a). Among Native Americans, obesity is highly prevalent “Even at the youngest school ages, overweight is more than twice as likely as national patterns, and obesity is more than three times as prevalent” (Zelphier, Himes and Story, 1999, p. 1). African American women were described as predominantly sedentary, putting them at greater risk of obesity, hypertension, diabetes, and coronary heart disease (Rohm-Young & Voorhees, 2003). Generally Caucasians tend to be more active in comparison to African Americans or Hispanics. Boys tend to be more active than girls especially during the adolescence period according to Hershey (n.d, para.1)

There seem to be ethnic and cultural differences involved in the acceptance of obesity. For instance, there seems to be a greater latitude in body size acceptance among African Americans (Neumark-Sztainer, Falkner, Story, Perry, Hannan, & Mulert, 2002). Other factors contribute to obesity: “Age and gender, ethnicity, social norms, socioeconomic class, and family composition, as well as parents’ knowledge, attitudes, and beliefs (KAB) and children’s knowledge, attitudes and beliefs are characteristics that affect both food intake and physical activity” (Dietz & Gortmaker, 2001, p. 341). This clearly demonstrates that factors within families may influence obesity among children and adolescents.

Table I
Facts and Figures on Overweight and Obesity Among Children and Adolescents, 2003

The figures are percentages of children who are obese based on gender and ethnicity.

6-11 years		
Race and ethnicity	Gender	
	Male	Female
White	-	-
Black	-	-
White, non - Hispanic	12	-
Black, non - Hispanic	17.1	22.2
Mexican	27.3	19.6

Total	16.0	14.5
12-19 years		
Race and ethnicity	Gender	
	Male	Female
White	-	-
Black	-	-
White, non - Hispanic	12.8	12.4
Black, non - Hispanic	20.7	26.6
Mexican	27.5	19.4
Total	16.0	15.5

Source: Table drawn from statistics provided by Center for Disease Control (n.d) on prevalence of obesity by state, 1991-2001

Table 2
State of the States on Obesity

The figures are percentages of obese adults in each state.

State Obesity	1991	1995	1998	1999	2000	2001
Alabama	13.2	18.3	20.7	21.8	23.5	23.4
Alaska	13.1	19.2	20.7	19.2	20.5	21.0
Arizona	11.0	12.8	12.7	11.6	18.8	17.9
Arkansas	12.7	17.3	19.2	21.9	22.6	21.7
California	10.0	14.4	16.8	19.6	19.2	20.9
Colorado	8.4	10.00	14.0	14.3	13.8	14.4
Connecticut	10.9	11.9	14.7	14.5	16.9	17.3
Delaware	14.9	16.2	16.6	17.1	16.2	20.0
District of Columbia	15.2	n/a	19.9	17.9	21.2	19.9
Florida	10.1	16.5	17.4	17.9	18.1	18.4
Georgia	9.2	12.6	18.7	20.7	20.9	22.1
Hawaii	10.4	10.4	15.3	15.3	15.1	17.6

Idaho	11.7	13.8	16.0	19.5	18.4	20.0
Illinois	12.7	16.4	17.9	20.2	20.9	20.5
Indiana	14.8	19.6	19.5	19.4	21.3	24.0
Iowa	14.4	17.2	19.3	20.9	20.8	21.8
Kansas	n/a	15.8	17.3	18.5	20.1	21.0
Kentucky	12.7	16.6	19.9	21.1	22.3	24.2
Louisiana	15.7	17.4	21.3	21.5	22.8	23.3
Maine	12.1	13.7	17.0	18.9	19.7	19.0
Maryland	11.2	15.8	19.8	17.6	19.5	19.8
Massachusetts	8.8	11.1	13.8	14.3	16.4	16.1
Michigan	15.2	17.7	20.7	22.1	21.8	24.4
Minnesota	10.6	15.0	15.7	15.0	16.8	19.2
Mississippi	15.7	18.6	22.0	22.8	24.3	25.9
Missouri	12.0	18.0	19.8	20.8	21.6	22.5
Montana	9.5	12.6	1.7	14.7	15.2	18.2
Nebraska	12.5	15.7	17.5	20.2	20.6	20.1
Nevada	n/a	13.3	13.4	15.3	17.2	19.1
New Hampshire	10.4	14.7	14.7	13.8	17.1	19.0
New Jersey	9.7	14.2	15.2	16.8	17.6	19.0
New Mexico	7.8	12.7	14.7	17.3	17.8	18.8
New York	12.8	13.3	15.9	16.9	17.2	19.7
North Carolina	13.0	16.5	19.0	21.0	21.3	22.4
North Dakota	12.9	15.6	18.7	21.2	19.8	19.9
Ohio	14.9	17.2	19.5	19.8	21.0	21.8
Oklahoma	11.9	13.0	18.7	20.2	19.0	22.1
Oregon	11.2	14.7	17.8	19.6	21.0	20.7
Pennsylvania	14.4	16.1	19.0	19.0	20.7	21.4
Rhode Island	9.1	12.9	16.2	16.01	16.8	17.3
South Carolina	13.8	16.1	20.2	20.2	21.5	21.7
South Dakota	12.8	13.6	15.4	19.0	19.2	20.6
Tennessee	12.1	18.0	18.5	20.1	22.7	22.6
Texas	12.7	15.0	19.9	21.1	22.7	23.8
Utah	9.7	12.6	15.3	16.3	18.5	18.4
Vermont	10.0	14.2	14.4	17.2	17.7	17.1

Virginia	10.1	15.2	18.2	18.6	17.5	20.0
Washington	9.9	13.5	17.6	17.7	18.5	18.9
West Virginia	15.2	17.8	22.9	23.9	22.8	24.6
Wisconsin	12.7	15.3	17.9	19.3	19.4	21.9
Wyoming	n/a	13.9	14.5	16.4	17.6	19.2

Source Center for Disease Control (n.d). State of the States on obesity

The top ten states with the highest prevalence of adult obesity in their order are: Mississippi, West Virginia, Michigan, Kentucky, Indiana, Texas, Louisiana, Alabama, Tennessee, and Georgia.

The top ten states with lowest prevalence of obesity are: Colorado, Massachusetts, Vermont, Connecticut, Rhode Island, Hawaii, Arizona, Montana, Florida, and New Mexico.

By geographic region, people in the South and the Midwest are more likely to be obese than those from the Northeast and West according to information provided by the National Center for Health Statistics (2004). Those with lower educational levels are more likely to be obese than those with high education levels.

Table 3

Obesity and Educational Level

These figures are percentages of obese adults based on gender and educational level.

Education	Both Sexes	Men	Women
Less than high school graduate	61	63.2	58.8
GED Diploma	62	66.7	56.9
High School Graduate	59	67.3	51.2
Some college – No Degree	56.3	65	48.4
Associate of Arts Degree	59.5	69.5	50.8
Bachelor of Arts/ Science degree	52.4	64.3	40.4
Master’s, doctorate or medical degree	49.1	60.7	35.6

Source: National Center for Health Statistics (2004).

The federal government has passed a number of acts to address obesity nationally. These are:

1. The Right to Start Act of 2003. This act provides training, education, and counseling according to subtitle G, section 371 and subtitle H, section 381 that provides grants to implement overweight and obesity treatment and prevention programs.
2. The Improved Nutrition and Physical Activity Act (2003) was established to provide health services for improved nutrition, increased physical activity, and obesity prevention, among other things.
3. Commonsense Consumption Act (2003). This act prohibits civil liability action against food manufacturers, marketers, traders, distributors, etc., by people who are obese.
4. Richard B. Russell National School Lunch Act (2003) aims to improve the nutrition of students served under nutrition programs.
5. House of Representatives Concurrent Resolution 76 (2003) promotes healthy weight and physical activity among children.
6. House of Representatives Resolution 716. The purpose of this resolution is to establish grants to provide health services for increased nutrition, physical activity, and obesity prevention.

State Legal Efforts to Fight Obesity

Several states have enacted bills and legislation to address the problem of obesity.

Some states are tackling the problem through nutrition and health reporting.

1. Alabama SJR 97 bans the practice of giving waivers to public schools that exempt students from participating in sport. Only students with special conditions have to be considered under this law.
2. Connecticut House Bill 5344, 2004, ensures lunch breaks, physical activity, and nutrition standards.
3. Illinois Senate Bill 2940, 2004, requires that health care providers collect obesity-related information from students.
4. Louisiana Senate Bill 871 mandates that each public elementary school provide 30 minutes of moderate to vigorous exercise daily. The bill has provision for monetary rewards to one public elementary school and one secondary school that have outstanding physical activity programs
5. Oklahoma Healthy and Fit Kids Act (2004). This law requires a six member Safe School Committee tasked to address health education, physical education, physical activity, and nutrition and health services.
6. Tennessee House Bill 272, 2004, signed into law on May 18 requires the state board of education, department of education, and the department of health to develop minimum nutritional standards for individual food items offered for sale to students. The law also requires that all non-compliant vendors reimburse the school for any penalties assessed in the program and for any violations committed by the vendor.

Current Interventions in Schools

Schools are excellent locales to fight obesity because 90% -95% of children aged between 5-17 are enrolled there (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2002; Goran, Reynolds, & Lindquist, 1999). Many schools have a variety of interventions that are geared towards the promotion of health.

School districts have started modifying children's nutrition. The current trend is the drive to ban soft drinks in schools. At least 12 states -- California, Hawaii, Minnesota, Virginia, Kentucky, Maryland, Michigan, Nevada, North Carolina, Oklahoma, Utah, and Wisconsin -- considered banning the sale of soft drinks (Harris Bowman, 2001). Several school districts in Los Angeles, San Francisco, New York, and Maryland have spearheaded the ban of soft drinks on school campuses. However, there seems to be no policy in place in these school districts. A telephone survey to these school districts confirmed that there are only board resolutions to that effect.

The San Francisco Unified School District was the first district in California to pass such a resolution. Washington has now banned the sale of carbonated sport and soft drinks in school cafeterias. Schools are in favor of selling fruit based drinks, milk, and water. The drinks must have specified quantities of nutrients. Vail (2004) stated that students will buy whatever is available in school cafeterias. This thrust on controlling what students drink and eat is positive, but must be complemented with what students eat and drink while they are at home. Schools are trying to ensure that they do not contribute to the obesity problem through what is served in cafeterias and vending machines, but also must score victories in fighting obesity through their nutrition programs (Vail, 2004). School curricula that alter children's beliefs, knowledge, and attitudes about obesity may influence children's food consumption patterns or physical activity levels at home and school (Dietz & Gortmaker, 2001).

Swinburn and Egger, (2002) are of the opinion that the epidemiological triad is a model that is applicable to obesity prevention. The model addresses obesity by employing host, vector, and environment strategies to promote the fight against obesity. Host strategies are educational programs which tend to be effective among people with higher incomes and educational levels.

Vector-based strategies address the intake of energy dense food and drinks. These foods are high in fat and low in water and fiber, while the drinks tend to be high in sugar and of large portion sizes. Each "12 ounces of a carbonated, sweetened drink soft drink contains the equivalent of 10 teaspoons of sugar and 150 kcal" (American Academy of Pediatrics, 2004, p. 152). Daily intake of soft drinks and fruit drinks that are excessive in fats and sugar account for 40% percent of children's daily energy intake. The United States has large portion sizes for food and drink. Adolescent males are the greatest consumers of sweetened soft drinks with 20% consuming four or more daily servings (American Academy of Pediatrics, 2004, p. 152). The range of calorie-dense foods include regular milk, sugar-sweetened beverages, high fat foods, and fast foods, and the foods that offset calorie intake include vegetables, fruits, and whole grains (Dietz & Gortmaker, 2001).

Environmental strategies address four factors: (a) Physical aspects which include what is available in terms of food and physical activity choices, training choices, nutrition and exercise expertise, technological innovations, information, and food labels; (b) economic factors specifically in reference to costs and incomes for consumers and money spent on promoting healthy life styles by government departments; (c) policies, laws and

regulations that impact eating behaviors and physical activity: and (d) socio-cultural factors such as attitudes, perceptions, values, and beliefs about obesity. The role that obesogenic environments, defined as the sum of influences that the surroundings, opportunities or conditions of life, have on promoting obesity, are broader and include costs, laws, policies, and social and cultural attitudes. For instance, is the neighborhood safe for children to walk to school or to play in the nearby parks? This consideration is particularly critical for children who live in neighborhoods of people from low economic classes.

Epidemiological Triad as it applies to obesity.

(The *agent* is chronic positive energy balance. The circles refer to the predominant strategies to address each corner of the triad)

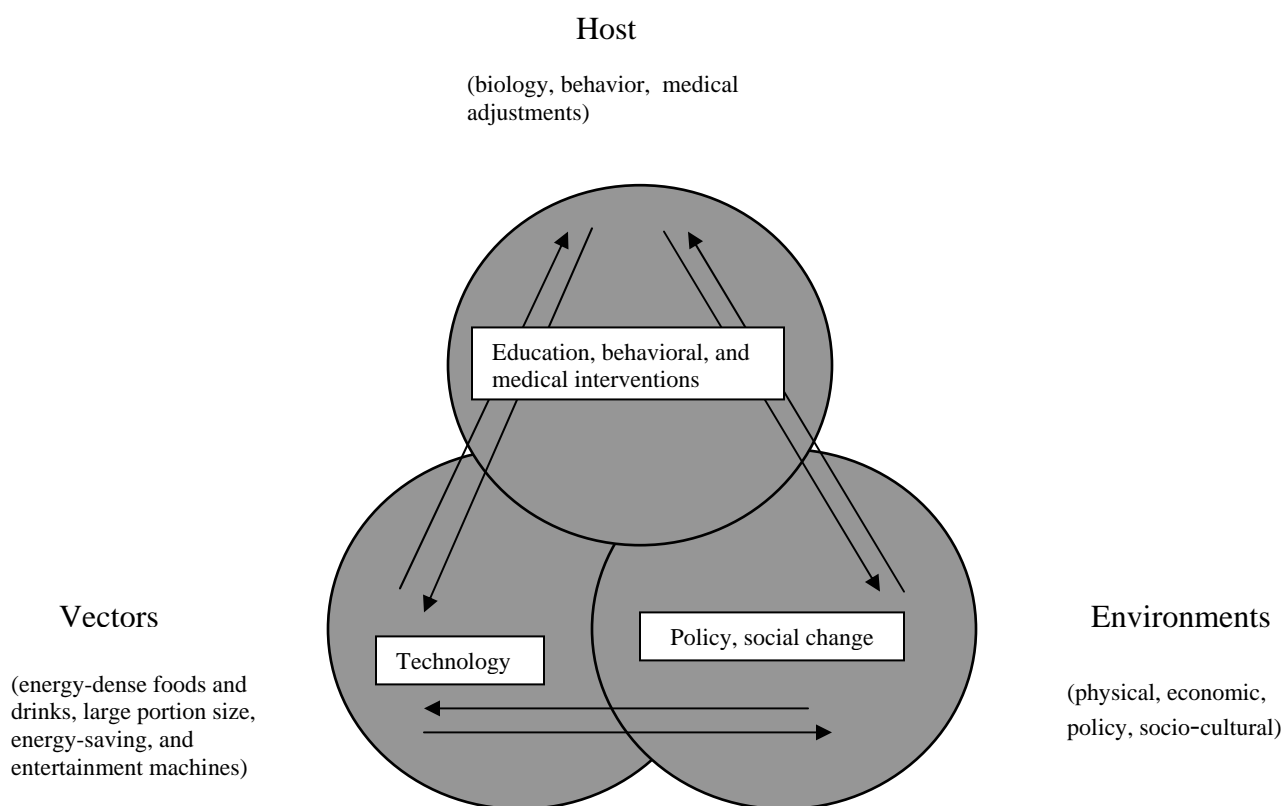


Figure 1. Source: Preventive strategies against weight and obesity by Swinburn B., & Egger, G. (2002). The International Association for the Study of Obesity, 3, p. 291.

The Healthy Eating Pyramid, the 5-a-Day for Better Health, and the National Cholesterol Education Program are interventions in the United States that are being used as models in other countries (Swinburn & Egger, 2002). However the Food and Drug Administration Report of the Working Group on Obesity stated the need for further research on (a) the information consumers use when making decisions about weight management, and (b)

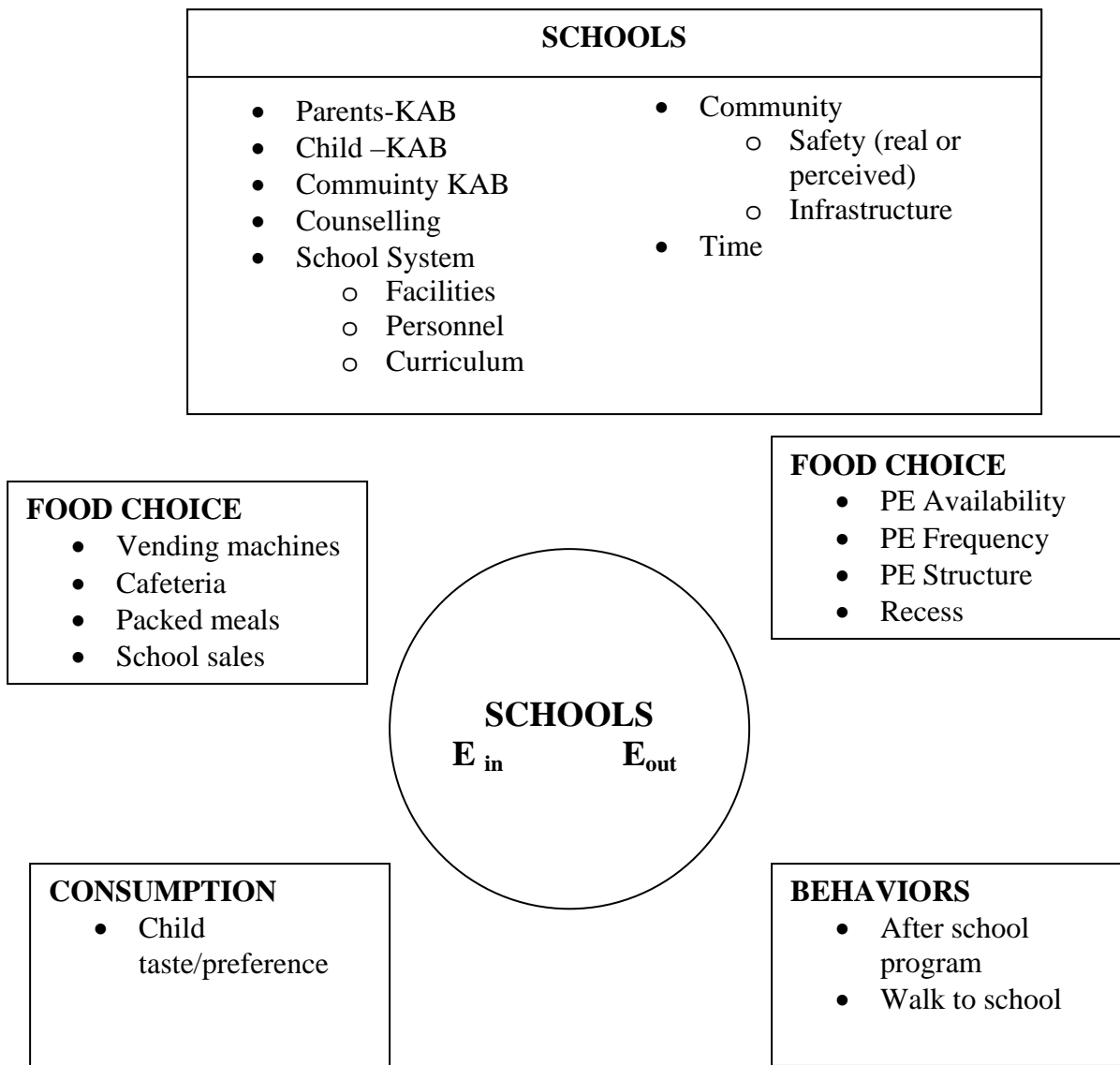
the relationship between overweight and obesity, food consumption patterns, and other areas.

Dietz and Gortmaker (2001) are of the view that factors in schools may contribute to obesity and its prevention. They gave their own version that takes the school curriculum as critical in changing the knowledge, attitudes, and beliefs (KAB) about obesity. Curriculum should influence parents, children and knowledge on obesity. School policies can influence how food is prepared.

Their argument is that there are a broad range of activities that impact student energy balance. For instance, is there a coordinated program that promotes health and physical activity in the school? How many times it is offered per week? Is it safe to walk to school or to play in the neighboring parks? These questions seem to concur with what Swinburn and Egger (2002) proposed in the epidemiological triad.

Figure 2. School –based approaches to obesity prevention

Knowledge, attitudes and beliefs (KAB) play an important role in obesity prevention.



Source: Diatz and Gortmaker, (2001). School based approaches to obesity. (p. 347)

Recommendations

1. As obese children are the targets of discrimination by all in the school system and at home, it requires educators to adopt a shift of attitudes and beliefs. Educators should expand their definition of inclusive classrooms by adding obese children on their list. It is not the fault of these children that they are obese and therefore educators should create learning environments that are conducive for all to succeed. This ranges from ensuring the right uniform and desk sizes for all children and providing a respectful and tolerant environment concerning obesity (Loewy, 1998).

2. Children should be exposed to greater physical activity. Goran, Reynolds, and Lindquist (1999) stated that there is an inverse relationship between obesity and physical activity in children and a positive relationship between obesity and physical inactivity. Therefore, physical activity in school and after school would help alleviate the problem of obesity among youth. Parents should control and limit the amount of time children spend watching television, especially removing television from children's bedrooms (Dietz & Gortmaker, 2001). Children must eat well as national studies indicate that there is less consumption of fruits and vegetables among children and youth (Boynnton-Jarrett, Thomas, Peterson, Wiercha, Sobol, & Gortmaker, 2003).
3. The Epidemiological Triad suggested by Swinburn and Egger (2002) factors in the environment as contributing to obesity. Strategies involving physical activity must involve the school, home, and the community, and design programs that are "culturally relevant and appropriate for the diversity of school aged children regarding factors like gender, age, region, and socio-economic status" (Goran, Reynolds & Lindquist, 2002, p. 28). They added that programs should focus on increasing the enjoyment of physical activity and argued that patterns of physical activity and fitness developed in childhood extend into adult life. Family interventions in reducing obesity are likely to work well if they are integrated with family and community programs (Goran, Reynolds, & Lindquist, 2002). Dietz et al. suggested the need for public health policy to address the obesity epidemic.
4. The physical education curricula should promote physical activity, and this should work well when concerted efforts involving the school, home, and community aim at creating conditions that encourage a physically active existence. Schools should revive the old tradition of daily physical education (Wallis, 2004). Teachers and parents should act as role models in promoting healthy lifestyles and physical activity. A study conducted by Neumark-Sztainer and Story (1997) revealed that adolescents preferred to deal with a leader who was presently overweight, or who had been overweight before when developing programs. This implies that it is important to recruit teachers and counselors who are overweight and obese in developing school based obesity intervention programs. The study also revealed that obese children preferred programs which are physically involving rather than listening to lectures and presentations or through group discussions. Obese children preferred programs where they worked in isolation with normal weight children in order to minimize stigmatization and teasing.
5. School based interventions may be effective if there is sufficient administrative support, reorganization of the physical education structure, and a shift from competition to an orientation of life-long fitness (Neumark-Sztainer & Story, 1997).
6. Agencies should put in place environments, laws, and regulations that promote physical activity and fitness among children, and make sure that resources are allocated to mitigate obesity in communities and schools. Access to programs and facilities such as parks, playgrounds, recreational programs, and health clubs (Frenn et. al 2003).

7. The high prevalence of teasing by family members, peers and teachers requires education on mistreatment of obese children. There is a need to protect the psychosocial and physical well-being of these children (Neumark-Sztainer, Falker, Story, Perry, Hannan, & Mulert, 2001).
8. Schools have to rid themselves of exclusive pouring rights where schools agree to promote a certain brand of drink in exchange for money. In addition, what school nutrition programs offer for breakfast and lunch should not resemble those found in restaurants or malls but instead students need to be taught about the value of eating healthy food such as fruit and vegetables (Vail, 2004). Yeoman (2003) argued that 85% of American schools fail United States Department of Agriculture (USDA) standards for saturated fat. She added that by third grade it is normally difficult to change the diet patterns of children.
9. The choice of food brought into the home needs to be carefully monitored. Parents may need to introduce foods that offset calorie intake such as fruits, vegetables, and whole grains.
10. The Health and Human Services website encourages daily physical activities that may include:
 - Washing and waxing a car for 45-60 minutes,
 - Washing windows or floors for 45-60 minutes,
 - Gardening for 30-45 minutes,
 - Wheeling self in wheelchair 30-40 minutes,
 - Pushing a stroller 1½ miles in 30 minutes,
 - Raking leaves for 30 minutes,
 - Walking 2 miles in 30 minutes (15min/mile),
 - Shoveling snow for 15 minutes, and
 - Stairwalking for 15 minutes.

Baranowski, Cullen, Nicklas, Thompson, and Baranowski (2002) are of the opinion that it is not clear whether the causes of obesity are influenced more by diet or physical activity.

Conclusion

In summary, obesity, a complex, multifaceted disease has grown to be an epidemic in the United States. No single solution can cure it. The apparent cause for this unprecedented growth is attributed to the sedentary lifestyles of the American public. There are several correlates of obesity that range from environmental, socioeconomic, genetic, and food consumption patterns of individuals. Obesity is more common in low socio-economic and low educational level communities. Allowing children to spend many hours watching television was associated with increased risk of obesity as children tend to snack high energy foods and at the same time not expending the energy. Children should be encouraged to engage in physical or outdoor activities that help burn calories or to be encouraged to do outside activities. Addressing obesity would require efforts that address environmental, socio-economic, and nutritional education, and training among parents and children.

Research indicates that children of obese parents will become obese in adult life. Therefore, it becomes critical to use homes, schools, and communities as the foci of

fighting obesity. Schools need to develop school programs that have expertise and are preferably manned with previously obese people. This may help minimize a sense of frustration, stigmatization, and ridicule, and instead spur hope and motivation among obese students. Schools should develop programs that are enjoyable and that encourage lifelong learning about obesity. An integration of home-school interventions may produce the national efficacy in the fight against obesity.

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