

**A SYNTHESIS OF THE LITERATURE ON INTERVENTIONS TO IMPROVE THE  
DIETS OF AFRICAN AMERICAN YOUTH IN ORDER TO PREVENT OVERWEIGHT  
AND OBESITY**

by

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This literature review examines the problem of overweight and obesity in African American youth focusing on what is currently known regarding interventions designed to improve the diets of this population. The paper discusses the causes and contributing factors to the rise of overweight and obesity, followed by an overview of the major types of interventions that have been designed to address factors across the social-ecological continuum--that is, from the intrapersonal, interpersonal, organizational, community, and policy levels, paying particular attention to school-based interventions. The cultural appropriateness of nutrition interventions for African American youth and barriers to program effectiveness are also explored. Evidence from the literature suggests the need to employ multi-component interventions which emphasize upstream, policy change. In addition, collaborative partnerships have also been identified as being necessary in order to sustain interventions and maximize their long-term impacts. The issue of overweight and obesity among African American youth is a significant public health problem that is associated with the poor quality of diet. Improving the diets of African American children and adolescents requires multi-component, coordinated efforts in order to ameliorate the negative health consequences. This issue suggests the need for continued research to develop effective interventions.

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## **PREFACE**

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## **1.0 INTRODUCTION**

### **1.1 PROBLEM IDENTIFICATION**

The United States has witnessed an increased prevalence of overweight and obesity among all its children and adolescents. Recent data from the National Health and Nutrition Examination Survey (NHANES) demonstrate that the prevalence of obesity among children and adolescents increased between 1988-1994 and 2003-2004 as follows: children ages 2-5, from 7.2% to 13.9%; those aged 6-11, from 11% to 19%; and those 12-19 years old, from 11% to 17%. (CDC National Center for Health Statistics, 2006). The *Healthy People 2010 Midcourse Review* notes the lack of progress toward improving the nutrition of children and adolescents and also decreasing overweight and obesity among this population (U.S. Department of Health and Human Services, 2006). This disturbing trend demands an effective program of diet-related interventions. These interventions would benefit all children and adolescents, especially high risk African American youth.

Data depict that overweight and obesity prevalence is higher among minority populations, and that these differences become more apparent with age. For example, the prevalence of overweight for African American children between 1988-1994 and 1999-2000 for the age groups 2-5, 6-11, and 12-19 were 8.4%, 19.5%, and 23.6%, respectively, as compared with 10.1%, 11.8%, and 12.7% for white children (Ogden, Flegal, Carroll, & Johnson, 2002).

Similar trends exist with occurrences of obesity-related diseases (Centers for Disease Control and Prevention, CDC, 2007). Schwartz and Chadha report higher rates of type 2 diabetes among non-white minority populations, for both children and adults, relative to white populations (2008).

In addition to race, socioeconomic status creates health disparities. According to Visscher, obesity is most common among low socioeconomic status populations in industrialized nations (2001). As shown in the 1999 U.S. census, 26% of those living in poverty are minority populations compared to 8% of Whites (U.S. Bureau of the Census, 1999). Therefore, some minorities encounter health disparities associated with both race and socioeconomic factors. These findings illustrate the urgent need to develop effective nutrition interventions to prevent overweight and obesity among African American youth.

## **1.2 SCOPE AND FOCUS OF THE LITERATURE REVIEW**

The enormity of the problem of overweight and obesity among U.S. African American children and adolescents requires an in-depth comprehension of the factors contributing to this issue and the most effective methods to address the problem. Interventions vary in focus: some target individual-level contributing factors, such as knowledge and behavior, while others address social and environmental contexts and policies. Though traditional approaches primarily emphasize individual factors, now there exists a movement for broader, more multifaceted approaches. Flynn, McNeill, Maloff, Wu, and Tough synthesized recent reviews which suggest that a paradigm shift to multi-level approaches that address social and environmental influences is necessary for effective overweight and obesity prevention (2006). A social ecological

perspective acknowledges the complexity of contributing factors, both micro- and macro-level, and facilitates a multi-level approach to improving nutrition (Story, Kaphinger, Robinson-O'Brien, & Glanz, 2008). Many interventions, such as individual, family, social, community, and policy approaches, exist across the social-ecological continuum; it is important to determine the strengths in each of these interventions and then link these components to create more effective, multi-level interventions.

### **1.3 PURPOSE AND OBJECTIVES OF LITERATURE REVIEW**

First, this review discusses the current literature surrounding the public health significance of increased overweight and obesity prevalence among African American youth, the impact of increased overweight and obesity, and potential causes and contributing factors to this increase. Second, there is a brief overview of the various types of interventions used to prevent overweight and obesity. However, due to the vastness of this problem, this review focuses primarily on school-based interventions. The decision to focus on school-based approaches is based on the notion that schools provide an ideal setting to reach large numbers of youth which is essential in order to have the greatest impact. In addition, the school system's organizational foundation provides the opportunity for social-ecological interventions with individual, family, school, community, and policy components.

This paper addresses the research question: What intervention strategies have been effective in improving African American children's diets in order to prevent overweight and obesity? The following dimensions of the research question are explored in this review: 1) What

specific types of school-based interventions are effective in improving African American youth's diets in order to prevent overweight and obesity? 2) What role does culture play in determining African American youth's diets? 3) What are the barriers to nutrition interventions targeting African American youth to prevent overweight and obesity?

## **2.0 BACKGROUND**

### **2.1 CAUSES AND CONTRIBUTING FACTORS TO OVERWEIGHT AND OBESITY**

There are a number of possible explanations for increased overweight and obesity rates. In a 2001 article featured in the Annual Review of Public Health, Dietz maintained that the prevalence of overweight and obesity increases occurred because calories consumed exceed calories expended; this suggests that the most effective strategies target energy intake and energy expenditure. Increases in total daily energy intake imply that diet-related factors greatly contribute to overweight and obesity. For example, daily energy intake increased from 2789 kcals in 1976-1980 to 2864 kcals in 1988-1994 for males aged 12-19 and from 1751 kcals to 1975 kcals for females 12-19 years old during this time (Trioano, Briefel, Carroll, & Bialostosky, 2000; as cited in, Finkelstein, Ruhm, & Kosa, 2005).

A number of social and environmental changes contribute to the food supply and consumption trends associated with increased overweight and obesity among youth. Some of these factors include: (a) growth in consumption of away-from-home meals and snacks eaten at restaurants and fast-food establishments (National Restaurant Association, 1998, as cited in French, Story, & Jeffery, 2001); (b) increased added sugar consumption which is reportedly the highest among adolescents (French and colleagues, 2001); (c) increased consumption of sugar-sweetened beverages and fruit juices, especially among African American youth, which

paralleled a decreased consumption of water and milk (Finkelstein and colleagues, 2005; Putnam, & Gerrior, 1999; Wang, Bleich, & Gortmaker, 2008); (d) changes in production methods and an increased consumption of highly-processed, caloric dense foods that contain added fats and sugars (Cutler, Glaeser, & Shapiro, 2003 as cited in Finkelstein, Ruhm, & Kosa, 2005; Drewnowski, & Specter, 2004; Putnam, 2000, as cited in French, Story, & Jeffery, 2001); (e) increased daily carbohydrate consumption (CDC, 2004); (f) insufficient daily intake of fruits and vegetables (French, et al., 2001); (g) high costs of fruits and vegetables relative to lower priced unhealthy, processed foods with added fats, oils and sugar (Putnam, Allshouse, & Kantor, 2002); (h) increased snacking behavior among youth (Jahns, Siega-Riz, & Popkin, 2001; Zizza, Siega-Riz, & Popkin, 2001); (i) increased exposure to food advertisements and marketing strategies aimed at youth (French and colleagues, 2001); and, (j) agricultural policies leading to the overproduction of commodity grain and oilseed crops, such as soybeans and corn, utilized as inexpensive fats and sugars which are added to processed foods (Story, et al., 2008).

These causal and contributing factors associated with increased overweight and obesity prevalence among children illustrate a societal shift in eating behaviors stemming from environmental changes. Technological advancements allowing for mass-production of higher-caloric density food items likely account for the lower prices of processed foods high in fat, oil, sugar, and salt. Therefore, the affordability of unhealthy processed foods appeals to consumers, especially those of lower socioeconomic status. Though many of these factors contribute to the increased consumption of lower-priced processed and fast foods, the poor quality of these items is the root of the problem. The aforementioned findings demonstrate the link between numerous social, environmental, and policy factors and increased overweight and obesity rates. Such a relationship illustrates the need to intervene with a social-ecological approach.

## **2.2 CONSEQUENCES OF OVERWEIGHT AND OBESITY**

### **2.2.1 Increased chronic disease**

The relationship between overweight and the development of a number of chronic diseases, such as cardiovascular disease (CVD), type 2 diabetes, and cancer, among adults is well-established (Finkelstein, Ruhm, & Kosa, 2005). Though increased obesity-related diseases typically emerge with age, evidence suggests risk indicators and chronic disease already appear among younger populations. According to Freedman, Dietz, Srinivasan, and Berenson, “Sixty percent of overweight five- to 10-year-old children already have one associated cardiovascular disease risk factor, such as hyperinsulinemia, hyperlipidemia, or elevated blood pressure, and over 20% have two or more adverse cardiovascular disease risk factors” (1999). Dramatic increases in type 2 diabetes among children reflect of the urgency of this problem. The relationship between diabetes and cardiovascular disease also suggests a future rise of cardiovascular events in adolescence (Katz, 2005). As demonstrated with diabetes, without effective intervention, cases of chronic diseases traditionally seen among adults will continue to increase in childhood and adolescence. This threat underlies the rationale for determining the most effective interventions to decrease these rates and improve health outcomes for younger generations.

## **2.2.2 Psychosocial consequences**

In addition to increased chronic disease diagnoses and risk factors, overweight and obesity in youth have a number of psychosocial consequences. Overweight and obese children and adolescents often experience biases, stereotyping, victimization, and discrimination from their peers, parents, adults, and educators (Puhl, & Latner, 2007). These experiences can negatively impact overweight and obese youth's psychological well-being and overall quality of life, especially since peer relationships and social interactions play an important role during these developmental stages. For instance, the social stigma associated with overweight and obesity may contribute to suicidal ideation (Ackard, Neumark-Sztainer, Story, & Perry, 2003), depression, decreased self-esteem, and body dissatisfaction (Wardle, & Cooke, 2005).

Not only should interventions address the role of social stigma on weight status without perpetuating stereotypes or biases, but they should also acknowledge cultural differences in weight and body image perceptions. For example, evidence suggests that fuller-figures are more acceptable and even preferred among African Americans, especially with African American girls (Latner, Stunkard, & Wilson, 2005). However, Puhl and Latner maintain that minority populations are underrepresented in studies assessing social stigma and psychosocial consequences of overweight and obesity (2007). These findings regarding the psychosocial effects of overweight and obesity further illustrate the need for preventative efforts, especially those that are culturally appropriate.

## **2.3 BRIEF OVERVIEW OF INTERVENTIONS TO PREVENT OVERWEIGHT AND OBESITY**

### **2.3.1 Individual factors**

Individual factors, such as biology, cognitions, demographics, and behaviors, all have an influence on youth overweight and obesity (Story, et al., 2008). Traditional public health interventions have targeted individuals with information-based interventions which have a limited scope and minimal effectiveness (Finkelstein, Ruhm, Kosa, 2005). Although many interventions are multi-level, these programs still include the necessary individual-level strategies to prompt initial behavior change.

#### **2.3.1.1 Role of taste preferences**

One individual-level factor that has an impact on food choices and dietary behaviors is taste preference. Two reviews summarized research regarding the influence of the following factors on food preference: (a) innate predispositions towards sweet tastes, (b) aversion to bitter tastes, (c) learned and conditioned food likings or aversions, (d) food familiarity, (e) exposure, (f) social modeling, (g) cultural beliefs and exposure, (h) fear of trying new foods (neophobia concept; Rozin, 1976, as cited in Cooke, 2007), (i) genetic factors such as taste sensitivity, (j) heritability of pickiness and personality traits, and (k) family environment (Harris, 2008; Wardle, & Cooke, 2008). Although taste and food preference are individually-based and partially genetically inherent, many other factors that contribute to the development of food preferences have social and environmental contexts.

Cooke reviewed studies examining the influence of food exposure on children's eating behaviors. She found the following: (a) a link between early exposure and food reception; (b) relationship between number of exposures needed for changing preferences and age variations; (c) connection between exposure interventions and changes in preferences attempted (e.g. increase liking of flavor requires taste exposure); (d) influence between specific food characteristics and innate factors; (e) effects of recency and duration, and (f) exposure effectiveness decreased by reward (2007). These findings provide researchers with guidance for developing effective exposure interventions to improve the nutrition of children and adolescents.

### **2.3.2 Family factors**

Dietz and Gortmaker identified some family factors that influence the consumption, preparation, and choices of foods (2001). These include socioeconomic status, social norms, family composition, ethnicity, and interactions between the attitudes, knowledge, and beliefs of parents and children. A number of these contributors are modifiable and present potential avenues for intervention. Factors in the home environment most associated with nutritious eating are parental intake and parental dietary practices, availability and accessibility to healthy foods, and frequency of family meals (Story, et al., 2008). Dietz and Gortmaker suggest utilizing a “division of responsibility” between parents and children to address food choices (2001). This approach assigns parents the responsibility of providing and determining food options, but children have the responsibility for choosing which foods they consume. This method is meant to empower youth to take an active role in their health.

### **2.3.2.1 Home and family environment as primary target**

Some studies demonstrate the potential for preventing overweight and obesity through family-based approaches. The Girl's Health Enrichment Multisite Studies (GEMS) initiative assessed a 12-week program for 8-10 year old African American girls (Beech, Klesges, Kumanyika, Murray, et al., 2003). This program included diet-related elements within a child-targeted intervention, parent-targeted intervention, and a comparison group. Although this pilot study had a limited ability to determine long-term impacts on BMI, the findings were positive. Children in the intervention group had a 34.1% reduction in sweetened beverage consumption relative to the comparison group. Participants reported high satisfaction with the program, increased knowledge of nutrition, and improvement in the home nutrition environment.

White, Martin, Newton, Walden, and colleagues reported preliminary findings from an intervention aimed at improving weight-, diet-, and fitness-related outcomes in 11 through 15 year old African American girls (2003). The Health Improvement Program for Teens (HIP-Teens), a family-based intervention, incorporated strategies that addressed nutrition, physical activity, healthy food choices, and weight loss. Results at a six-month assessment showed that adolescents and parents in the intervention group had significant body fat and weight reductions relative to controls. Adolescents' weight loss and program adherence were mediated by family factors such as family satisfaction, climate, and parental adherence to program activities (White, et al., 2003). These results suggest that collaborative efforts between teens and their parents improve the effectiveness of interventions and increase the adoption of healthy behaviors.

Most programs and studies directly address family involvement as an additional component and indirectly target parents. For instance, one short-term after-school intervention had African American females develop and create nutrition education media campaigns for their

parents to encourage parents to provide more fruits and vegetables in the home and increase consumption of these foods (Evans, Dave, Tanner, Dube, et al., 2006). The intervention altered the home nutrition environment by increasing both parental social support and fruit and vegetable availability and accessibility, but it showed mixed findings on fruit and vegetable intake. Though these findings are limited and unlikely generalizable, they exhibit the importance and impact of involving families, even through indirect methods.

### **2.3.3 Community factors**

With an increase in the family workforce, many parents utilize child-care services, after-school programs, and summer programs. Research suggests that 60% of children under the age of five spend approximately 29 hours a week in a child care setting, while 41% spend 35 hours or more (Iruka, & Carver, 2006, as cited in Story, et al., 2008). Story and colleagues maintain that more than 6.5 million youth participate in summer and after-school programs at recreational centers, schools, YMCAs, Boys and Girls Clubs, and parks; African American and Hispanic children attend these programs more frequently than other populations (2008). Therefore, after-school and summer programs provide opportunities to improve nutrition in children and adolescents, especially in African American youth.

The USDA, through the Child and Adult Care Food Program (CACFP), provides meals and snacks for a number of center-based care facilities and requires a minimum number of servings from four food groups; it does not, however, follow standards from the Dietary Guidelines for Americans or prohibit the serving of calorie-dense, poor-nutrition foods (Story, et al., 2008). Due to sanctions by Congress, a number of states now provide dinner to children in areas where 50% of the children qualify for free or reduced price school meals, with children

eating three federally-funded meals and a snack every weekday during the school year (Fox, Hamilton, & Lin, 2004, as cited in Story, et al., 2008), some youth, especially those from lower socioeconomic neighborhoods, may consume more meals in these establishments than at home.

### **2.3.3.1 Evidence of interventions**

One program, “Students and Parents Actively Involved in Being Fit,” addressed the diets and exercise behaviors of urban African American children and their parents (Engels, Gretebeck, Gretebeck, & Jimenez, 2005). Some of the program strategies included nutrition education and use of handouts on nutrition and physical activity. Engels and colleagues noted that children not only gained dietary benefits from the intervention, but they also had reductions in their diastolic and systolic blood pressure that paralleled higher levels of fruit and vegetable consumption. While Engels and colleagues maintained that parent involvement was essential, but they suggested that future programs provide early-morning or weekend time options to deal with the challenge of work-related conflicts.

Two studies from the GEMS project assessed interventions employed at an after-school program and a summer camp. Story, Sherwood, Himes, Davis, and colleagues reported the findings from a 12-week after-school program for 54 African American girls. Participants in the intervention group attended meetings twice a week which focused on decreasing the consumption of unhealthy foods (e.g. high-fat foods, sweetened beverages) and increasing the adoption of healthful behaviors (e.g. increased fruit and vegetable consumption and healthy snack preparation). The program also involved parents. The following outcomes reflected changes among intervention participants relative to controls: (a) improved behavioral intentions for healthy eating; (b) increased nutrition knowledge; and (c) parents’ reports of lower caloric

intake from fat, improved food choices and preparation methods, and increased provision of healthful foods.

Baranowski, Baranowski, Cullum, Thompson, and colleagues assessed an intervention for African American girls at a summer camp program; this intervention added an internet component for both parents and youth (2003). Some intervention strategies at the summer camp included goal-setting, snack recipes and preparation, and educational games for increasing fruit and vegetable consumption. The internet component included separate websites targeting children and parents with behavioral and environmental focuses that aimed to increase healthy food and beverage consumption and reduce unhealthy food intake.

Results of the summer camp component showed that relative to controls, treatment girls consumed 1.2 times more servings of fruits and vegetables at follow up and reduced servings of sweetened beverages by 20% while increasing water intake by 40%. Although treatment participants demonstrated a lower intake of calories from fat than controls, intake was still above the targeted goal. Low log-in rates revealed the ineffectiveness of the internet component.

### **2.3.3.2 Primary care providers**

Dietz and Gortmaker reported limited studies to determine the effectiveness interventions to prevent overweight and obesity in primary care settings. The authors indicated the following barriers to these interventions: (a) providers lack confidence in utilizing behavior modification techniques; (b) no widely accepted models of treatment exists; (c) interactions between providers and patients are often too brief; (d) providers feel unequipped to treat these groups; and (e) reimbursement for treatment is limited (2001). Furthermore, many primary care provider-based interventions focus on treatment strategies as opposed to prevention efforts (Dietz, & Gortmaker, 2001).

One study assessed parents' perceptions of counseling provided in primary care for overweight and at-risk children. Taveras, Gortmaker, Mitchell, and Gillman found that certain characteristics were associated with lower reports of receiving advice on nutrition and physical activity (2008). Specifically, African American, Hispanic/Latino, Asian parents and overweight parents with children whose BMI was in the 85<sup>th</sup>-94<sup>th</sup> percentile reported lower satisfaction ratings and less counseling. These findings suggest that primary care providers miss ample opportunities advise parents with overweight children. The racial disparity evidenced in this study suggests a need for improvement in cultural sensitivity and patient-provider.

#### **2.3.3.3 Church-based interventions**

Church-based health promotion initiatives typically target adults; studies and interventions for youth populations in the church setting are limited. However, the Go Girls project is one example of a weight-control intervention targeting African American adolescent females from middle to upper socioeconomic neighborhoods. This multicomponent program involved adolescent participants and their parents in weekly sessions that addressed behavioral goals: decrease fast food intake, increase fruit and vegetable intake, and decrease fat intake (Resnicow, Taylor, Baskin, & McCarty, 2005). Participants were given two-way pagers to receive daily messages they developed based on individual goals. Counselors also conducted motivational interviewing calls four to six times throughout the duration of the program. Unfortunately, the study did not reveal significant BMI changes.

#### **2.3.3.4 School and community gardening initiatives**

Although gardening initiatives are more recent intervention strategies, some research does provide information regarding specific issues and effects related to these gardening

programs. Ozar, who conducted a review of youth gardening projects, discussed the following prominent findings in his review: (a) resource and implementation barriers, such as time, staff, and funding, challenge sustainability; (b) despite a limited body of research, findings are promising; (c) potential exists for improving nutrition-related knowledge, beliefs, and behaviors; (d) develops social-ecological framework; (e) policy changes and parent involvement are needed; (f) has positive impact on overall community (Ozar, 2006). These factors highlight the potential for positive effects and specific challenges that professionals must consider when developing youth gardening programs.

One program that incorporated nutrition lessons, gardening activities, and family newsletters included over 200 4<sup>th</sup> graders (Morris, Koumjian, Biggs, & Zidenberg-Cherr, 2002). The researchers found that students demonstrated improvements in vegetable preferences and nutrition knowledge and showed interest in program activities, teachers reported high satisfaction and support, while intervention parents scored higher on nutrition knowledge than controls (Morris, et al., 2002).

Another intervention with 56 children focused on basic gardening, the ABCs of healthy eating, food safety, and healthy snacks (Koch, Waliczek, & Zajicek, 2006). Though the researchers did not detect changes in participants' preferences for fruits and vegetables, children reported an increased healthier snack consumption and improved nutrition knowledge (Koch, Waliczek, & Zajicek, 2006). The findings from these studies show that youth gardening interventions are feasible and can impact children's nutrition knowledge and food choices.

## **3.0 METHODOLOGY**

### **3.1 DATA COLLECTION AND ANALYSIS**

Peer-reviewed journal articles were located through multiple database searches, mainly using the PUBMED and SCOPUS search engines. Journals on public health (N=3), research (N=2), nutrition (N=5), obesity-related (N=2), ethnic- or minority-based journals (N=1), medical (N=2), and the pediatric and adolescent populations (N=4) were selected for review because they contain studies on interventions to prevent overweight and obesity among African American youth. Due to the social-ecological nature of this problem, social, behavioral, and environmental journals were also included. The Annual Review of Public Health archives, which were searched to examine current literature reviews of overweight- and obesity-related factors, provided access to many of the articles reviewed in this document.

The following search terms were used for this review: 1) African American youth, urban youth; 2) nutrition interventions, nutrition programs, nutrition campaigns, healthy diet promotion; 3) overweight and/or obesity prevention; 4) cultural appropriateness; and 5) barriers to nutrition interventions. The search began with a broad focus and then became more specific. First, the main foci terms, African American youth, nutrition interventions, and overweight and/or obesity prevention, were searched individually. Next, these individual searchers were linked together to produce more-specific search results.

Inclusion criteria for this review were African American youth participants or studies applicable to this population, nutrition or diet-related component to interventions, impact on BMI or diet, cultural influence on diet and weight, culture-specific barriers to healthy eating and weight, and reviews and/or meta-analyses. Studies were excluded if the results were not applicable to African American youth or if access to the full-text article was not available. The abstracts of articles served as the initial basis for inclusion. After determining the studies' relevancy to this review, a more in-depth appraisal of the articles followed. The entire search and inclusion process yielded 20 articles which met the review criteria.

### **3.2 DEFINITION OF TERMS**

The review equates African American with non-Hispanic blacks. Furthermore, the term youth describes children as ages 6-11 and adolescents as 12-17. These age groups were chosen because most interventions addressing overweight and obesity occur in middle or high schools, and most data regarding weight and nutrition status is assessed in these ranges.

Obesity and overweight is defined by the CDC guidelines. Physicians determine the weight status of children and adolescents, ages 2-19, by calculating their Body Mass Index (BMI) using their height and weight (2007). The BMI for children and adolescents is both sex- and age-specific since body fat differs with these variables and is compared to a standard growth chart. BMI scores between the 85<sup>th</sup> and 94<sup>th</sup> percentile signify at-risk for overweight, while BMI scores equal to or greater than the 95<sup>th</sup> percentile qualify as overweight.

Interventions to prevent overweight and obesity with nutrition or diet-related components typically define and measure these components in terms of the following factors: fruit and

vegetable consumption; fat consumption; sugar-sweetened or fruit juice beverage consumption; nutritional knowledge, attitudes, awareness, or beliefs; snacking behaviors; and intentions to change. Nutrition and diet-related goals typically follow national dietary guidelines and recommendations such as five servings of fruits and vegetables per day, 20-30 grams of fiber per day, and less than 30% of energy intake from fat.

There is no standard measure of nutrition or diet improvement among studies. Some studies utilize dietary logs, recall questionnaires, food intake surveys and self-report methods, direct observation, and digital photography. Studies often compare dietary variables to changes in participants' BMI, percent body fat, and overweight and obesity prevalence and incidence. Each study's effect on nutrition or diet was examined in accordance with the study's specified measure of impact.

### **3.3 LIMITATIONS AND PROBLEMS ENCOUNTERED**

The enormity of the problem of overweight and obesity was a challenge encountered during the search process. Because literature related to this issue is overwhelming in size, it is difficult to conduct an exhaustive review of the relevant studies. The complexity of the factors contributing to the increased prevalence of overweight and obesity provides the opportunity to use numerous types of interventions. Essentially, the social-ecological nature of this problem creates problems when attempting to synthesize effective approaches to combating overweight and obesity. The response to these issues was to narrow the focus of the review to school-based interventions that targeted African American youth, cultural implications, and barriers to nutrition interventions. Since schools provide access to a diverse group of students, school-based interventions are

predominately the main source of data regarding the effectiveness of overweight and obesity prevention programs for youth populations.

## **4.0 RESULTS AND FINDINGS**

### **4.1 SCHOOL-BASED INTERVENTIONS**

#### **4.1.1 Food service standards and regulations**

The National School Lunch Program (NSLP) offers lunches to schools attended by about 92% of fifth-twelfth graders, and the School Breakfast Program (SBP) is available to nearly 50% of U.S. students (Burghardt, Gordon, & Fraker, 1995). Both programs receive federal funding. In addition to these reimbursed meals, school-food services also consist of “competitive foods”, such as a la carte options and vending machines (Story et al., 2008). Although the federal meal programs must meet defined Dietary Guidelines for Americans, national standards do not apply to competitive foods (Story, et al., 2008).

In response to this lack of regulation, professionals have made various recommendations for competitive foods. For instance, the Institute of Medicine (IOM) report, Nutrition Standards for Healthy Schools, recommends that federal meal programs be the main source of food. The report suggests that limitations be put into place to guide the sale of competitive foods, by requiring that these foods only consist of nonfat/low-fat dairy products, fruits, whole grains, and vegetables (2007, as cited in Story, et al., 2008). Story and colleagues note that despite local

efforts in several school districts, only 16 states require standards for competitive foods with none reaching the level recommended by the IMO report (2008).

#### **4.1.2 Pathways Study**

The Pathways Study assessed the effectiveness of a three year, school-based overweight and obesity prevention program for American Indian schoolchildren (Caballero, Clay, Davis, Ethelbah, et al., 2003). This multicomponent intervention, implemented in 41 schools in seven American Indian communities, incorporated the following strategies: nutrition and physical activity curriculum, improved food service, increased physical activity, and family involvement. Dietary intake was assessed by direct and unobtrusive observation during lunch periods and dietary recall. Breakfast and lunch menus were also analyzed by computer software. A questionnaire measured behaviors, attitudes, and knowledge related to diet.

Although the intervention did not reach the goal of reducing body fat, the program was well-received and showed other positive effects. The intervention group reported lower total daily energy intake than the controls; data suggest a positive trend for increased physical activity in the intervention group relative to controls. Caballero, Clay, Davis, Ethelbah, and colleagues report that the intervention significantly reduced the dietary fat and saturated fat intake of children. Data also show that the intervention curricula led to an impressive increase in nutrition knowledge among intervention participants relative to controls. The authors maintain that the food service strategies were widely accepted and easily implemented, though all schools did not fully adhere to the guidelines. It appears as though the food service regulations had the greatest effect on the dietary fat consumption of the students.

#### **4.1.3 School-based intervention to address overweight and diabetes**

Another study assessed the effects of a school-based, lifestyle intervention to prevent risk factors for type 2 diabetes among Hispanic adolescents (Rosenbaum, Nonas, Weil, Horlick, Fennoy, et al., 2007). Classes were randomly assigned either to classroom intervention (nutrition education), a classroom (nutrition education) and exercise intervention, or a control group. The nutrition education feature of the program consisted of weekly classroom lessons taught by the researchers. These lessons covered the basis of the experiment and diabetes as well as diet-related modifications and such nutrition education topics as dietary fat, fast food, large portion sizes, and sweetened sodas and juices.

Compared to controls, the treatment groups showed significant reductions in percent body fat, BMI, and other diabetes risk factors (e.g. inflammatory markers) as well as higher insulin sensitivity. However, no significant differences emerged between the two intervention groups. Since changes in diet and exercise behavior were not quantified prior to or following the intervention, the impact of the diet-related strategy compared to the exercise component on intervention outcomes could not be determined.

#### **4.1.4 Wise Mind Study**

The Wise Mind Study was designed to measure if a two-year, school-based environmental approach to prevent weight gain (Healthy Eating and Exercise, HEE) was more effective in preventing weight gain than a control school that received an environmental substance use prevention program (Alcohol/Drug/Tobacco use/abuse prevention, ADT) (Williamson, Copeland, Anton, Champagne, Han, et al., 2007). Youth in grades two-six from four private

Catholic schools participated in the study. Diet-related goals included an increase fruit, dairy, vegetable, and whole grain consumption and suggesting a decrease in dietary fat and sugar consumption.

The HEE program, using a social-ecological framework, incorporated environmental modifications that were meant to "...alter the ecology of the school environments, including policy, personal, social, cultural, and physical environmental change". These strategies included: elimination of vending machines; modification of cafeteria menus; promotion of healthy food; training of teachers for classroom instruction; training of cafeteria staff; monthly newsletters for parents; internet-based health information; and sponsoring of health events.

To measure food selection and intake (e.g. kilocalories for protein, fat, and carbohydrates), the following processes were used: (1) taking digital photos of meals taken before and after consumption; (2) estimating reference points by registered dietitians; and (3) analyzing estimates by a computer software package. Of the 627 student participants, only 16 were African American. The researchers report that the HEE intervention affected food behavior as this group showed reduced total food intake which was primarily determined by improved food selections. The intervention had no significant effects on BMI or weight gain compared to the control group.

#### **4.1.5 Planet Health**

The Plant Health Program is a theory-based (e.g. Social Cognitive Theory and behavioral-choice), multicomponent overweight prevention program for urban middle school children (Gortmaker, Peterson, Wiecha, Sobol, et al., 1999). The intervention features an interdisciplinary curriculum designed to moderate fat intake, improve diet through fruit and

vegetable consumption, decrease television viewing, and increase physical activity. The study included 10 schools from four communities; the schools were randomized to a control or treatment intervention for two years. Both sixth and seventh grade classes in the intervention schools received the curriculum integrated into physical education and main subject courses by regular classroom instructors.

The findings showed a reduction in obesity prevalence from 23.6% to 20.3% among treatment girls relative to an increase in obesity prevalence, 21.5% to 23.7%, among control girls. Though outcomes revealed no differences among boys, the program was particularly effective among African American girls who had the greatest reduction in obesity prevalence. Other observed changes among treatment participants include increased fruit and vegetable intake and reduced television viewing. In fact, decreased television viewing appeared to mediate most of the intervention effects.

Additional studies suggest other benefits of the Planet Health Program. Some of these unanticipated positive effects include: (a) a protective function from adapting unhealthy weight-control behaviors (Austin, Field, Wiecha, Peterson, et al., 2005); (b) reported cost-effectiveness of the program (Wang, Yang, Lowry, & Wechsler, 2003); and (c) delayed menarche onset due to decreased fat-accumulation and increased physical activity which may protect against the development of breast cancer later in life (Chavarro, Peterson, Sobol, Wiecha, et al., 2005). Wiecha, Ayadi, Fuemmeler, Carter, and colleagues examined the implementation and sustainability of this program in other settings (2004). The researchers found the program rated high on acceptability, feasibility, and broad applicability. A large majority of teachers also indicated intentions to continue the program the following year due to the role the program played in increased health consciousness of the educators.

#### **4.1.6 Multicomponent School Nutrition Policy Initiative (SNPI)**

Foster, Sherman, Borrandaile, Grundy, and colleagues conducted a study in 10 schools primarily serving low-income, urban communities to assess the effects of a multicomponent School Nutrition Policy Initiative (SNPI) (2008). This two-year obesity prevention program targeted children in grades four through six and included the following strategies: a school self-assessment, nutrition education, nutrition food service policy, social marketing, and parent outreach. Dietary intake was measured with a food frequency questionnaire that assessed total energy intake, fruit and vegetable servings, and fat consumption.

Baseline data showed that African American children, with more than 40% overweight or obese, comprised approximately half of the sample. Follow-up measures revealed significant differences in incidence and prevalence between intervention and control schools. Intervention schools had fewer students who became overweight relative to control schools, but were no differences in incidence of obesity occurred. Intervention schools showed a 10.3% reduction of overweight, while control schools had a 25.9% increase. African American students in intervention schools were 41% less likely to be overweight than those in control schools. Differences in the prevalence of obesity between intervention and control schools did not reach statistical significance. Although participants in both the intervention and control schools showed similar changes in consumption of energy, fat, and fruits and vegetables, the authors could not determine the mediating effects of these changes on incidence and prevalence due to the

limitations of self-report methods. It is unclear if diet, exercise, a combination of the two, or other factors contributed to weight outcomes.

#### **4.1.7 LA Health**

Williamson, Champagne, Harsha, Han, Martin, and colleagues report the design and methodology for a youth obesity prevention program that targets low-income, African American youth, grades four through six, in rural Louisiana (2008). The research design randomly assigned schools to the following treatment arms: (a) primary prevention program (environmental approach); (b) combined primary and secondary prevention program (primary environmental approach and classroom/internet approach); and, (c) no-intervention control group. Observational control schools were also selected as comparisons but not through the randomized control trial process.

The primary prevention component, based on Social Learning Theory and the environmental approach used in the Wise Mind Study, includes both dietary (consistent with standard nutrition recommendations) and physical activity goals. Some of the strategies of this program are regulating food services, emphasizing social support, modifying environment cues, and promoting self-efficacy. This program also invites parents through the distribution of bi-monthly newsletters that provide information on the principles taught to the students.

The secondary prevention program incorporates the features from the primary prevention program as well as strategies that emphasize individual behavior change and behavior modification. The education component of this program provides weekly nutrition and exercise lessons and hands-on activities. Although this approach uses an internet website based on the HIPteens program, it was delivered in the classroom setting combined with internet counseling

(chat rooms) and email communications. Through a private, personal log-in system, the website avoids stigma and allows for dissemination of weight loss and weight management information to overweight and typical weight participants, respectively.

The study aims to (1) decrease total caloric intake among overweight and at-risk for overweight youth; (2) increase fruit, vegetable, legume, and whole grain consumption; (3) decrease intake of sodium, dietary fats, and sweets; and (4) balance overall macronutrient intake. The researchers plan to use digital photography of food selections and food intake based on the Wise Mind study methodology (Williamson, et al., 2007) and a number of questionnaires to measure diet-related variables. Because this intervention is on-going, its outcome measures are not yet available.

#### **4.1.8 HEALTH-KIDS**

Wang, Tussing, Odoms-Young, Braunschweig, and colleagues discussed the design of a program titled the HEALTH-KIDS (“Healthy Eating and Active Lifestyles from School to Home for KIDS”) Study (2006). This intervention targeted African American children from low-income neighborhoods and incorporated environmental changes in the students’ schools, homes, and communities. Based on Social Cognitive Theory and the Theory of Triadic Influence model principles, the intervention considered cultural, social, environmental, and intrapersonal influences. This program included features from the GEM pilot studies and Planet Health. The researchers incorporated community input from focus groups and pilot tested study instruments for program appropriateness. Students in grades five through eight in four schools participated in the study. Each school was either an intervention or control site.

This program is an on-going intervention utilizing multi-level strategies to address students' nutrition environments, promote healthful eating, and encourage physical activity while decreasing sedentary behaviors. The intervention includes the following components: (a) flyers and posters to promote healthy eating and consequences of overweight and obesity; (b) health-related messages broadcast on school intercoms to alter knowledge, attitudes, beliefs, and peer norms; (c) class curriculum to provide lessons for monthly health classes on topics related to and nutrition; (d) fresh fruit or vegetables given to students during lessons; (d) training for food service staff; (e) food service standards and regulations; (f) family events, classes, and health fairs; (g) directions and coupons for partner grocery stores; (h) newsletters promoting health campaigns; (i) partnerships with local fresh produce stores to increase access and affordability; and (j) partnerships with local corner stores to expand the healthy snack and beverage selections. The family support program addressed the following factors: strategies for budgeting and "smart" shopping, family empowerment, provision of culturally appropriate recipes, reduction of television viewing, and the modification of the home nutrition environment. Results from the HEALTH-KIDS Study are not currently published.

## **4.2 CULTURAL APPROPRIATENESS**

### **4.2.1 Overview of the role of culture**

A major challenge for professionals is conceptualizing the meaning of culture. Generally, culture lacks widely-accepted measures, explanatory models, and operational definitions (Kreuter, & McClure, 2004). Specific cultural traditions, such as dietary practices and food

preparation methods, may have indirect or direct effects on health behaviors, priorities, decisions, and the acceptance of health promotion programs (Kreuter, & McClure, 2004).

#### **4.2.2 Cultural considerations with health messages**

To address the impact of culture, Kreuter and McClure promote the use of a communication model. Specifically, the researchers focus on audience segmentation which is used to tailor information based on the specific characteristics and needs of a subsection of the population (2004). The authors promote the use of a communication model when addressing the impact of culture. This framework specifies five input variables which have cultural relevance: source, message, channel, receiver, and destination (Kreuter, & McClure, 2004). By emphasizing an IOM report on health communication strategies, the authors suggest that culture and diversity be considered at each decision point when developing campaigns for diverse cultural subpopulations (2004). Although some other studies employ cultural sensitivity approaches, less is known about how these methods improve the effectiveness of communication (Kreuter, & McClure, 2004).

#### **4.2.3 Focus group with mother-daughter dyads**

In a study assessing cultural attitudes of African American mother-daughter dyads, Boyington and colleagues utilized focus groups and discovered a number of trends among the participants' weight perceptions and eating behaviors (2008). Contrary to other ethnicities, the African American adolescents in this study suggested that weight was individually classified and

dependent upon personal comfort and satisfaction. Those participants who maintained a preference for fuller-figures were less influenced by individuals outside of their social circle.

While respondents discussed food taste, texture, and context as barriers to making healthy food choices, they did demonstrate interest in acquiring knowledge and skills to manage or overcome these hindrances. Participants noted the influence of parental support, particularly with adult female role models on food production, but also distinguished the need for independence when making food choices. These adolescents dispelled popular, culturally-identifiable figures, such as Oprah Winfrey, as realistic role models due to celebrities' access to amenities such as personal trainers and chefs.

#### **4.2.4 Focus groups with adolescents, adults and seniors**

Another study assessed African American adolescents, adults, and seniors in group interviews to determine various cultural food themes (Airhihenbuwa, & Kumanyika, 1996). The adolescent group did not report beliefs that their ethnicity affected their food choices, whereas, the older groups did express their perceptions of cultural influence.

All of the age groups acknowledged "soul food" and discussed both the positive and negative attributes of these foods. Participants suggested encouraging certain valuable attributes of traditions associated with soul food such as family dining and use of vegetables, but eliminating or modifying other customs such as cooking with foods high in fat, cholesterol, and sodium. Participants also reported that limited access to healthy foods in many stores frequented by African Americans was a barrier to healthy eating.

## **4.3 BARRIERS TO NUTRITION AND WEIGHT INTERVENTIONS**

### **4.3.1 African Americans' perspectives**

A number of studies used focus groups to assess how the perceptions of African American children and adolescents influence their food choices and eating behaviors (Cullen, Baranowski, Rittenberry, & Olvera, 2000; O'Dea, 2003; Neumark-Sztainer, Story, Perry, & Casey, 1999; Boyington, Carter-Edwards, Piehl, Hutson, Langdon, McManus, 2008). One prevailing finding among studies identifies appeal as a barrier to consuming healthful foods (Cullen, Baranowski, Rittenberry, & Olvera, 2000; O'Dea, 2003; Neumark-Sztainer, Story, Perry, & Casey, 1999; Boyington, Carter-Edwards, Piehl, Hutson, Langdon, McManus, 2008). Youth participants discussed the relationship among taste, appearance, and preparation of foods with their food choices. The respondents highlighted how food appeal affects their consumption of fruits, vegetables, and low-fat or fat-free products. Respondents, who expressed a desire for sweeter foods, suggested that vegetables be prepared with sugar to improve taste.

Bauer, Patel, Prokop, and Austin held focus groups with teachers and faculty who helped implement the nutrition intervention Planet Health in low-income, urban schools (2006). Respondents in this study insisted that school food services provide minimal healthy options for students and that cafeteria food options undermine nutrition lessons. Youth criticized the appearance of fruits and vegetables served at schools, stating that these items were often bruised, lacked quality and variety, and were not well-prepared.

Convenience and time factors emerged as other prevailing themes discussed in the focus groups. The participants blamed a lack of time for determining food choices: waiting in lunch-

lines at school, eating at fast-food restaurants, and consuming of prepackaged and prepared convenience foods. (Cullen, et al., 2003, & Neumark-Sztainer, et al., 1999).

Access and availability of fruits and vegetables emerged as additional factors influencing youth's eating behaviors. Many respondents noted parental control in purchasing and providing healthful foods at home (Cullen, Baranowski, Rittenberry, & Olvera, 2000; O'Dea, 2003; Neumark-Sztainer, Story, Perry, & Casey, 1999; Boyington, Carter-Edwards, Piehl, Hutson, Langdon, McManus, 2008). Respondents maintained that some environments, school and restaurants, limited that access to healthful food options is limited in other environments, such as schools and restaurants. Neumark-Sztainer and colleagues reported that adolescents identified cost as an influencing factor. Some respondents noted the contrast between inexpensive fast-foods and higher-priced options at healthier dining establishments.

Although the effect of peer support on eating behaviors was not as widely discussed as parental influence and support, participants in all three studies noted that peers play a role in their food choices (Cullen, Baranowski, Rittenberry, & Olvera, 2000; O'Dea, 2003; Neumark-Sztainer, Story, Perry, & Casey, 1999; Boyington, Carter-Edwards, Piehl, Hutson, Langdon, McManus, 2008). Youth admitted that healthy foods led to negative comments, while opting for unhealthy "junk" food was the more popular choice in the social context of eating.

Some of the researchers found that the low-priority of healthy eating inhibited healthy diets. Children and adolescents responded that they primarily worried about friends, family, and school, making healthy eating a less important consideration. More specifically, researchers reported that youth view poor dietary choices as risk factors for older adults, not for their age group. (Cullen, et al., 2000; O'Dea, 2003; Neumark-Sztainer, et al., 1999; Boyington, et al., 2008).

Respondents also noted the effect of television advertisements and marketing strategies on their eating behaviors (Cullen, et al., 2000; O'Dea, 2003; Neumark-Sztainer, et al., 1999). These advertisements typically promote unhealthy, convenient, or ready-to-eat products with little or no nutritional value. Respondents emphasized the prevalence of fast-food restaurant advertisements, arguing that these fast-food establishments do not promote healthier food options, especially in regard to beverages.

In each of the studies, the respondents offered specific suggestions to intervene with and improve diets. Children and adolescents suggested improving the taste, appearance, and preparation of foods, as well as increasing the access and availability of healthful foods in the home, school, and restaurant environments. Respondents indicated that if healthier options were better advertised and provided along with meals, they would be more inclined to consume these foods, especially in regard to fruits and vegetables. Participants recommended using positive role models (Cullen, et al., 2000), tailoring advertisements to encourage healthy eating, and improving purchasing designs as ways to make it "cool" to adapt a healthy diet (Neumark-Sztainer, et al., 1999). Participants further asserted that unhealthy foods become either less available or eliminated. Neumark and colleagues reported that some respondents suggested making healthy foods the only available options in some environments.

Other strategies suggested by participants include increased parental support (O'Dea, 2003) and time availability for meal preparation (Neumark-Sztainer, et al., 1999). Adolescents endorsed increased education for young children on the importance of healthy eating without forcing or controlling food choices. In addition, respondents offered recommendations for planning ahead to eat healthful foods which mostly involved changes to food availability.

Participants also expressed interest in learning more about self-monitoring strategies, nutrition, and the benefits of healthful dietary practices.

## **5.0 DISCUSSION**

### **5.1 COMMON FINDINGS**

#### **5.1.1 School-based interventions**

Studies indicate that school-based nutrition interventions are successful in improving the diets of African American children and adolescents (Planet Health, SNPI, Pathways, Wise Mind study) and weight-related variables (Planet Health, SNPI, overweight/diabetes intervention). Some school-based interventions lowered overweight prevalence and incidence but had no impact on obesity rates (Planet Health, SNPI). This suggests that certain programs are more effective as preventive or early intervention approaches, rather than as treatment for obese students.

Strategies that alter the nutritional environment in schools may be particularly beneficial (SNPI, Pathways, HEALTH-KIDS, Wise Mind study). Theory-based studies applied concepts from Social Cognitive Theory, Social-Ecological perspective, behavior-choice, and other behavior change models. Nutrition interventions to prevent overweight and obesity typically occur in tandem with other components and program goals such as increasing physical activity, reducing television viewing, and improving self-efficacy.

Although results are not yet available, the HEALTH-KIDS and LA Health studies may serve as models for school-based interventions that target African American youth. A major

strength of the HEALTH-KIDS Program is its holistic approach to address the nutrition environments that youth encounter in the school, home, and community. Other attributes of this program include: theory- and evidence-based methods, formative research, cultural sensitivity, and use of community input. The effort to ground the HEALTH-KIDS Program in theory and research improves the quality of the intervention, saves resources by utilizing previously developed and tested materials, and increases the likelihood for program effectiveness.

The LA Health Program seems promising with its use of multicomponent environmental and behavioral interventions, internet-based component, parent involvement, food service regulations, evidence-based strategies, and novel approach to dietary assessment. Not only do these two programs demonstrate some of the first attempts to intervene in the larger, social-ecological context based in schools, but if these interventions prove effective, other schools can apply similar strategies to prevent overweight and obesity.

### **5.1.2 Culture and barriers**

A number of common themes emerged among studies that addressed the role of culture on dietary practices and weight-status. Culture is viewed as a necessary consideration when designing nutrition and weight interventions. The African American population, particularly its females, shared a higher acceptance of and even preference for fuller-figures among African American populations, particularly females. They base weight and body satisfaction more on individual and personal interpretations than on the opinions of outsiders. However, African American females may benefit from realistic and culturally-appropriate female role models.

Studies showed culturally indefinable characteristics related to diet and nutrition. While African American youth do demonstrate a willingness to learn more healthful dietary habits and

modify their food practice, but they still embrace a cultural style of eating. Soul food is recognized as a cultural tradition with both positive and negative effects on health.

Two of the most prominent culture-specific barriers to quality nutrition are food appeal and taste preferences. These characteristics affect the willingness of African American youth to consume fruit, vegetable, and low-fat/no-fat products. The low-priority of healthy diets emerged as another theme with detrimental implications considering the health consequences that are associated with overweight and obesity. Youth further identified time, the wide availability of unhealthy food options, parent and peer influence, and food advertisements as other barriers preventing them from making healthy choices. The suggestions offered by the African American participants, with their emphasis on environment, social, and policy changes, parallel the social-ecological continuum.

## **5.2 GAPS IN RESEARCH**

### **5.2.1 School-based interventions**

More studies are needed to show the effectiveness of nutrition interventions to preventing overweight and obesity among African American youth. Although this subgroup is disproportionately affected by overweight and obesity, few interventions target this population. However, studies that focus on other minority populations (Pathways and Wise Mind study) or apply social-ecological concepts (Wise Mind study) provide valuable knowledge that may guide future interventions that address African American youth.

Other issues challenge the comparison of intervention effects and impede the identification of best practice approaches. For example one limitation comes from the lack of a standard nutrition measurement tool to assess intervention outcomes. Furthermore, in nearly all of the interventions, the mediating effects of diet-related strategies relative to other program components were unclear.

Factors involving the individual, family, society, and environment affect overweight and obesity prevention in schools and create gaps in knowledge. Additional research on school-based interventions should address some of the following issues: (a) impact of food service standards and regulations; (b) feasibility of interventions based on a social-ecological model; (c) dissemination of findings; (d) generalizability of effective interventions; and (f) impact of nutrition interventions on African American youth.

### **5.2.2 Culture and barriers**

Additional gaps in knowledge stem from the role of culture on nutrition and barriers to diet-related, overweight prevention programs. The main cultural and barrier issues that require additional research include: (a) role of culture on perceptions of nutrition and diet-related messages and educational materials; (b) effect of cultural-specific weight preferences on intervention acceptance and adherence; (c) effectiveness of culturally-relevant and tailored strategies (e.g. food preparation, soul food, traditions, food preferences); (d) influence of taste, appearance, texture, and preparation on food choices; (e) role of social support on food choices and preferences; and (f) effective approaches to address nutrition barriers (e.g. exposure, increasing access, modeling, time/convenience, regulating food options).

## **5.3 DIRECTIONS FOR FUTURE INTERVENTIONS**

### **5.3.1 School-based interventions**

The importance of social-ecological approaches to improve the diets of African American youth's is consistently reiterated throughout the literature on overweight and obesity prevention.

The intervention approaches integrated in some studies demonstrate the adoption of this perspective (SNPI, Pathways, HEALTH-KIDS, LA Health, Wise Mind study). There is a growing emphasis on collaborative efforts among families, schools, communities, and policy-makers to achieve sustainable, wide-spread change.

Some of the most promising approaches to school-based nutrition interventions to address overweight and obesity among African American youth include: (a) increased exposure to healthy foods in order to alter taste preferences; (b) family/parent components in school-based interventions (e.g. family goal setting, health events, newsletters, meetings, nutrition information, culturally-appropriate recipes); (c) interdisciplinary nutrition curriculum, diet, and overweight/obesity; (d) supportive social environments; (e) food service trainings, standards, and regulations; (f) implementation of school gardens; (g) various communication channels to provide nutrition education; (h) promotion of healthy lifestyles rather than weight reduction; (i) increase in access, availability, and quality of healthy food options available in schools; (j) addressing the stigma and psychosocial effects associated with overweight and obesity; (k) incorporation of theory- and evidence-based approaches; and (l) multiple components that address the social-ecological continuum (e.g. individual, family, social, environment, community, policy).

### **5.3.2 Culture and barriers**

Nutrition interventions must consider the role of culture and address specific barriers to nutrition programs. Interventionists should tailor messages and materials to meet the specific needs and interests of the population. Interventions should promote the continuation of healthful, culture-specific eating habits (e.g. family meals and use of vegetables in cooking) and recommend a modification in or limitation of culture-specific, unhealthy food practices (e.g. high-fat and high-sodium preparation methods). Cultural perceptions and attitudes toward weight must be incorporated into the intervention design.

Strategies that address culture-specific barriers can be easily integrated into larger interventions such as those based in schools. As reported by African American youth, the following strategies may be effective in addressing some of the barriers to healthy eating. These include: (a) improve food appeal (e.g. taste, texture, appearance, preferences) through increased exposure, cooking lessons, and school gardens; (b) increase access and availability to healthy foods by establishing food service standards, partnering with community organizations and businesses, eliminating unhealthy options, and creating school gardens; (c) foster a positive and supportive environment that promotes healthy eating and healthy lifestyles; (d) address time issues by increasing knowledge of quick, healthy snacks and meals, teaching ways to prepare food ahead of time, improving preparation skills, and providing small, individual-sized healthy snacks; (e) educate youth on the importance of healthy eating, how it impacts their health (both present and future), and why they should perceive nutrition as a priority; and (f) improve marketing and promotion strategies to appeal to youth populations. The basis of these intervention strategies closely resembles a social-ecological perspective.

## **6.0 CONCLUSION**

Because schools present ideal locations to reach diverse groups of students at various developmental ages, schools emerge as prime environments for addressing and preventing overweight and obesity. Yet, such school-based nutrition interventions require the use of multiple strategies. There is a great need for action on the local, state, and federal levels to improve the quality of foods served at schools. While it is essential to set nutrition standards and regulations at the school-level, other approaches, such as education and behavior change strategies, are also necessary.

Further research is needed to determine the effectiveness and sustainability of school-based interventions in order to extend program benefits to other populations. Schools may effectively serve as the main intervention site for the integration of other social-ecological components.

In order to accurately represent the targeted subgroup, gain trust and legitimacy, tailor messages and materials, and increase chances of program success, researchers and professionals must allot adequate time to formative research and practice cultural-sensitivity. These considerations are crucial for effectively communicating health information to African American youth. For instance, it may be more culturally appropriate to implement programs that focus more on healthful eating as a means to healthy living rather than those that promote weight loss.

Interventions should also address the culture-specific barriers associated with healthy eating, especially food appeal/taste preferences, access issues, and low-priority of nutrition.

Nutrition interventions for African American youth require social-ecological approaches to prevent overweight and obesity and to improve health outcomes and overall quality of life. As a result, policy-makers should make national nutrition campaigns and obesity prevention a high priority. Interventionists must consider the nutrition environment in homes, schools, and communities. Although individual-level approaches to improve the knowledge, beliefs, attitudes, and behaviors of children and adolescents, these approaches are inadequate and only impact food choices to a limited degree. Without addressing the social and environmental context in which youth make food decisions, efforts to raise the quality of the diets of African American youth will not reach weight-related goals and national dietary standards.

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