Obesity in the Lower Socio-Economic Status Segments of American Society

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Abstract

Recently, obesity has become more commonplace in low SES segments of the American population than in the affluent. Our purpose is to examine the reasoning for burgeoning obesity in lower SES populations and suggest possible methods of intervention. The etiology of obesity observed in this segment of the population is thought to be multifactorial. Three factors associated with risk for obesity and SES are physical activity, nutrition and certain psychosocial factors (i.e. self esteem, body image, depression, etc.). The onset of obesity among individuals is occurring earlier in life than previously observed. Based on these trends and observations, public schools may provide the ideal setting for interventions by reaching at-risk populations and thus maximizing the cost-benefit ratio of these programs targeting children. Public schools may play a role in certain psychosocial behaviors and have a direct impact on children's physical activity levels and nutritional habits. As an example, education is linked to income, which in turn can influence food options, meal preparation, or food security issues, as well as one's potential exercise habits. Therefore, incorporating school-based interventions increases the likelihood of success in lifelong management of body composition.

Introduction

Obesity has been shown to be associated with low socioeconomic status (SES) in industrialized, developed nations. Overwhelming evidence has been demonstrated in the United States (Albrigth et al. 2005; Bove and Olson 2006; Estabrooks et al. 2003; Giles-Corti and Donovan 2002; Gordon-Larsen et al. 2006; Hanson and Chen 2007b; Luepker et al. 1993; Mauro et al. 2008; Molnar et al. 2004; Okosun et al. 2006; Richardson et al. 2004; Robert and Reither 2004; Sallis et al. 1996; Wang 2001; Wang et al. 2006; Wang et al. 2007; Wilson et al. 2004), Australia (Dollman et al. 2007; Kavanaugh et al. 2005; Najman et al. 2006; O'Dea and Wilson 2006; Proper et al. 2007; Salmon et al. 2005; Spinks et al. 2006), China (Zhang et al. 2007) Finland (Huurre et al. 2002) France (Lioret et al. 2007; Wagner et al. 2003), Great Britain (Brodersen et al. 2007; Power and Parsons, 2000; Wardle and Griffith 2001), Ireland (Share and Strain 2008), Italy (La Torre et al. 2006), New Zealand (Metcalf et al. 2007), Northern Ireland (Wagner et al. 2003), Scotland (Inchley et al. 2005), Spain (Serra-Majem et al. 2006), and Sweden (Bergstrom et al. 1996; Lindstrom et al. 2001). Multiple mechanisms have been

proposed including the relationship of education levels, income, and other markers of SES to lower levels of recreational physical activity, poor nutrition, and certain psychosocial factors. Lower SES has been associated with less health consciousness (thinking about things to do to keep healthy) stronger beliefs in the influence of chance on health, and lower life expectancies. These attitudinal factors were in turn, associated with unhealthy behavioral choices (Wardle and Steptoe 2003). Some investigations, however indicated no evidence of a link between SES and obesity in developed countries (Freitas et al. 2007; Kelly et al. 2006; Moussa et al. 1994; Rutt and Coleman 2005; Wagner et al. 2004).

In developing countries, however, the level of obesity is greater in the higher socioeconomic status segments of society (Wang 2001). Evidence exists in Brazil, (Montiero et al. 2004), Cameroon (Fezeu et al. 2005), India (Reddy et al. 2002) Jordan (Montiero et al. 2004) and Madagascar (Montiero et al. 2004). It has even been suggested that the obesity rates in various segments of the population can be used to describe the developmental status of a nation in that as a country's GNP increases, obesity shifts to the lower SES segment of the population (Montiero et al. 2004; Sobal and Stunkard 1989). Proposed rationale for the increased risk for obesity in higher SES groups include: the greater capacity of the elite to obtain food, cultural values that favor round body shapes, and lower levels of physical activity (Fezeu et al. 2005; Montiero et al. 2004). Lack of food and high energy expenditure are less frequent once a society reaches a certain level of economic growth, particularly among its poorer sections (Montiero et al. 2004). This link between obesity and high SES is translated to the incidence of cardiovascular events (Reddy et al. 2002).

Mechanism of Obesity

Obesity results from a positive caloric balance in that intake of calories is greater than caloric expenditure. Nutrition plays a direct role in determining caloric balance by being the sole variable accounting for caloric intake. Caloric output, however is dependent on three specific variables. These include physical activity, resting metabolism, and the thermogenic effect of food. Of the three, physical activity is the most often altered in order to increase caloric expenditure. Psychosocial factors may influence (O'Dea, 2008) and be influenced by nutrition, physical activity (Zhang et al. 2007), or both.

Obesity increases the risk for a variety of chronic diseases including coronary artery disease, strokes (Pyle et al. 2006), glucose intolerance (Swallen et al. 2005) and some forms of cancer. Obesity is not a direct cause of most diseases, but unfavorably alters the risk factor profile. For example, obesity may lead to increases in blood pressure and blood cholesterol, which in turn, can lead to cardiovascular disease and strokes. In the United States, obesity is the seventh leading cause of death with 280,000 preventable deaths in 2005 (Rutt and Coleman 2005). The estimated health care costs are estimated at $117 billion, which exceeds the costs spent on cigarette smoking and alcoholism combined (Rutt and Coleman 2005).

Obesity appears to be more prevalent in the low SES segments of American society regardless of the type of community. Investigations have shown similar results in urban (Rutt and Coleman 2005; Sallis et al. 1996; Wang et al. 2006; Wang et al. 2007), suburban (Rutt and Coleman 2005), and rural cohorts (Bove et al. 2006). Regardless of the geographical location or type of community, it is difficult to separate racial and ethnic factors from SES in the United States (Okosun et al. 2006). In international studies, where race and SES are not as tightly linked, the strong inverse correlation between SES and obesity remains (Power and Parsons 2000). Therefore, this paper will not examine the relationship between race or ethnicity and

obesity except as it pertains to SES. The purpose of this paper is to examine how physical activity, nutrition and psychosocial factors relate to SES and obesity in American society and to suggest possible intervention strategies.

Physical Activity

Increasing physical activity is an effective way to maintain body composition and potentially prevent obesity. Physical activity has been shown to induce health related benefits in males and females of all age groups (American College of Sports Medicine 2005; Freitas et al. 2006; Giles-Corti and Donovan 2002; Gordon-Larsen et al. 2005; Metcalf et al. 2007; Najman et al. 2006; Reddy et al. 2002; Richardson et al. 2004; Rutt and Coleman 2005). In fact, physical activity appears to be the most beneficial prevention practice in individuals at high risk for coronary artery disease (Richardson et al. 2004). Some of the benefits to the coronary artery disease risk profile include reduced blood pressure, enhanced blood lipid profile, reduction of percent body fat, and lowered incidence of type II diabetes (American College of Sports Medicine 2005). Physical activity has also been shown to reduce the prevalence of abdominal fat accumulation (Okusun et al. 2006), which serves as an independent contributor to cardiovascular risk, apart from percent body fat. Finally, low levels of physical activity have been associated with decreased calcium stores and bone mineral density in boys and girls of low SES (Gokce-Kutsal et al. 2007). Increased sedentary behaviors and lower levels of physical activity are evident in lower SES segments of society in developed countries around the world (Proper et al. 2007).

Recreational physical activity has been shown to be lower in low SES neighborhoods for all cohorts. Less access to public facilities was reported in low SES neighborhoods (Estabrooks

et al. 2003; Gordon-Larsen et al. 2005; Wilson et al. 2004). Perception of lower neighborhood safety and social disorder was also significantly associated with less recreational physical activity (Giles-Corti and Donovan 2002; Kavanaugh et al. 2005; Molnar et al. 2004; Salmon et al. 2005). Low SES areas reported higher perceptions of neighborhood crime, unattended dogs, unpleasantness of neighbors, and untrustworthy neighbors (Wilson et al. 2004). As a result of the reduced physical activity, living in communities with higher SES disadvantage was associated with higher BMI (Robert and Reither 2004). Support for improving local communities is recommended. Spinks et al. (2006) disagree with the above findings and have found that SES is not associated with insufficient physical activity.

SES and Physical Activity in Children

Currently, approximately 1/3 of American children are overweight or obese and low SES groups are disproportionately affected (Wang et al. 2007). SES has been shown to be inversely related to sedentary behavior and incidences of overweight in children over six years of age (Hanson and Chen 2007; Inchley et al. 2005; Lioret et al. 2007) and adolescents (Lohman et al. 2006). In America, sedentary behavior is a mediator of BMI and BMI, in turn, is higher in children of low SES status (Hanson and Chen 2007; O'Dea and Wilson 2006). SES also indicates a clear inverse relationship with percent body fat in children and adolescents (Booth et al. 1999). A childhood spent in poor social and economic conditions has been shown to lead to a less healthy adulthood. In both adolescent boys and girls, low SES and parental education levels were related to an unfavorable risk factor profile (Bergstrom et al. 1996) indicating a need for early intervention in low SES communities.

As mentioned previously, recreational physical activity has been shown to be lower in low SES children and adolescents (Hanson and Chen 2007). Serra-Majem et al. (2006) found low SES and geographical region were the two main predictors of overweight and obesity in boys. Vigorous physical activity in children, particularly girls, is lower among low SES groups (Inchley et al. 2005). As such, the predictors of obesity may differ based on gender. Regardless, it has been shown that boys and girls of higher SES are more likely to participate in extra-curricular physical activities. (La Torre et al. 2006). Cost of extra-curricular activities as well as transportation to and from practice may be reasons lower SES youth are under-represented. Parental involvement in sport is an important correlate in preschool (Hinkley et al. 2008) and adolescent physical activity participation outside school independent of SES (Wagner et al. 2004). Parental work schedules as well as higher incidences of single parent homes are potential reasons for low participation of lower SES youth in recreational physical activity. Apart from walking to school, there were greater relative declines in cycling to school and physical education, and increases in overweight and obesity among children attending schools in low SES areas compared with those attending schools in higher SES areas (Salmon et al. 2005).

SES and Physical Activity in Women

Socioeconomic status shows a stronger bond with obesity and lack of recreational physical activity in women than in any other subgroup. Low income, ethnic minority women have the highest inactivity rates in the USA (Albright et al. 2005; Ball et al. 2006). As such, individual SES was negatively associated with percent body fat and BMI in women (Robert and Reither 2004; Sobal and Stunkard 1989). Obesity is a severely stigmatized condition among women in developed society, and one of relative affective neutrality among men. The negative

attitudes toward obesity among girls are present from a very young age and are largely absent among boys (Sobal and Stunkard 1989). Attitudes regarding weight in females change in adolescence with concern of obesity reaching peak intensity. The increase in body fat of 15% to 100% greater than boys during puberty occurs at a time of intensifying socialization and an increase in adult female values, including a concern with being too fat (Sobal and Stunkard 1989). Adolescent girls are keenly aware of the values society places on physical attractiveness and that perceived attractiveness is associated with being thin. It has been shown that both girls and women of higher SES practice behaviors (i.e. physical activity and dieting) designed to maintain a thin appearance (Power and Parsons 2000; Sobal and Stunkard 1989). As such, leaner females are found in higher SES groups (Dollman et al. 2007). As females of low SES have been shown to be less physically active than their higher SES counterparts, public health strategies aimed at reducing early negative experiences/attitudes to physical activity, reducing TV viewing, promoting a wider variety of physical activity and addressing neighborhood safety and other barriers to physical activity in SES depressed should be used (Ball et al. 2006). The differential weight gain in females and the accompanying causal behaviors associated with SES status may begin early in life and be influenced by parental SES (Ball and Crawford 2005). Female SES of origin as well as current SES status may influence adult behavior choices (Huurre et al. 2003). In women whose current SES was lower than their SES of origin, obesity was greater than those who remained in the social class of their parents which was, in turn, higher than for those who were upwardly mobile (Sobal and Stunkard 1989).

SES and Physical Activity in Men

Adult men have the weakest relationship between SES and recreational physical activity and obesity (Sobal and Stunkard 1989). It has been shown that higher SES men and women had higher levels of perceived overweight, monitored their weight more closely and were more likely to be trying to lose weight. Higher SES groups also reported more restrictive dietary practices and more vigorous physical activity. (Wardle and Griffith 2001). However, it appears that adolescent (Inchley et al. 2005; Sallis et al. 1996), and preschool (Hinkley et al. 2008) boys do significantly more vigorous physical activity than girls in all SES categories although the gap appears to be narrowing in the United States.

Nutrition

Malnourished and Obese

The SES of an individual can predict overall health status and mortality (Lantz et al. 1998; Pappas et al. 1986). The impact of SES on nutritional intake can directly impact a person's body weight. While comparisons between lower SES and higher SES groups for total caloric intake have indicated small observable differences (Hulshof et al. 1991; Steele et al. 1991), significant differences of diet quality, as assessed by intake of specific macro and micro nutrients have been reported (Braddon et al. 1988; Fehily et al. 1984; Irala-Estevez et al. 2000). Dietary intake among individuals from low SES communities are lower in fresh fruit and vegetables, whole-grain breads, and fiber; and higher in total fat, saturated fat, eggs, meat, and refined sugar than those from high SES (Bolton et al. 1991; Hulshof et al. 1991; Smith et al. 1992; Shimakawa et al. 1994). These dietary patterns can result in lower intakes of monounsaturated fats, thiamine, riboflavin, niacin, vitamin C, calcium, magnesium, and iron, all of which are essential for many physiological functions (Shahar et al. 2005).

Although total caloric intakes among these groups may be similar, dietary composition is not. Consuming greater amounts of dietary fat, which can be more efficiently converted to body triacylglycerols, may contribute to the observed differences in body weight among these individuals. Eating excess fat as part of one's daily dietary intake contributes to an increase in overall adipose tissue mass (Thomas et al. 1992).

Available Nutrition

Individual availability to various food options can play a role on overall nutrient intake. If there are fewer sources of fresh fruit and vegetables in a community, it decreases the likelihood that a person will consume these foods daily. Zenk et al. (2005) reported that individuals shopping at supermarkets consumed fruits and vegetables more frequently than those who shopped at independent grocers. The availability of community supermarkets is associated with lower rates of obesity and more healthful diets (Moorland et al. 2006; Laraia et al. 2004). Many lower SES communities have fewer neighborhood supermarkets, which make certain food options more or less available (Alwitt and Donley 1997; Morland et al. 2006). These available food choices directly contribute to overall diet quality. A national sample of food store availability indicated these trends with non-chain supermarkets and grocery stores being more prevalent in low-income and minority neighborhoods (Powell et al. 2007). Another benefit of larger supermarkets is their ability to offer food at lower prices than smaller grocery or convenience stores. The lack of supermarkets in lower SES communities, contributes to higher food prices, resulting in higher total shopping costs and reductions in healthful options (Chung and Myers 1999; Kaufman et al. 1997; Mantovani et al. 1997). Smaller grocery and convenience stores, which are more prevalent in lower SES communities, tend to carry less fresh produce,

dairy, and other perishables. Reduction of these food items could explain the observed nutrient intakes of certain populations where availability is an issue. Many convenience stores offer calorically dense, low nutrient quality, highly processed snack-food options, which may contribute to higher total and saturated fat levels among populations frequenting these businesses.

In many communities, a gallon of milk is more expensive than a comparable amount of soft drink. When trying to stretch the family grocery dollar, pricing and quantity are major factors when selecting household food items. Another consideration when shopping for food is that many individuals of lower SES rely on public transportation systems, making the purchase of large quantities of groceries difficult. Lack of private transportation among lower SES populations also plays a role on nutrient intake by limiting their ability to travel greater distances to purchase food items and relying on local stores and options (Clifton 2004).

SES, Nutrition, and Children

Currently observed childhood obesity rates among lower SES populations in the United States are concerning. Low-income children are at increased risk of obesity regardless of ethnicity, although ethnic differences in childhood obesity appear at lower-income levels (Kumanyika and Grier 2006). Research investigating the relationship between SES and adiposity in children has observed an inverse relationship between these two variables (Shrewsbury and Wardle 2008). Children of lower SES communities mirror the dietary intake of their parents and caregivers, exhibiting lower intakes of fruits, vegetables, monounsaturated fats, protein, and most vitamins and minerals, while consuming greater amounts of soft drinks, fried foods, oils, and sugars than higher children of higher SES (Shahar et al. 2005). The eating

behaviors and healthful eating concerns of parents can have a significant impact on those of children and adolescents (Boutelle et al. 2007). Availability of foods within the community, as well as the household, impacts a child's nutritional status and weight. Children eat the foods that are available at home, school, and within the community. If these foods consist of high caloric and low nutrient density food options, weight gain and other weight-related issues among individuals within these households may be more prevalent.

Gordon-Larson et al. (2003) evaluated the impact of keeping adolescents in their same environments but changing family income and parental education on adolescent overweight. Changing these socioeconomic components had limited effect in overweight prevalence among different ethnic groups and could not explain the disparity observed between SES levels. They concluded that benefits seen by increasing SES among white adults could not be automatically transferred to other gender-age-ethnic groups. Factors such as environmental, contextual, biological, and socio-cultural should be included in addressing overweight and obesity issues.

Psychosocial Factors

There are increased societal concerns that obesity carries with it a higher risk for psychosocial difficulties for individuals of all ages (Pyle et al. 2006; Shoup et al. 2008). However, studies correlating these psychosocial factors such as depression (Simmons-Alling and Talley 2008), body dissatisfaction (body image), self-esteem (Latner et al. 2005; Wardle and Cooke 2005) and weight-based teasing, (Goldfield et al. 2007) are at best inconclusive as they relate to obesity (Alleyne and LaPoint 2004; Goldfield et al. 2007; Janicke et al. 2007; Mauro et al. 2008; O'Dea 2008; Swallen et al. 2005; Wardle and Cooke 2005). This is especially true in the younger populations (Alleyne and LaPoint 2004; Carpenter et al. 2000; Goldfield et al. 2007;

O'Dea 2008; Swallen et al. 2005). It appears that direct causal relationships between SES, obesity, and psychosocial factors are as complex as the disease itself. Much of the complexity surrounding the relationship between obesity and psychosocial factors is related to inconsistent study designs, variance in the demographics of subjects studied, and sociocultural surroundings of the subjects (Alleyne and LaPoint 2004; Janicke et al. 2007; Latner et al. 2005; O'Dea 2008; Wardle and Cooke 2005). The psychosocial complexity is further clouded by pre-existing psychosocial pathology which may or may not impact the degree of psychosocial symptoms reported by obese/overweight subjects to clinicians and/or researchers (Mauro et al. 2008; Simmons-Alling and Talley 2008; Swallen et al. 2005; Wardle and Cooke 2005). In general, obese individuals are not consumed by psychosocial factors relating to their condition anymore than their normal weight or underweight counterparts (O'Dea 2008; Wardle and Cooke 2005). Obesity is a complex multifactorial condition whereby psychosocial factors should be addressed from a sociocultural perspective rather than a simple cause/effect relationship. In other words, a holistic approach that considers gender, ethnicity, age, and SES should be undertaken for a successful intervention.

Gender and Psychosocial Factors

Gender appears to play a unique part in the relationship between obesity, SES, and psychosocial factors. It is an important sociocultural factor that influences psychosocial pathologies amongst obese/overweight individuals. In regards to gender, psychosocial factors related to obesity differ among males and females (Latner et al. 2005; Simmons-Alling and Talley 2008). It appears that with females, there are stronger associations between body dissatisfaction and higher BMI (Goldfield et al. 2007) especially as it relates to higher SES.

Women of higher SES appear to internalize societal norms valuing thinness (Power and Parsons 2000). Females of lower SES, however, tend to be more satisfied with their bodies compared to their counterparts of higher SES (Alleyne and LaPoint 2004). Race/ethnicity factor into gender as African American women of low SES tend to have a greater cultural tolerance for obesity. Therefore, less body image issues typically present themselves within the lower SES of this population (Alleyne and LaPoint 2004; Carpenter et al., 2000; Latner et al. 2005). Other ethnicities, of non Anglo/Caucasian background seem to have a tolerance for obesity and overweight as well (O'Dea 2008). O'Dea (2008) found that the majority of Aboriginal, southern European, Pacific Islanders, and Middle Eastern girls questioned, believed their weight to be pleasing. Sociocultural factors such as gender appear to influence psychosocial factors in children, adolescents, and adults although causality vacillates (Simmons-Alling and Talley 2008).

Gender appears to relate to depressive symptoms as well. Carpenter et al. (2000) found a relationship between body weight and major depressive symptoms. Their results indicated that women had a positive body weight relationship to depressive symptoms, whereby men had a negative relationship. In other words, overweight women were more likely to report depressive symptoms as opposed to their male counterparts. The authors also concluded that weight and depression concerns may not emerge until the individuals' adult years. Janicke et al. (2007) however, found no strong associations between obesity and depressive symptoms on quality of life. Swallen et al. (2005) expressed similar findings in their study of adolescents in grades 7-12 BMI and Health Related Quality of Life (HRQOL). These studies again demonstrate the multifactorial complexity surrounding obesity, SES, and psychosocial factors. Although not the intention of this article, racial and ethnic differences add a complex causal relationship between

obesity, SES, and psychosocial factors (Latner et al. 2005; Swallen et al. 2005) and should not be overlooked when undertaking methods of treatment and prevention.

Psychosocial Factors and Physical Activity

One certainty is that physical activity does help in the management of negative psychosocial factors experienced by obese/overweight individuals (Pyle et al. 2006; Shoup et al. 2008; Zhang et al. 2007). Physical activity positively influences numerous metabolic and endocrine changes in the body (Dencker and Andersen 2008). These changes, in turn reduce the resultant psychosocial outcomes experienced by the obese/overweight individual. This suggestion proposes that physical activity is an intervention to psychosocial factors related to obesity. Physical activity has been shown to reduce stress and positively influence mental health (Pyle et al. 2006). Physical activity intervention may assist the obese/overweight individual in dealing with psychosocial concerns through positive physical behavioral changes. These changes, initiated at early stages in an individual's life, can promote lifelong behaviors. These positive behaviors can ultimately reduce the risks for chronic diseases.

Conclusion

Rationale for Public School Based Interventions

Our suggestion for obesity intervention centers on the American public school system. School based intervention has been suggested previously (Zhang et al. 2007). Emphasis on home and school based programs to reduce abdominal obesity has been proposed (Okusun et al. 2006). Wang et al. (2006) have indicated school-based obesity prevention programs are urgently needed in urban, low-SES communities. Public schools have the potential to reach the largest

number of people in the United States. Public schools reach all children in America except home-schooled children and those attending private schools, which are less likely to be low SES children. Because early intervention is important in the prevention of obesity, public schools could focus on curtailing obesity at a young age. Public schools may play a role in certain psychosocial behaviors and have a direct impact on children's physical activity levels and nutritional habits.

Education levels are positively linked to health knowledge and leisure time physical activity, but inversely related to cigarette smoking, blood pressure, BMI, and serum cholesterol level in women, but these results are not conclusive in men (Luepker et al. 1993). The unfavorable changes in risk factors concurrently increase disease risk (Metcalf et al. 2007). Higher education levels have been shown to increase physical activity participation and other healthy behaviors (Ball and Crawford 2007; Wagner et al. 2003). Social participation was the strongest predictor of low physical activity among the psychosocial variables and a strong predictor for socioeconomic differences in low-leisure time physical activity. It is possible that some of the socioeconomic differences in leisure-time physical activity are due to differing social participation between the various socioeconomic groups (Lindstrom et al. 2001). Physical education should focus on maximizing caloric expenditure while emphasizing the socially enjoyable experiences. This is especially critical in girls, for whom obesity and SES indicate a stronger link. Physical activity has also been shown to increase academic achievement, increase energy levels, and reduce stress in school aged children (Zhang et al. 2007).

For many individuals, excess weight gained during childhood and adolescence appears to persist into adulthood (Whitaker et al. 1997). With the multitude of risk factors associated with obesity, prevention appears to be the most viable solution. While the problem of obesity among

lower SES populations appears to be multifactorial, efforts to reduce this trend are being made (Shaya et al. 2008). The public school system is able to accesses these at-risk children. Nutrition interventions involving schools can focus on various components within the system and curriculum. These programs can include enhancing the nutrition knowledge of students, promoting healthy eating, and increasing nutrition awareness among the students. School food options should be evaluated not solely on what children will purchase, but also on what are the most nutrient dense choices available. Educational efforts to improve nutrition knowledge can be incorporated into courses such as math, science, social studies, history, and family and consumer science classes. A literature review conducted by Shaya et al. (2008), identified 51 studies involving school-based obesity intervention programs, of which 40 yielded significant results. Of the 40 studies evaluated, thirteen involved physical activity only, twelve incorporated educational and behavioral components, and 15 employed a combination of these two. The duration of these programs varied from less than 12-weeks to greater than 12-months. The combination, as well as the length, of these intervention programs may be dependent upon the school systems financial status and fund availability. Physical education programs within schools, as well as nutrition options, may be affected and limited in schools with reduced funding and economic bases, thus impacting the effectiveness of efforts in lower SES communities. Although no consistent positive results have been observed in intervention programs targeting school-aged children and obesity, continual efforts and new strategies focusing on school systems, the family component, and the community environments should be made.

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