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Obesity and Quality of Life in Communities of Diverse Ethnicity and Low Socioeconomics

Joan Griffith
University of Toledo Health Science Campus
USA

1. Introduction

The prevalence of childhood overweight and obesity is increasing throughout the world, in both developed and developing countries (Wang & Lobstein, 2006). Based on available data, the prevalence of childhood overweight and obesity has increased in almost all countries with exceptions in Russia and Poland where the prevalence rates for overweight among school-age children decreased during the 1990s (Wang & Lobstein, 2006). Globally, obesity and overweight have risen more in economically developed countries and in urbanized populations (Wang & Lobstein, 2006). North America, Europe, and parts of the Western Pacific have the highest prevalence of overweight children while parts of South East Asia and much of sub-Saharan Africa have the lowest prevalence (Wang & Lobstein, 2006).

Socioeconomic status and ethnicity can affect overweight and obesity prevalence for adults and children, and may be modified by the economics of the country. Among middle-income countries, members of better-off households are more likely to be at risk than members of poorer households, and urban residents may be more at risk than rural ones (Wang & Lobstein, 2006). Comparing communities in South Africa, the overweight prevalence among young white (23%) and Indian populations (25%) were higher than that among young Africans (17%). In industrialized, economically developed countries, children in the lowest socioeconomic status groups and children in specific racial or ethnic groups may be at the greatest risk for overweight/obesity (Wang & Lobstein, 2006).

The enormous direct and indirect costs of adult obesity in the United States have been well-documented (Wang & Lobstein, 2006; Finkelstein, Fiebelkorn & Wang, 2003). Adult obesity often begins during childhood and adolescence. The epidemic of childhood obesity, if not reversed, warns of increasing medical and financial obesity-related costs (Finkelstein, Fiebelkorn & Wang, 2003). The next generation of adults will have to confront these problems at an even earlier age (Wang & Lobstein, 2006), especially members of our most vulnerable populations. Obesity-related co-morbidities include dyslipidemia, obstructive sleep apnea, disordered sleep, joint pain, hypertension, insulin resistance, diabetes, erosive tooth wear, and depression (Barlow and the Expert Committee, 2007) and children living in ethnic minority or low-socioeconomic communities are at greatest risk. These conditions have the potential to adversely affect the quality of life for obese children.

Previous research has presented various conclusions regarding the prevalence of overweight/obesity among individuals living in ethnic minority and low socioeconomic communities. These conclusions have included such findings as: (1) obesity is viewed more positively by individuals living in ethnic minority and low socioeconomic communities than by individuals in more affluent communities; (2) overweight/obesity resulted in less adverse psychosocial influence; and (3) overweight/obesity was perceived to cause less undesirable health impact. These conclusions may be problematic as they may reflect culture values that may be difficult to change and could represent insurmountable obstacles to the development of effective interventions. They may also serve as defense mechanisms for warding off adverse psychosocial complications (Bennett & Wolin, 2006).

Over the past decade public awareness of the adverse effects of obesity has increased and most individuals have become more knowledgeable of the benefits of healthier lifestyles. This increased awareness and knowledge should result in positive lifestyle changes, especially among at-risk populations. Therefore, the questions we must now ask are: (1) "Will more recent studies provide any new insight on the disparate prevalence of childhood obesity?' and (2) Will the former conclusions about the at-risk communities require any modifications?"

The specific aim of this chapter is to review some of the recent scientific evidence on the prevalence and impact of childhood obesity among communities of diverse ethnicity and low-socioeconomics and to review the changes associated with crucial factors that may affect the quality of life of overweight/obese children. By reviewing the prevailing data, we hope to answer the above questions. The chapter will look at (1) the prevailing obesity prevalence disparity; (2) the frequency of the misperception of weight status among adults in communities of diverse ethnicity/low-socioeconomics and its impact on their children; (3) the effect of the mother's perceptions of their children's weight ; (4) the role of behavioral and social factors such as family involvement, frequency of family dinners, television watching, physical inactivity and healthful eating; (5) the built environment concept, especially the role of parental perception of neighborhood safety and their willingness to allow their children to participate in outside physical activity; (6) the significance of "food deserts" and "food insecurity"; (7) the relationship between economics and attitudes toward health; (8) the critical medical and psychosocial consequences of childhood obesity that influence the quality of life for obese children; and (9) the self-image of obese children, especially data from recent studies among obese African American children.

The chapter is based on a PubMed literature search conducted by focusing on the major topic of "childhood obesity". Several different subtitles were incorporated including: "obesity disparity", "misperception of weight among adults", "mothers' weight perception of children", "behavioral and social factors", family involvement", "built community", "food deserts", "economics and health", school environment", "faith organizations", and "psychosocial consequences". The search was limited to English-language and foreign-languages articles with English abstracts published between 2006-2011. In addition, a number of studies identified in the course of reading were included.

2. Quality of life

The quality of life (QOL) model consists of subjective evaluations of positive and negative aspects of life (http://www.cdc.gov/hrqol/concept.htm; http://en.wikipedia.org/wiki/Quality_of_life). Quality of life refers to the personal satisfaction or dissatisfaction with the

cultural or intellectual conditions of our living conditions and is distinct from the basic tangible belongings we need for comfort (http://www.cdc.gov/hrqol/concept.htm; http://en.wikipedia.org/wiki/Quality_of_life). Key domains of the overall quality of life include health, job, housing, school and neighborhood. In addition, culture, values, and spirituality are vital aspects of overall quality of life (http://www.cdc.gov/hrqol/concept.htm; http://en.wikipedia.org/wiki/Quality_of_life).

Health-related quality of life (HRQOL) provides a measure of the burden of preventable disease, injuries, and disabilities (http://www.cdc.gov/hrqol/concept.htm; http://en.wikipedia.org/wiki/Quality_of_life). The concept of health-related quality of life and its determinants cover the features of overall quality of life that affect physical and or mental health (http://www.cdc.gov/hrqol/concept.htm; http://en.wikipedia.org/wiki/Quality_of_life) and can offer a better understanding of the relationships between health-related quality of life and risk factors. On the individual level, determinants of health-related quality of life include physical and mental health perceptions and other correlates such as health risks and conditions, functional status, social support and, socioeconomic status. Health surveillance frequently includes health-related quality of life questions about perceived physical and mental health and function. These questions are important components of health surveillance and are commonly regarded as compelling markers of service needs and intervention outcomes (http://www.cdc.gov/hrqol/concept.htm; http://en.wikipedia.org/wiki/Quality_of_life).

Intuitively, there should be general consensus that obesity affects the quality of life for adults and children. One health-related quality of life measurement tool is the Impact of Weight on Quality of Life-Kids. It is a 27-item questionnaire assessing weight-specific health-related quality of life. It provides scores on physical comfort, body esteem, social life, family relations, and a total score. Higher scores indicate better health-related quality of life. A study to examine the health-related quality of life in adolescents with extreme obesity, i.e., body mass index greater than 40 kilogram per meter-squared, concluded that generic and weight-specific measurement tools, as assessed by the Pediatric Quality of Life Inventory and Impact of Weight on Quality of Life-Kids, respectively, indicated global health-related quality of life impairment and that the impairment differed significantly by race (Modi et al., 2008). Physical, emotional and social scores on the Pediatric Quality of Life Inventory and the physical comfort and body esteem scores of the Impact of Weight on Quality of Life-Kids were significantly higher for black compared to white adolescents with extreme obesity. The authors acknowledged that although racial differences in adolescent body image/esteem had been previously reported it was unknown why black adolescent with extreme obesity reported less impact of weight on their physical functioning. Interestingly, health-related quality of life did not differ for extremely obese adolescents based on type of treatment sought as extremely obese adolescents seeking bariatric surgery reported similar health-related quality of life compared to adolescents requesting behavioral treatment. The data suggested that health-related quality of life was not homogenous in adolescents with extreme obesity (Modi et al., 2008).

The association between obesity and obesity-related co-morbidities is well document (Barlow, 2007; Daniels, 2006) and we are witnessing the impact of these co-morbidities on health-related quality of life throughout the world. The overall prevalence of overweight and obesity in urban children in New Delhi increased from 16% in 2002 to 24% in 2006-2007 with 29% of children in private schools and 11.3% of children in government funded schools

(Bhardwaj et al., 2008) affected. India has the highest number of patients with type 2 diabetes mellitus globally and the rapid rise of obesity in children is the prime reason for increasing insulin resistance, the metabolic syndrome, dyslipidemia, polycystic ovarian syndrome and elevated C-reactive protein. (Bhardwaj et al., 2008). As compared to other ethnic groups, children with ancestral origin in South Asia manifest adiposity, insulin resistance and metabolic perturbations earlier in life; and the metabolic syndrome and obesity track into adulthood (Bhardwaj et al., 2008).

The Treatment Options for Type 2 Diabetes in Adolescents and Youth cohort represents the largest and best-characterized national sample of American youth with recent-onset type 2 diabetes (Copeland et al., 2011). Analysis of the cohort at baseline revealed that 64.9% were female; mean age was 14.0 years; mean diabetes duration was 7.8 months; mean body mass index Z-score was 2.15; 89.4% had a family history of diabetes; 41.1% were Hispanic; 31.5% were non-Hispanic black; 38.8% were living with both biological parents; 41.5% had a household annual income of less than $25,000; 26.3% had a highest education level of parent/guardian less than a high school degree; 26.3% had a blood pressure at the 90th percentile or great; 13.6% had a blood pressure at the 95th percentile or greater; 13.0% had microabluminuria; 79.8% had a low high-density lipoprotein level; and 10.2% had high triglycerides. Alarmingly, the clinical and biochemical abnormalities and comorbidities were prevalent within 2 years of diagnosis (Copeland et al., 2011).

Adenotonsillectomy is the first-line treatment for sleep-disordered breathing (Amin et al., 2008). Three clinical markers have been found to be independent risk factors for recurrence of sleep-disordered breathing after adenotonsillectomy: the velocity of increased body mass index, obesity, and being African American (Amin et al., 2008). In the children with recurrence of disordered-sleep, systolic blood pressure at 1 year post surgery was higher than baseline and higher than in children who did not experience recurrence (Amin et al., 2008). Another study of health-related quality of life for children with sleep-disordered breathing who underwent adenotonsillectomy demonstrated similar findings in that it documented these children were more likely to be obese than children seen in a general pediatric clinic and that African American children who were obese were more likely to have sleep-disordered breathing (Rudnick et al., 2007).

Among first and second generation United States immigrant children and adolescents from Central and South American and the Caribbean basin the prevalence of the metabolic syndrome was 29% overall (Messiah et al., 2009). Boys were significantly more likely than girls to have abnormal systolic blood pressure and Hispanics were significantly more likely than blacks to have abnormal triglycerides and HDL cholesterol (Messiah et al., 2009). Additionally, obese 13-19 year-old children have increased odds of erosive tooth wear compared to similar aged healthy weight children (McGuire et al., 2009).

Weight-related teasing is an increasing problem, especially for children overweight or obese and negative outcomes have been associated with weight-based teasing (McCormack & Laska, 2011). Specifically, body satisfaction was lower among children being teased by family or peers than those who were not teased. Stigmatization of overweight children is extremely prevalent and stereotypes about low intelligence may contribute to weight stigma (Latner et al., 2007). In 2007 a study was completed to determine the weight-based stigmatization of Mexican overweight and non-overweight children by their mothers and peers (Bacardi-Gascon et al., 2007). Four hundred and thirty-two fifth and sixth graders and 342 mothers participated. Children were given a questionnaire displaying six drawings; participants' responses were

numbered in order of preference from 1 to 6 (most to least well liked). Participants were divided into categories based on socioeconomic status, ethnicity, and current body mass index. The majority of the children chose the child in a wheelchair as the preferred friend. Boys and girls, Indian and non-Indian, with and without risk of overweight chose the obese peer as the least-preferred friend. Non-overweight girls and their mothers liked the obese child less than non-overweight boys and their mothers. Based on their data, the authors concluded that the negative attitude of mothers toward the obese child was projected to their children and influenced their children's decisions (Bacardi-Gascon et al., 2007).

Chinese children's perceptions of self-competence and their coping strategies varied based on gender and weight (Chen et al., 2007). Higher body mass index was related to lower athletic competency in boys and lower social competence in girls. Better behavioral conduct competence contributed to better global self-worth in boys while in girls, better behavioral conduct competence and physical appearance competence contributed to better global self-worth (Chen et al., 2007). Eating and drinking were reported as one of the most frequently used coping strategies by children, but the children felt that this strategy was not effective (Chen et al., 2007).

Ecological models of health suggest that lower individual and environmental socioeconomic status may be related to health attitudes and behaviors that contribute to obesity (McAlexander et al., 2009). After examining the role of social relationships and negative emotional traits in the development of central adiposity and arterial stiffness in healthy adolescents, it appears that psychosocial variables may be important in the development of central adiposity and arterial stiffness in adolescence and that adolescents with less supportive relationships and higher anger had increased waist-to-hip ratios, i.e., increased risk of central adiposity, overtime (Medie & Matthews, 2009).

The question has been asked as to whether overweight and obesity may eventually be associated with premature death. Proportional hazards analysis and data from the National Health Interview Survey Linked Mortality Files were used to estimate life expectancies for each body mass index strata and quantified years-of-life-lost by comparing differences between age, race, smoking status and gender and the normal body mass index reference group (Finkelstein et al., 2010). The evidence suggested that overweight and mild obesity were not associated with a reduction in life expectancy. However, higher body mass index categories were associated with lower expected survival. In aggregate, excess body mass index is responsible for approximately 95 million years-of-life lost. White females accounted for more than two-thirds of the aggregate years-of-life-lost. The authors concluded that unless something is done to reduce the rising prevalence of those with body mass indexes greater than 35, or to diminish the impact of obesity or its correlates on years-of-life-lost, expected life expectancy for United States adults may decrease in the future (Finkelstein et al., 2010). This prediction is even more concerning when we recall that adult obesity begins in childhood/adolescence. Clearly, we must evaluate the impact on quality of life in the process of identifying effective weight management programs (Fullerton et al., 2007).

2.1 Socioeconomic status or position

Socioeconomic position has been shown to be related to obesity and weight gain (Baltrus et al., 2007). Specifically, (1) long-term weight gain in adulthood was associated with childhood socioeconomic position and education in women and education and income in men; (2) low childhood socioeconomic position was associated with increased weight

among women 17-30 years old; (3) and low educational status was associated with increased weight gain among women 13-30 years and men 17-30 years (Baltrus et al., 2007). Socioeconomic status/race variable explains approximately 24% of geographic variability in childhood obesity and childhood obesity is significantly associated with lower household income, lower home ownership, less educated women, single parent household, and non-white residents (Grow et al., 2010). Daily priorities are affected by the reality of household finances. Local community leaders in the south-side of Chicago felt awareness was higher for acute health conditions than for obesity, and though parents were concerned about their children's health parents were stressed by competing priorities and constrained by lack of knowledge, parenting skills, time, and financial resources (Burnet & Plaut, 2008).

Distinct socioeconomic status dimensions can differentially predict obesity across race/ethnicity (Scharoun-Lee M, Adair L et al., 2009). After studying the effect of social advantage, schooling, employment and economic hardship, the authors concluded that the association of social advantage and economic hardship factors with obesity differed by race/ethnicity in females (Scharoun-Lee M, Adair L et al., 2009). High social advantage was inversely associated with obesity in white and Hispanic females (9-20% lower) while high scores on economic hardship were positively associated with obesity in white and Asian females. In contrast, no significant racial/ethnic differences were observed in males. The schooling factor was significantly positive for females of all racial/ethnic groups (Scharoun-Lee M, Adair L et al., 2009).

The racial/ethnic disparities in obesity escalate from childhood to adulthood in the United States and may be attributed to the differences in socioeconomic status (Scharoun-Lee M, Kaufman J et al., 2009). Males with a disadvantaged background who experienced an early transition into the labor force, marriage and residential independence have the highest risk for developing obesity while females exposed to persistent adversity were at highest risk. Socioeconomic status has a stronger relationship with the persistence of obesity than its incidence and ethnic minorities have the highest obesity risk across socioeconomic status groups (Scharoun-Lee M, Kaufman J et al., 2009).

Race/ethnicity, socioeconomic status, and behavior factors were independently related to childhood and adolescent obesity (Singh et al., 2008). Among children in the United States, aged 10-17 years, who participated in the 2003 National Survey of Children's Health, ethnic minority status, non-metropolitan residence, lower socioeconomic status, lower social capital, higher television viewing and higher physical inactivity were all independently associated with higher obesity prevalence (Singh et al., 2008). Compared to affluent white children, the odds of obesity were 2.7, 1.9 and 3.2 times higher for poor Hispanics, whites and black children, respectively (Singh et al., 2008).

While the social disparities in body mass index trajectories may vary across adulthood by gender, race/ethnicity and lifetime socio-economic position the body mass index scores are consistently higher for women, racial/ethnic minority groups and those from a lower socioeconomic position (Clarke et al., 2009). However, body mass index scores for socially advantaged groups in recent years are actually higher than those for their socially disadvantaged counterparts who were born 10 years earlier. Social status and socio-economic resources are important for maintaining optimal weight (Clarke et al., 2009). Although those in advantaged social positions have experienced an increase in body mass index recently (Clarke et al., 2009) overall, poor children with a sedentary lifestyle have a 3.7 times higher odds of obesity than their active, affluent counter parts (Singh et al., 2008).

2.1.1 Prevailing obesity prevalence disparity

Pediatric obesity has reached critical levels and a worrisome trend has been identified worldwide (Lieb et al., 2009). There is a greater prevalence of obesity in ethnic and racial minorities than in non-Hispanic whites (Clarke et al., 2009; Lieb et al., 2009; Scharoun-Lee M, Kaufman J et al., 2009). The reason for this disparity is multifactorial, with culture, environment, and genetics playing a role (Calzada, Anderson-Worts, 2009). Of note, the higher availability of obesigenic diets and poor dietary behavior world-wide have created an increasingly urban Asian childhood obesity epidemic, which coupled with persistent undernutrition, present a complex double burden of malnutrition (Guldan, 2010). Some dietary patterns associated with overweight include snacking, eating out, fast food, sweetened beverages and excessive meat; unhealthy macronutrient energy proportions and a preference for refined grains (Guldan, 2010). Among White and South Asian children age 5-7 years, born between 1991 and 1999, and included in the East Berkshire Child Health System, overweight and obesity among South Asian boys were significantly higher than that among South Asian girls and the boys may be at greater risk of morbidity and mortality (Balakrishnan et al., 2008).

A cross-sectional study to examine factors associated with health behaviors, including physical activity and dietary intake of Chinese women who had immigrated to the United States and their children revealed that approximately 37% of the children were overweight with body mass index greater the 85th percentile (Chen, 2009). A high household income was related to low maternal body mass index, higher maternal fat intake, and high maternal intake of sweets while a high level of maternal acculturation was related to low body mass index in children (Chen, 2009). In contrast, among 3 to 5 years old Canadian Inuit children across the Canadian High Arctic the overall prevalence of overweight was 50.8% with significantly more boys (57.1%) than girls (45.2%) in the overweight category (Galloway et al., 2010). Yet, an examination of biological, socio-economic and dietary factors, including birth weight, breastfeeding, day care attendance, traditional and market food consumption and sweetened beverage intake revealed no significant associations that could explain the development of obesity in this population (Galloway et al., 2010).

In a study of Norwegian adolescents, aged 15-16 years, the prevalence of overweight was 11.8% and obesity was 2.4%, higher in boys (Groholt et al., 2008). Further analysis revealed that the northernmost counties were 70% to 90% more likely to be overweight and obese compared with adolescents in Oslo, the capital and southernmost county. Other factors that were significantly associated with overweight and obesity included lower educational plans, poor family economy and physical inactivity. Eating breakfast was positively associated with not being overweight or obese (Groholt et al., 2008). A nationwide representative survey of New Zealand schoolchildren demonstrated a 2.7% incidence of extreme obesity compared to 4% in the United States but ethnic differences in prevalence with 0.8% in New Zealand European, 5.1% in Maori, and 10.9% in Pacific Island groups (Goulding et al., 2007).

Data from the Reports on School Health Survey, Ministry of Education, Culture, Sports, Science and Technology, revealed no evidence of any major rise in prevalence of obesity as expressed by mean body mass index for Japanese children 5-17 years old between 1948-2003 (Hermanussen et al., 2007). The authors concluded that Japanese children and adolescents may be more resistant against environmental factors that have caused obesity in affluent western societies (Hermanussen et al., 2007). However, a previous study using data from the cross-sectional annual National Nutrition Survey, Japan, from 1976 to 2000 of children

between the ages of 6 and 14 revealed an increasing trend in obesity prevalence in Japanese school children (Matsushita et al., 2004). The prevalence of obese boys and girls increased from 6.1% and 7.1%, respectively, between 1976 and 1980, to 11.1% and 10.2% in 1996 to 2000. The increasing trend was most evident among 9- to 11-year old children of both sexes living in small towns, whereas no changes were observed in girls in metropolitan areas (Matsushita et al., 2004).

In the United States, one of the states with the highest prevalence rates of obesity is Mississippi. The prevalence and trends of obesity among Mississippi public school students, 2005-2009 were published in 2010 (Molaison et al., 2010). The data revealed that in 2009 the prevalence of obesity for all students in K-12 was 23.9% as compared to 23.5%in 2007, and 25.5% in 2005. However, the disparity between races appeared to be increasing over time with the prevalence remaining level for non-white students while decreasing each year for white students (Molaison et al., 2010).

2.2 Misperception of weight status among adults

Misperception of weight has been defined as viewing self as being about the right weight when actually overweight or obese (Bennett & Wolin, 2006). Adults frequently misperceive their weight and the level of misperception appears to vary based on ethnicity/race and gender (Bennett & Wolin, 2006). According to Bennett & Wolin misperception was present among 43% of overweight white men and 9% among obese white men versus 21% among overweight white women and 3% among obese white women compared to 66% for overweight black men and 26% for obese black men versus 41% for overweight black women and 11% for obese black women compared to 64% for overweight Hispanic men and 17% for obese Hispanic males versus 29% for overweight Hispanic women and 7% for obese Hispanic women (Bennett & Wolin, 2006). The high level of misperception among blacks may be a function of several factors: (1) weight satisfaction versus a lack of awareness about the extent of their overweight; (2) lack of awareness about clinical thresholds for overweight and obesity; or (3) a reliance on social comparisons to make judgment about their weight status (Bennett & Wolin, 2006).

Despite greater self-reported prevalence of certain risk factors for poor health, African Americans may have a more optimistic view of their overall health and weight status and lack of an awareness of their actual risk (Burroughs et al., 2008). Surprisingly, 72% of African Americans reported "good to excellent" health compared to 62% of Hispanics even though 56% of African Americans compared to 34% of Hispanics who self-described as "slightly" overweight met criteria for obesity based on body mass index (Burroughs et al., 2008). Additionally, 33% of the African Americans reported high blood pressure, 20% arthritis, 18% high cholesterol, and 15% diabetes compared to 17% of Hispanics who reported high cholesterol, 15% high blood pressure, and 12% sleep difficulty. Misperception of their weight may cause parents to misperceive the children's weight and delay corrective intervention.

2.3 Effect of the mother's perceptions of their children's weight

Parents frequently define overweight in functional terms while children will define it based on physical appearance (Burnet & Blaut, 2008). In a study examining maternal perception of their overweight children among participants in an urban Special Supplemental Nutritional Program for Women, Infants and Children serving primarily Hispanic families, (Hackie &

Bowles, 2007), 61% of mothers did not recognize their children, ages 2-5 years, as overweight. Perception of the child's overweight was independent of age and educational level of the mother. Fifty percent of mothers had taken no steps to control what their child ate. The authors concluded that Hispanic mothers of overweight children may not perceive their children as being overweight and interventions will need to be based on the mother's belief system and cultural background (Hackie & Bowles, 2007).

In a similar study, of 192 African-American and Hispanic 4-5 year old children, most mothers perceived their children to be thinner than actual size (Killion et al., 2006). Approximately 66% of mothers of overweight and obese children were satisfied with their children's existing body size or wanted them to be heavier while 50% of the mothers of obese children wanted their children to be thinner (Killion et al., 2006).

The agreement between adolescent and caregiver on body size satisfaction varies by body mass index category (Mitola et al., 2007). Among normal weight adolescents, 61% of adolescent-caregivers agreed that current body size was ideal. Among adolescents at risk for overweight, 38% of adolescent-caregivers agreed that current body size was ideal, and 38% were discordant with adolescents wanting to be thinner and caregivers satisfied with current body size. Among overweight adolescents, adolescent-caregiver agreement was 67%; 52% agreed the adolescent should be thinner and 15% agreed current body size was ideal. Body size satisfaction is related to body mass index category for adolescents and caregivers, but adolescents have a lower threshold for satisfaction therefore, encouraging caregivers to discuss their adolescents' views on body size satisfaction may allow caregivers to support their adolescents in addressing weight-related issues (Mitola et al., 2007).

2.3.1 Body image discrepancy

Body image discrepancy reflects the difference between ideal and current body images (Banitt et al., 2008). In a cross-sectional study to investigate the relationship between body image discrepancy and weight status among adolescents, participants were asked to select body imagines from a 13-figure rating scale. There was an increase in body image discrepancy with the increasing prevalence of obesity (Banitt et al., 2008). Overall, half of the females and one third of males wanted a thinner body (Banitt et al., 2008). Body image discrepancy was positively related to body mass index percentile. A one-unit increase in body image discrepancy was observed with a 4.84 unit increase in body mass index percentile among females and a 3.88-unit increase in males. Both male and female adolescents reported body image discrepancy at a body mass index percentile that corresponded to normal weight. While black and white differences existed in body image discrepancy, black female adolescents were similar to their white counterparts and reported body image discrepancy at a weight range that was within the normal range (Banitt et al., 2008). The authors stressed the need for interventions that will help adolescents develop a healthy and realistic body image and healthy ways to manage their weight (Banitt et al., 2008).

Whether satisfaction with overweight and obesity contribute to greater weight gain in African American women than men remains debatable; yet little data is available for younger adult African Americans on their perceived and ideal body image (Gilliard et al., 2007). In a survey of 509 self-identified African American freshmen in 2003 and 669 in 2006 at a historically black university, the data did not suggest that greater weight gain in women than men is driven by a desire to be heavier. The high proportion of overweight women

with a normal perceived body image may contribute to the greater weight gain. Of concern, nearly half of men with normal body mass index wanted to be heavier, while approximately 5/8 of overweight men were satisfied with being overweight or wanted to be heavier (Gilliard et al., 2007).

2.4 Role of behavioral and social factors

Ethnicity is associated with differences in food-related beliefs, preferences, and behaviors; and cultural influences may contribute to the higher than average risk of obesity among children and youth in United States ethnic minority populations (Kumanyika, 2008). Evidence indicates that ethnic differences along several pathways may increase the risk of obesity. Development of useful interventions in the future requires a better understanding of which causes of obesity might be more prevalent or intensified in low-income and diverse communities; understanding of how the social, cultural and economic environments might magnify these factors; and determining which changes in those environments would help the most to reduce obesity (Kumanyika & Greer, 2006). Parents' weight is among the strongest correlate for child weight (Elder & Arredondo, 2010).

The social and structural environment in which Hispanic children are reared may play an essential role in uncovering their risk for obesity and related behaviors (Elder & Arredondo, 2010). Overweight children were less active compared to normal weight children; parents of overweight children provided less instrumental support to engage in activity and set fewer limits on their child's activities; parents of overweight children were less likely to control, but more likely to set limits on their child's diet compared to normal weight children; parents who rated their health more positively and were less acculturated were more likely to have overweight children (Elder & Arredondo, 2010). Foreign-born Hispanic men and women have a substantially lower likelihood of being overweight or obese than Hispanics born in the United States; and the likelihood of obesity/overweight increases the longer foreign-born individuals remained in the United States (Akresh, 2008).

Racial discrimination may be an important factor related to weight gain among ethnic minorities (Gee et al., 2008). Findings from an analysis of data from the 2002 to 2003 National Latino and Asian American Study revealed that: (1) racial discrimination was associated with increased body mass index and obesity; (2) the association between racial discrimination and body mass index strengthened the longer the time spent in the United States (Gee et al., 2008).

Cultural attitudes and belief are not the only potential sources of ethnic variation in childhood obesity prevalence and should not be studied in isolation (Kumanyika, 2008). Demographic, socio-structural and environmental variables must also be considered. Attitudes about and environmental contexts for physical activity are relevant. Individual behavior and lifestyle are responsive to the ecological contexts in which they are practiced (Kumanyika, 2008).

A secondary analysis of cross-sectional data from the 2004-2005 School Physical Activity and Nutrition study examined the prevalence rates of five types of beverage consumption (fruit-flavored drinks, regular sodas, diet sodas, milk, and 100% fruit juice) by sociodemographic factors among fourth, eighth, and eleventh grade public school students in Texas (Evans et al., 2010). The data revealed that the most commonly consumed beverage by all students was milk. More than 50% of students also had consumed regular soda and fruit-flavored drink during the previous day. Milk and fruit juice intake decreased with increasing grade

level. By the eleventh grade, the prevalence of any beverage consumption, including milk and juice was significantly greater among boys. Ethnic differences in sugar-sweetened beverage consumption were most prevalent in eighth and eleventh grades, with the highest estimated prevalence of sugar-sweetened beverages (fruit-flavored drink and regular soda) consumption among African Americans (Evans et al., 2010).

Evidence linking restaurant food with overweight and the role of different types of restaurants among Latinos demonstrated that both child and parent body mass index scores were lowest in families selecting Mexican restaurants (Duerksen et al., 2007). The authors suggested that eating at fast-food chains and other Anglo-oriented restaurants may contribute to higher obesity rates linked to acculturation among Mexican Americans (Duerksen et al., 2007).

2.4.1 Family involvement

Home and family variables such as parenting styles, female-headed households, parental education, teen parenting, obese adults and economic insecurity may contribute to childhood obesity (Kumanyika & Grier, 2006). Parenting interventions have produced changes in factors associated with childhood obesity (Ayala et al., 2010). In 2008, researchers examined the intervention effect on (1) parenting strategies, including limit setting, monitoring, discipline, control, and reinforcement related to children's diet and physical activity; (2) parental support for physical activity; (3) parent-mediated family behaviors such as family meals eaten together and television viewing during family dinners; and (4) perceived barriers and other parent cognitions related to children's eating and activity. After 2 years, significant improvements were observed in three of five parenting strategies, parental support, and two of four parent-medicated family behaviors among parents receiving monthly visits by the promotora and monthly mailed newsletters as compared with those in the interventions targeting the school and community environments via physical and social changes such as training school personnel to promote healthy eating or modifying child menus in local restaurants) and control conditions (Ayala et al., 2010).

To determine the self-efficacy and dietary fat reduction behaviors in obese African-American and white mothers recruited from the Special Supplemental Nutrition Program for Women, Infants and Children in Wisconsin, Chang et al., 2008 designed a study to examine the influence of weight management and education on five types of fat reduction behaviors mediated through three task-specific domains of self-efficacy (negative mood, positive mood, and food availability) among young, low-income obese African-American and white mothers. The study also investigated the interaction of race with the relationships between weight management, education, self-efficacy, and fat reduction behaviors. For both racial groups, weight management status predicted low-fat food substitution and meat modifications behaviors; education predicted meat modification behavior. Three task-specific domains of self-efficacy predicted different types of fat reduction behaviors and differed by race. Weight management influenced behaviors of low-fat food substitution, meat modification and fried-food avoidance, mediated partially through self-efficacies of negative mood (African Americans), positive mood (African Americans, whites), and food availability (African Americans). Race affected the relationships between weight management, education, three task-specific domains of self-efficacy, and five types of fat reduction behaviors. Self-efficacies operated differentially for African Americans and whites (Chang et al., 2008).

The efficacy of an interactive, child-centered and family-based program in promoting healthy weigh and health behaviors in Chinese American children has been demonstrated (Chen et al., 2010) and significantly decreased body mass index, diastolic blood pressure and fat intake while increasing vegetable and fruit intake, actual physical activity and knowledge about physical activity. The authors concluded that interactive child-centered and family-based behavioral programs were feasible and effective and could be modified for other minority ethnic groups who are at high risk for overweight and obesity and have limited access to programs that promote healthy lifestyles (Chen et al., 2010).
Ellis et al., 2010 conducted a pilot randomized clinical trial to determine whether participation in an intensive, home- and community-based 6-months intervention could increase family support for healthy eating and exercise in obese African-American adolescents. Results demonstrated that participation was associated with significantly greater improvements in family encouragement for healthy eating and family participation exercise and greatly decreased discouraging behavior from family members. Increased family participation in exercise was significantly related to lower youth body mass index, percent overweight, and body fat composition (Ellis et al., 2010).

2.4.2 Frequency of family dinners

The recommendation for reducing childhood obesity from the expert committee (Barlow et al., 2007) included limiting eating out at restaurants, particularly fast food restaurants and other kinds of restaurants that serve large portions of energy-dense foods. They also included encouraging family meals in which parents and children eat together. Studies have indicated that family meals may be a protective factor against childhood obesity (Rollins et al., 2010). As limited evidence is available for children with different racial, socioeconomic and individual characteristics, Rollins' team (Rollins et al., 2010) examined data from the 2003 National Survey of Children's Health (n=16,770). This study revealed that: (1) non-Hispanic white children who consumed family meals every day were less likely to be obese than those eating meals zero to a few days per week; (2) a moderate effect for sex was observed in non-Hispanic black children, as meal frequency was marginally protective in boys but not in girls; and (3) a higher frequency of meals was a marginal risk factor for obesity in Hispanic boys from low-education households but not in girls from similar households (Rollins et al., 2010).
A similar study determined that for whites, higher frequency of family dinners was associated with (1) reduced odds of being overweight in 1997; (2) reduced odds of becoming overweight, and (3) increased odds of ceasing to be overweight in 2000 (Sen, 2006). No such associations were found for blacks and Hispanics. The author suggested that the reasons for racial and ethnic differences in the relationship between frequency of family dinners and overweight may include differences in the types and portions of food consumed at family meals.

2.4.3 Television watching

The imbalance between energy intake and energy expenditure forms the foundation for childhood obesity (Cillero & Jago, 2010). There is escalating public health concern regarding the effects of sedentary lifestyles on children and adolescents (Marshall, Gorely & Biddle, 2006). Many studies have proposed that the increased sedentary lifestyle among children and adolescents is associated with obesity (Crespo et al., 2001). Television viewing, playing

digital games and using computers constitute critical sedentary activities (Rey-Lopez et al., 2008). It has been argued that not all forms of sedentary behavior contribute equally in the development of obesity. The effect of sedentary lifestyle on the risk for obesity may depend on genotype. For example, a higher risk of obesity was found among girls carrying the 27Glu allele of the ADRB2 gene, even when they spent less than 12.5 hour per week viewing television (Ochoa et al., 2006); and blunting of meal-related changes in active ghrelin and PYY in obese Hispanic youth (Mittelman et al., 2010).

Stamatakis and colleagues (Stamatakis, Hamer & Dunstan., 2011) demonstrated that recreational sitting, as reflected by television/screen time, is related to mortality and CVD risk in adults regardless of physical activity participation. Acknowledging that the precise pathways linking sitting and cardio-metabolic disease are unclear, they proposed that metabolic mechanisms e.g., disturbed lipid metabolism, might partly explain the links. A dramatic reduction of lipoprotein lipase activity by 80% to 90% during sitting compared with standing or ambulating has been reported (Stamatakis, Hamer & Dunstan, 2011).

Lipoprotein lipase is a key enzyme for the catabolism of triglyceride-rich lipoproteins in the endothelium. A reduction in its activity might raise the possibility of other metabolic actions being impaired. It has been suggested that metabolic and inflammatory pathways may partially explain the association between sitting and CVD risk (Stamatakis, Hamer & Dunstan, 2011). C-reactive protein was 3-fold higher in participants spending more than 4 hours per day in screen time. Similarly, 5 days of bed rest, which represents an extreme form of sedentary behavior, had profound effects on various metabolic risk (including insulin resistance and vascular dysfunction) but not on inflammation. Thus, low-grade inflammation might only result from chronic exposure to sedentary lifestyle (Stamatakis, Hamer & Dunstan, 2011).

To develop effective strategies to prevent and treat obesity, we must delineate and understand the relationships among childhood obesity and health behaviors such as dietary intake and sedentary lifestyles. Sedentary lifestyle has been described as "the absence of health-enhancing physical activity" (Marshall, Gorely & Biddle, 2006). Increasing the percentage of activity for children and adolescents is important for at least two reasons: (a) reallocating small amounts of sedentary time to more active behavior significantly improves energy balance and fitness and (b) epidemiologic data suggest that some sedentary behaviors track better than physical activity from childhood to adolescence (Marshall, Gorely & Biddle, 2006).

In 1985 the first assertion that television viewing may lead to obesity in some children and adolescents was published (Dietz & Gortmaker, 1985). The authors reported that the prevalence of obesity in adolescents increased 2% for each additional hour of television watched (Yen et al., 2010). They suggested that this relationship may be mediated by a direct displacement of physical activity, as well as, an increase in caloric consumption induced by food advertisements and snacking time (Dietz & Gortmaker, 1985).

The displacement hypothesis suggests that sedentary lifestyle decreases physical activity as a result of the increasing availability of high-tech devices in an industrialized lifestyle (Yen et al., 2010). Some studies on the association between sedentary behaviors and adolescent obesity have demonstrated only a weak association or no association at all. Many of these studies are not comparative and the results are not conclusive (Rey-Lopez et al., 2008). The absence of consensus has been suggested to be due to the lack of controls for confounding variables such as socioeconomic status and age (Yen et al., 2010).

During the late 1950s, sedentary behavior included an array of activities such as listening to the radio/vinyl records, reading books/comics, and television viewing (Stamatakis, Hamer & Dunstan, 2011). Contemporary activities include television viewing, Internet, compact disc/MP3 players and cellular phones. Screen time, especially television viewing, seems to be the primary indicator of "non-occupational sitting" among adults (Stamatakis, Hamer & Dunstan, 2011) and aside from sleeping, television viewing comprises most of the "domestic setting" time (Stamatakis, Hamer & Dunstan, 2011).

Previous studies have demonstrated that adolescents and young adults from racial and ethnic minority groups watch more television and are less physically active (Richmond et al., 2010; Kimbro et al., 2011). However, several studies of children and young adults have demonstrated that television viewing and weight were not statistically related in black girls (Richmond et al., 2010; Lowry et al., 2001). Limitations of previous studies include: small sample size, localized to a few cities, and study design inconsistency that prevented study comparison (Richmond et al., 2010).

"Problematic sedentary behavior" has been defined as viewing television more than 2 hours per day, using the internet more than 20 hours per week; and using the cellular phone more than 1 hour per day (Yen et al., 2010; American Academy of Pediatrics, 2001). Interestingly, not all sedentary behavior has the same potential to increase the risk of obesity. According to Yen (Yen et al., 2010) adolescents who had high television viewing had higher BMI after controlling for the effects of socio-demographic characteristics and exercise level. While the associations between BMI and television viewing and exercise level became insignificant, the interaction between television viewing and exercise level was significantly associated with BMI. Among adolescents who had a *high exercise level*, no significant difference in BMI was found between those with high and low television viewing (Yen et al., 2010). Among adolescents who had a *low exercise level*, those who had high television viewing had higher BMI than those who had low television viewing. Adolescents who had *high Internet* use had higher BMI after controlling for the effects of sex, age, residential background, parental education level and exercise level. Interactions between Internet use and sex, age, parental education and exercise level were not significantly associated with BMI (Yen et al., 2010). Among Internet use, visiting erotic websites, viewing online films and reading online news were significantly associated with increased BMI. The amount of *cellular phone* use was not significantly associated with BMI after controlling for the effects of sex, age, residential background, parental education level and exercise level. Adolescents who used cellular phones to play electronic games had increased BMI. However, sending text messages, taking pictures, accessing the Internet and transmitting music/images were not associated with BMI (Yen et al., 2010).

Marshall and colleagues (Marshall, Gorely & Biddle, 2006) completed a systemic review to (a) estimate the prevalence and dose of television viewing, video game playing and computer; (b) assess age-related trends in television viewing; and (c) secular trends in television viewing among children 18 years old and younger. Their results suggested that over the past five decades children have not had a significant increase in the number of hours they watch television (Marshall, Gorely & Biddle, 2006). In 1948 US children and teenagers viewed television approximately 3.1 hour per day for 6 to 12 year olds and 2.6 hours per day for 13 to 19 year olds. In 1949, the average viewing time was 3.4 hours per day. In 1950s the average time was 2.6 hours per day. The television viewing times increased between 6-11 years, decreased between 11 to 15 years and peaked between 9-12 years (Marshall, Gorely & Biddle, 2006).

Today, children and adolescents watch 1.8 to 2.8 hours of television per day; 66% are "low users" (less than 2 hours per day); 28% watch more than 4 hours per day; boys and girls with access to video games spend approximately 60 minutes and 23 minutes per day, respectively playing video games (Marshall, Gorely & Biddle, 2006). Computers are used an additional 30 minutes per day and, on average, television viewing decreases during adolescence. However, high television users at a young age tend to remain high users when older (Marshall, Gorely & Biddle, 2006).

A meta-analysis found that a statistically significant relationship exists between obesity and television viewing among children and youth; but, the relation was too small to be of substantial clinical relevance (Gorely, Marshall, & Biddle, 2004). Television viewing is often associated with lower levels of physical activity among girls (Gorely, Marshall & Biddle, 2004) and it appears to have an independent relationship with weight status even after controlling for levels of physical activity (Richmond et al., 2010; Eisenmann et al., 2008).

After controlling for confounding variables Yen and colleagues (Yen et al., 2010) found adolescents with high television viewing or high Internet use had increased BMI. The relationship between BMI and television viewing and Internet use were statistically significant. Yet, they cautioned that similar to other studies, television viewing and Internet use only accounted for a very small variance in BMI. They also raised a provocative question as to whether the Internet and cellular phones may provide overweight adolescents who have low self-esteem alternatives through which they can reduce social interaction and feel more comfortable (Yen et al., 2010).

There is evidence that adolescents and young adults from racial and ethnic minority groups watch more television and are less physically active than their white peers (Crespo et al., 2001; Richmond 2010).

Yet, some studies have found that television viewing and weight are not statistically related in preadolescent to young adult black females (Richmond et al., 2010). Richmond and colleagues suggested that the lack of a relationship between television viewing and BMI among black girls may be one reason why some studies using racially heterogeneous populations have had not demonstrated a positive association (Richmond et al., 2010). In the study by Richmond et al (Richmond 2010), black females reported watching television 15 hours per week compared to 11 hours per week for both Hispanic and white females; BMI increased with greater time spent watching television; those who watched 8 to 14 hours per week had BMIs that were on average 0.8kg/meter-squared higher and those who watched greater than 14 hours per week had BMIs that were on average 1.2 kg/meter-squared higher than those who watched 7 hours of less per week. Having at least one obese parent was associated with a 3.7 kg/meter-squared increase in BMI relative to those without an obese parent. Overall all, black, Mexican-American, and Puerto Rican females were all significantly heavier than their white peers (Richmond et al., 2010). When data was stratified by race/ethnicity, they found similar results among white females between television viewing and BMI as in the overall population. Among both black and Hispanic females, they found no association between television viewing and BMI. They proposed that these differences may represent the fact that: (1) the majority of blacks are beyond some threshold effect for television exposure (Richmond et al., 2010); (2) blacks interact with television media differently than whites (Richmond et al., 2010); (3) blacks are less susceptible to the effects of television advertising than whites [16]; (4) the television is more likely to be on throughout the day in black homes so reported television viewing hours may not have their

full attention and thus have less of an impact (Richmond et al., 2010; Henderson, 2007); and (5) television is such a small factor in the lives of black Americans relative to other obesity-prone aspects of their environment (Richmond et al., 2010).

2.4.4 Healthful eating

The childhood obesity expert committee (Barlow et al., 2007) recommended that families adopt and maintain healthy habits that may help prevent excessive weight gain. These recommendations included eating diets with the recommended quantities of fruits and vegetables, rich in calcium, high in fiber and with a balanced source of energy from fat, carbohydrates and protein as well as limiting portion size, limiting consumption of sugar-sweetened beverages and eating breakfast daily.

Breakfast consumption has been a frequent focus of studies exploring dietary intake among adolescents and overall health (Merten et al., 2009). Analysis of the relationship between breakfast and obesity over time and in relation to weight outcome in young adulthood (Merten et al., 2009) revealed that adolescent regular breakfast consumption significantly predicted young adult regular breakfast consumption and an important factor associated with adolescents eating breakfast was having at least one parent home in the morning. Regular consumption during both adolescence and young adulthood prevented obesity in both periods. Living in disadvantaged communities decreased the odds adolescents would eat breakfast during adolescence and increased their chances for chronic obesity (Merten et al., 2009).

The role of sugar-sweetened beverages in obesity remains a source of research. In a representative sample of 365 low-income African-American preschool 3-5-year-old children investigators sought to determine the association between sugar-sweetened beverage consumption (soda, fruit drinks, and both combined) and overweight and obesity (Lim et al., 2009). After two years, the prevalence of overweight increased from 13% to 19% and the prevalence of obesity increased from 10% to 20%. The authors concluded that high consumption of sugar-sweetened beverages was significantly associated with an increased risk of obesity (Lim et al., 2009).

The Memphis Girls health Enrichment Multi-site Studies tested the effectiveness of a 2-year family-based intervention to reduce excessive increase in body mass index by promoting healthy eating habits and increasing physical activity in 303 healthy African-American girls, ages 8-10 years old along with one parent/caregiver. It was a randomized, controlled trail conducted at community centers. The main outcome measure was the difference in body mass index between the control and intervention groups. At the end of the 2-year trial the body mass index increased in all girls and no significant treatment effect was noted. However, positive effects were observed with a reduction of daily consumption of sweetened beverages and an increased consumption of water and vegetables. Nonetheless, the authors concluded that this particular intervention alone was insufficient for obesity prevention (Klesges et al., 2008; Klesges et al., 2010).

2.5 Built environment concept

The built environment consists of the neighborhoods, roads, buildings, food sources, and recreational facilities in which people live, work, are educated, eat, and play (Sallis & Glanz, 2006). The debate is ongoing as to whether recent changes in the built environment have

promoted sedentary lifestyles and encouraged less healthful diets (Sallis & Glanz, 2006). The physical design and quality of neighborhoods may determine where and how often children and adolescents participate in physical activity and parents may restrict their children's outdoor activities if neighborhood safety is a concern (Kumanyika & Grier, 2006). Additionally, family work schedules, discretionary time, money, and car ownership may adversely affect the ability of parents and caregivers in low-income communities to transport children to sports and other activities (Kumanyika & Grier, 2006).

While these arguments may be logical, research on the link between neighborhood socioeconomic status and obesity in child and adolescents is mixed, with some studies showing strong correlations among neighborhood, obesity, and physical activity and others showing little to no effect (Kimbro et al., 2011). Contrary to expectations, one study demonstrated some interesting findings among 5-year old children living in public housing (Kimbro et al., 2011). The authors showed that the poorest and wealthiest children had the lowest BMIs, while children in the middle of the socioeconomic distribution had the highest body mass indices; that the hours of outdoor play and television watching were both associated with body mass index, as was the ratio of outdoor play to television watching; that children living in public housing and those living in the neighborhoods with higher levels of physical disorder were playing outdoors more often than other children; and that children of mothers who perceived a high level of collective efficacy in their neighborhoods were playing outside for longer periods of time daily, watching television less and visiting the park or playground more often each week (Kimbro et al., 2011). Neighborhood safety may be modified by the mother's perceived neighborhood cohesiveness and social support as neighborhood cohesiveness had little to do with the actual physical state of the neighborhood environment (Kimbro et al., 2011).

Scientific evidence as to whether the built environment can directly affect childhood obesity and whether improvements to the built environment can encourage more physical activity and more healthful diets is limited (Sallis & Glanz, 2006; Kumanyika & Grier, 2006). Researchers have found many links between the built environment and children's physical activity but have not provided conclusive evidence that aspects of the built environment promote obesity. Obviously, barriers such as an absence of sidewalks, living long distances from schools, and the need to cross busy streets can discourage walking and biking to school. However, while removing these barriers may increase rates of "active commuting", there is no scientific evidence that more "active commuting" reduces the rates of obesity (Sallis & Glanz, 2006). Although research into the link between the built environment and childhood obesity is relative new, it is reasonable to assume that individuals who live in safe neighborhoods that enhance walking, and offer local markets with healthful food are likely to be more active and to eat more healthful foods (Sallis & Glanz, 2006).

2.6 Significance of food deserts and food insecurity

Food deserts describe areas that do not have easy access (within walking distance in cities or a reasonable driving distance in rural areas) to healthy foods, usually in the form of a supermarket. In urban areas, food desert also implies that the area is low income and residents may not own or have easy access to a vehicle, therefore, access to healthy foods must be within reasonable walking distance. Food security refers to the availability of food and one's access to it. A household is considered food-secure when its occupants do not live in hunger or fear of starvation (http://en.wikipedia.org/wiki/Food_security). More than

23% of American households with children did not have enough money to buy food in 2010 (http://www.upi.com/Health_News/2011/08/11).
For parents poor food quality and discrimination affect parent's food choices and their perceptions of food availability in their neighborhood (Sealy, 2010). Within communities with lower than average availability of healthful foods, higher than average availability of fast food restaurants, and increased exposure to ethnically-targeted food marketing may result in dependency on high calorie foods and beverages which are valued both socially and culturally. (Kumanyika, 2008).
Food-related parenting attitudes may influence children's dietary intake and weight. In food-insecure families, attitudes toward making healthful foods available were inversely associated with children's daily energy intake and body mass index among fifth grade Mexican-American students (Matheson et al., 2006). In food-secure families, attitudes about making healthful foods available were positively associated with children's fruit intake and percentage of energy from fats. Additionally, parental modeling of healthful food behavior was inversely associated with the energy density of foods (Matheson et al., 2006).

2.7 Relationship between economics and attitudes toward health

An analysis of data from the National Survey of Children's Health collected from 2003 to 2004 revealed that poverty impacts body mass index in at least two specific ways: unsafe neighborhoods and the cost and availability of healthy foods in low income communities (Lutfiyya et al., 9220). Overweight children were more likely to be African American and Hispanic than white; be males; live in households with incomes below 150% of Federal poverty level; watch television three hours or more daily; and not have received preventive care in the past 12 months. Overweight children were less likely to get minimum levels of moderate physical activity or have participated on a sports team (Groholt et al., 2008).
Utilizing data from the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey from 2001 to 2004, the frequency of clinician-reported delivery of obesity-prevention counseling at well-child visits was assessed (Branner et al., 2008). The results revealed that of 55,695,554 (weighted) visits, 24.4% included obesity prevention counseling; 15.4% of Hispanic patients received obesity prevention counseling compared to 28.8% of non-Hispanics. Frequencies of counseling were similar between whites and blacks, 25% and 27.1% respectively. Disparity was noted between frequency of counseling and insurance as 26.9% of patients with private insurance received more counseling compared to 19.1% of Medicaid patients and 15.1% of self-pay patients (Branner et al., 2008).

3. Conclusion

Obesity should be addressed through a comprehensive approach across multiple settings and sectors that can change individual nutrition and physical activity behavior and the environments and policies that affect these behaviors. New and continued national, state, and community-level surveillance of obesity, its behavioral risk factors, and the environment and polices that affect these behaviors is critical (MMWR 2010; 59(30):951-955).
Based on this review of several recent studies, some of the previously published findings on childhood obesity in communities of diverse ethnicity and low-socioeconomics must be

refuted, supported or recommended as areas for further reach. Specifically, this review did not identify any theories that can be unequivocally refuted for all low-income and ethnically diverse communities. The review supports the findings of the prevailing overweight/obesity prevalence disparity and has identified several areas where further research is warranted. The areas for future research include:

1. Is there a "critical body mass index" at which the number of hours of watching television is no longer effective in preventing obesity?
2. Are the adverse psychosocial effects of overweight/obesity in low-income and ethnically diverse communities age-independent?
3. Would correction of the child-parent/caretaker body image dissatisfaction discrepancy be an effective means of reducing overweight/obesity?
4. Does the frequency of family meals prevent overweight among blacks and Hispanics?
5. Are child-centered, family based interventions effective in all low-income and ethnically diverse settings?
6. As neighborhood safety is an important but not the only factor that will determine parental willingness to allow their children to participate in outdoor physical activity what other factors should be explored and enhanced?

It was not the aim of this review to be an exhaustive review of the literature. We hoped to provide an up-to-date summary of some of the more recent studies and to stimulate discussion among researchers focused on the quality of life impact of childhood obesity for members of low-socioeconomic and diverse communities based on more recent data. The review confirms the need for ongoing research in several areas relative to childhood obesity and hopefully will be a useful resource for future researchers and funders. The primary limitation of this review includes the fact that the review was limited and utilized only one major data source, PubMed. Additionally, there may have been selection bias on the part of the author. As we continue to search for effective interventions to reduce the prevalence of overweight and obesity among children living in low-income and diverse communities, it will be critical to have evidence-based data generated from comparative studies using multiple data sources.

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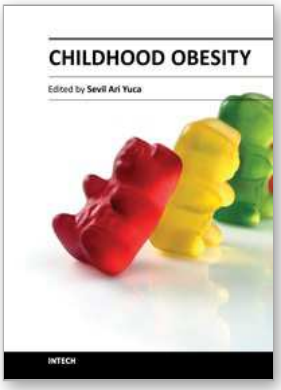

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This book aims to provide readers with a general as well as an advanced overview of the key trends in childhood obesity. Obesity is an illness that occurs due to a combination of genetic, environmental, psychosocial, metabolic and hormonal factors. The prevalence of obesity has shown a great rise both in adults and children in the last 30 years. It is known that one third of children who are obese in childhood and 80% of adolescents who are obese in their adolescent years continue to be obese later in life. Obesity is an important risk factor in serious illnesses such as heart disease, hyperlipidemia, hyperinsulinemia, hypertension and early atherosclerosis.

InTech Europe
University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China
Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821