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# Nutrition Environment and Practices in Twenty-Four Child-Care Centers in Georgia

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NUTRITION ENVIRONMENT AND PRACTICES IN TWENTY-FOUR  
CHILD-CARE CENTERS IN GEORGIA

by

JOYCE MAALOUF

M.S., AMERICAN UNIVERSITY OF BEIRUT, LEBANON

A Thesis Submitted to the Graduate Faculty  
of Georgia State University in Partial Fulfillment  
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# NUTRITION ENVIRONMENT AND PRACTICES IN TWENTY-FOUR CHILD-CARE CENTERS IN GEORGIA

by

JOYCE MAALOUF

Under the direction of Rodney Lyn, PhD

## ABSTRACT

**Background:** The amount of time children spend in child care (CC) each week has increased in recent years. As a result children consume a large proportion of their daily energy intake at CC facilities. The purpose of this study is to describe the baseline dietary practices in preschool-aged children attending CC centers in Southwest Georgia before the implementation of a one-year wellness policy implementation program. Additionally, the study will determine the relationship between the social and nutrition environment in childcare centers and dietary practices in child-care centers.

**Methods:** The data is the baseline data of a pilot study evaluating nutrition and physical activity wellness policy implementation in twenty four licensed CC in rural Georgia. Each CC provided a sample one week menu (three meals/day: breakfast, lunch and afternoon snacks). The energy and nutrient contents of 360 meals were analyzed using NutriKids. Food groups were assessed using a menu rubric. Menus were compared to the Dietary Reference Intakes, the Dietary Guidelines for Americans and MyPyramid food group recommendations for children 3 to 5 years of age.

**Results:** Children were served a mean of 883 kcal at three meals. The menus content met the requirements for energy, macro-nutrients, vitamins A and C. However, the menus were high in saturated fat, and sodium content and did not meet the requirements for iron, fiber and calcium. The majority of the centers did not meet the requirements of the Food Guide Pyramid for pre-schoolers. With the exception of milk, children at all participating centers were served less than the recommended amounts for grains, vegetables, meat/beans and fresh fruits.

**Conclusions:** Child care settings provide a unique opportunity to influence children's dietary behaviors and health. Our data suggests that children are not consuming recommended amounts of whole grains, fruits or vegetables while attending full-time childcare. Instead, children are consuming excessive amounts of added sugars from sweet snacks, sodium, and saturated fat from whole milk and high-fat or fried meats. We anticipate that by the end of the one-year implementation of the wellness policies, day-care centers in Southwest Georgia will be better equipped to improve the quality of food served to this population of children. Findings from this study and the policy recommendations that emerge could significantly impact efforts to provide healthier nutrition environments to children in child care centers.

*Index Words:* Nutrition assessment, child-care centers, pre-school, nutrition environment, Georgia

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**Maalouf J**, Nabulsi M, Vieth R, Kimball S, El-Rassi R, Mahfoud Z and El-Hajj Fuleihan G. SHORT TERM AND LONG TERM SAFETY OF HIGH DOSE VITAMIN D3 SUPPLEMENTATION IN SCHOOL CHILDREN. *J Clin Endocrinol Metab* 2008; Jul;93(7):2693-701

Nabulsi M., Mahfoud Z., **Maalouf J.**, Arabi A., El-Hajj Fuleihan G. Impact of maternal veiling during pregnancy and socioeconomic status on offspring's musculoskeletal health. *Osteoporosis International* 2008; 19:295-302.

El-Hajj Fuleihan, Nabulsi M, Tamim H, **Maalouf J**, Salamoun M, Khalifeh H, Choucair M, Arabi A, Vieth R. Effect of vitamin D supplementation on musculoskeletal parameters in school children: A randomized controlled trial. *J Clin Endocrinol Metab*. 2006; 91(2):405-12.



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## Chapter I

### Introduction

#### 1.1 Background

The number of individuals classified as overweight or obese have continuously increased in the last 30 years reaching epidemic proportions in the United States. The obesity rate for children ages 2 to 5 has more than doubled (from 5 to 10.4 percent) since 1980 (Centers for Disease Control and Prevention, 2006). According to the most recent National Health and Nutrition Examination Survey (NHANES), 16.9 percent of children ages 2–19 are obese and 31.7 percent are overweight or obese (Ogden et al., 2010). A recent report by Trust for America’s Health (2010) listed Georgia as having the second-highest population of overweight and obese children in the U.S. In a survey conducted in 2006, the obesity rate for children 2-5 years old in Georgia was 14.5% (Polhamus et al., 2007) versus 12.4% nationwide (Ogden et al., 2006). Overweight children are at a higher risk of being overweight or obese adults (Whitaker, Wright, Pepe, Seidel & Dietz, 1997). Overweight and obesity increase the risk for chronic diseases including type II diabetes, heart disease, hypertension, certain cancers, and many others, all of which place a heavy burden on individuals, families, communities, and society (Whitaker et al., 1997). Therefore, it is essential that society intervenes as early as possible to teach and reinforce healthy eating and physical activity habits among children.

Based on results of the National Education Survey conducted by the US Department of Education and the Survey of Income, as of 2006, it is estimated that 12 million, or 61%, of the 19 million US children 5 years of age and younger are in some form of child care on a regular basis (Iruka & Carver, 2006). As a result, pre-school children are consuming a large proportion of their daily energy intake at child-care facilities (Bruening, Passannante, McClowry, 1999; Padget & Briley, 2005). Therefore, child-care centers can encourage healthy lifestyles in children by adopting policies, environmental features, and providing programs supporting healthy diets and regular physical activity.

It has been recommended that a child who spends a full day (i.e. 8 hours or more) in child-care should consume one-half to two thirds of his or her daily dietary intake when in child-care (American Dietetic Association, 2005). This places a great deal of responsibility on child-care centers to ensure nutritionally adequate, healthful food. Guidance for dietary intake in children is available. Specifically, the new MyPyramid guidelines provide recommendations for daily amounts from the five main food groups (grains, vegetables, fruits, milk, and meat/beans) by age, sex, and activity level (United States Department of Agriculture, My Pyramid Plan). The Recommended Dietary Allowances offer guidelines for macronutrients and micronutrients for children age 4 to 8 years (Dietary Reference Intake, 2010). In addition, guidelines from the American Heart Association (Gidding et al., 2006) and the American Dietetic Association (Nicklas & Johnson, 2004) outline healthful eating recommendations for young children. The Position of the American Dietetic Association: *Benchmarks for Nutrition Programs in Child Care Settings* (2005) and the Head Start Program Performance Standards for Nutrition are unique in that they are intended to guide nutrition programs in child-care settings. In addition, the MyPyramid guidelines can be used to guide child-care menu planning.

Menus from child-care centers are an important source of information for parents, researchers, dietetics practitioners, and child-care regulators. State and federal regulators often review menus to ensure that child-care providers serve appropriate foods and beverages to children (American Dietetic Association, 2005). They also use menus to monitor adherence to program guidelines or state regulations as menu review is often the most cost-effective method to monitor foods served in child care. Researchers and dietetics practitioners also use menus to assess diet quality of foods and beverages served to children attending child care, and to identify opportunities for improvement through dietary intervention (American Dietetic Association, 2005).

## **1.2 Purpose of the study**

Previous studies have shown that children in child-care do not meet dietary intake recommendations (Bollella et al.,1999; Briley, Jastrow, Vickers & Roberts-Gray, 1999; Padget & Briley, 2005; Ball, Benjamin, Ward, 2008). Specific features of the child-care environment may underlie such findings. Improving our understanding of nutrition determinants in the childcare setting may ultimately lead to the development of more effective strategies for promoting nutrition among preschool children.

The purpose of this thesis is to describe the baseline dietary practices in child-care centers in Southwest Georgia before the implementation of a one-year wellness policy implementation program. Baseline menus were compared to the Dietary Reference Intakes (DRIs) and MyPyramid food group recommendations for children 3 to 5 years of age. Additionally, the study will determine the relationship between the social and nutrition environment in childcare centers and the dietary practices.

## **1.3 Research Questions**

- 1 What are the characteristics (energy, macro/micronutrients, quality) of the food served to children in 24 child-care centers in Southwest Georgia?
- 2 To what extent is the food served in participating childcare centers consistent with the dietary recommendations for children 3 to 5 years of age?
- 3 To what extent are the environmental factors and the dietary practices at the child-care centers related?

## **Chapter II**

### **Review of Literature**

#### **2.1 The burden of obesity**

##### **2.1.1 Prevalence and Trends in the United States**

The number of individuals classified as overweight or obese have continuously increased in the last 30 years reaching epidemic proportions in the United States (Ogden, Carroll, Curtin, Lamb & Flegal, 2010). In 2010, more than two-thirds of states (38) have adult obesity rates above 25 percent compared to 1991, where no state had an obesity rate above 20 percent (Trust for America's Health, 2010; Figure 1). Nationally, more than two-thirds (68%) of adults are overweight or obese. Adult obesity rates have grown from 15 percent in 1980 to 34 percent in 2008, based on a national survey (Flegal, Carroll, Odgen & Curtin, 2010). Meanwhile, the rates of obesity among children ages 2–19 have more than tripled since 1980 (Hedley et al., 2004). According to the most recent National Health and Nutrition Examination Survey (NHANES), 17 percent or 12.5 million US children ages 2–19 are obese (Ogden et al., 2010). This includes 10.4% of 2-5 years old, 19.6% of 6-11 years old and 18.1% of 12-19 years old (Ogden et al., 2010).

##### **2.1.2 Prevalence and Trends in Georgia**

According to the seventh annual *F as in Fat: How Obesity Threatens America's Future* 2010 report from the Trust for America's Health, the 10 states with the highest adult obesity rates are in the South, and nine of the 10 states with the highest childhood obesity rates are in the South (Table 1). A recent analysis using data from the Behavioral Risk Factor Surveillance System (BRFSS) produced county level obesity prevalence estimates for non-institutionalized civilian Georgian adults in 2007. Overall, 29% (1.9 million) of adult Georgians were obese in 2007, but the prevalence of obesity varies across the counties, ranging from 23.3% to 35.6% (Georgia Department of Community Health, 2009). In a survey conducted in 2006, the obesity

rate for children 2-5 years old in Georgia was 14.5% (Polhamus et al., 2007) versus 12.4% nationwide (Ogden et al., 2006). Georgia has the second-highest population of overweight and obese children in the U.S (Trust for America's Health, 2010). A study conducted recently in 39 schools from 10 counties across Georgia found that about 20% of children and adolescents were overweight and 16% were at-risk-for-overweight (Lewis et al., 2006). The extent of overweight was similar in all grades, but was higher in boys compared to girls, in rural and suburban regions compared to urban regions, and in African Americans and other minorities compared to whites (Lewis et al., 2006). The burden of overweight, obesity and related diseases disproportionately affects poorer populations in Georgia. Overweight among Georgians aged 2-5 years enrolled in the Woman, Infants and Children (WIC) program has increased 60% in the last decade. Children from lower-income households are more likely to be obese (26%) than those from higher-income households (21%) (Georgia Division of Public Health, 2005). These alarming numbers and trends speak to the urgency of addressing the problem of childhood overweight.

### **2.1.3 Risks associated with Overweight and Obesity**

Overweight and obesity increase the risk for chronic diseases including type II diabetes, heart disease, hypertension, certain cancers, and many others, all of which place a heavy burden on individuals, families, communities, and society (Centers for Disease Control and Prevention, 2006). The seriousness of these risks is illustrated by the recent increases among children in conditions formerly thought of as “adult” diseases, such as obesity-associated Type 2 diabetes and hypertension (Han, Lawlor & Kimm, 2010). Overweight children are at a higher risk of being overweight or obese as adults (Whitaker et al., 1997). The health risks and economic costs related to obesity are staggering. Medical expenditures for overweight and obese adults have been found to be 14.5% and 37% higher, respectively, than for normal weight adults (Zizza et al., 2004). The estimated average hospital length of stay for obese individuals is 60% longer than for normal-weight individuals nationwide (Zizza et al, 2004).

According to the Georgia Department of Health’s *Overweight and Obesity in Georgia Report* (2009), an estimated 6700 Georgians die every year from obesity-related diseases. The economic cost of obesity in Georgia is estimated at \$2.1 billion per year for children and \$2.4 billion per year for adults (Finkelstein, Fiebelkorn & Wang, 2004).



Figure 1: Obesity Trends Among U.S. Adults

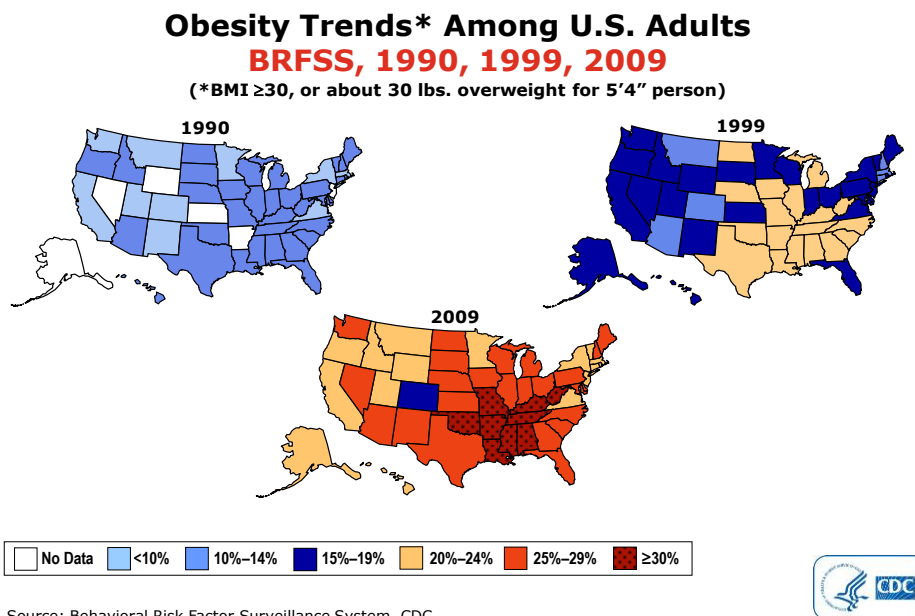


Table 1: States with the highest obesity rate for children and adolescents

States with the Highest Rates of Obese 10- to 17-year-olds		
Rank	States	Percentage of Obese 10- to 17-year-olds (95 percent Confidence Intervals)
1	Mississippi	21.9% (+/- 3.5)
2	Georgia	21.3% (+/- 5.1)
3	Kentucky	21.0% (+/- 3.5)
4 (tie)	Illinois	20.7% (+/- 3.6)
4 (tie)	Louisiana	20.7% (+/- 4.0)
6	Tennessee	20.6% (+/- 3.7)
7 (tie)	Arkansas	20.4% (+/- 3.6)
7 (tie)	Texas	20.4% (+/- 5.0)
9	D.C.	20.1% (+/- 3.9)
10	West Virginia	18.9% (+/- 3.2)

Adapted from: The 7<sup>th</sup> annual F as in Fat: How Obesity Threatens America's Future 2010, Trust for America's Health and the Robert Wood Johnson Foundation

## **2.2 Etiology of Overweight and Obesity**

The increases in childhood obesity and overweight are likely a consequence of “obesogenic” environments that favor increased energy intake and decreased energy expenditure (Eriksen & O’Dea, 2010). The decreases in energy expenditure are due both to decreased moderate to vigorous physical activity, and increased sedentary behavior, including computer activities, watching television, and playing videogames (Crespo et al., 2001; Dietz & Gortmaker, 2001). On the other hand, the increase in energy intake is due to unhealthy dietary habits. There has been a tremendous increase in recent decades in the availability of foods for consumption through increased in portion sizes, fast food availability and meals away from home (Lake & Townshend, 2006; Dietz & Gortmaker, 2001). There is now an emerging body of evidence that lack of fruit and vegetable consumption, sugar-sweetened beverage consumption play a role in positive energy balance and the development of childhood obesity (Dietz & Gortmaker, 2001). Furthermore, there has been a substantial rise in the amount of time children and adolescents spend viewing mass media, such as television, and hence in the amount of their exposure to food advertising (Crespo et al., 2001). Clearly these broad trends in the society can influence energy balance of children and potentially circumvent efforts by parents and such local institutions as schools and day-care centers to promote healthful diets and adequate levels of physical activity. Recognizing the increase in energy intake and subsequent increases in child overweight, it is important to intervene through programs that may prevent as well as treat the problem by reaching a majority of the targeted population especially at younger ages.

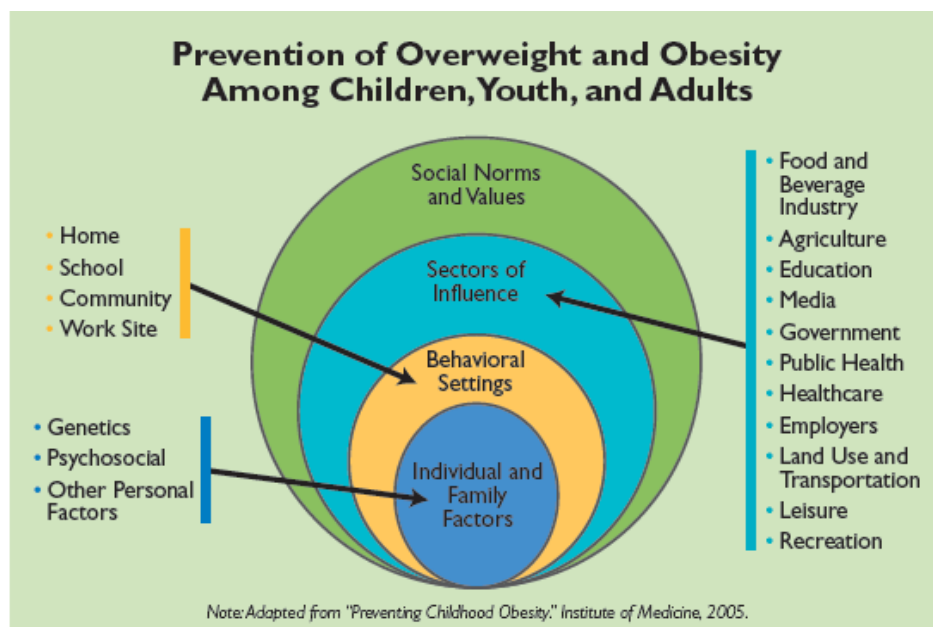
## **2.3 Theoretical framework**

The obesity epidemic is complex and multi-causal making it challenging to identify correlation, let alone causation of overweight and obesity. A deep understanding of the multiple systems, resources, and policies that shape the individual is necessary to begin to address the issue (Glanz & Saelens, 2010). The attention being focused on environmental determinants of disease signals a “broadening in theory from the individual-level intervention models that dominated twentieth-century practice to a social ecological model that emphasizes the role of the environment in the causation of illness” (Sloane et al. 2006, p.147).

Experts employ a socio-ecological framework that provides a method for examining the multiple effects and interrelatedness of social elements that contribute to obesity (Glanz & Saelens, 2010). According to the socio-ecological model, health behaviors arise and are maintained through four interacting levels of influence: individual factors, interpersonal relationships, schools and other organizations and the greater society (Glanz & Saelens, 2010; Figure 2). While individual-level behaviors factor into obesity rates, overarching social and environmental changes can have a broad, lasting impact on obesity (CDC, 2010). Effectively, the principles of the socio-ecological model suggest that initially creating an environment conducive to change is important to make it easier to adopt healthy behaviors. Given the widespread problems with overnutrition and unhealthy dietary habits, more attention should be focused towards increasing the health-promoting features of communities and neighborhoods and reducing the availability of high-calorie, high-fat food choices (Runge, 2007).

The Institute of Medicine's *Preventing Childhood Obesity: Health in the Balance* (Koplan et al., 2005) has recommended that childhood obesity prevention should address multiple levels and multiple sectors. Therefore, focus must be placed primarily on factors within family, school, day-care and community environments that affect food intake and physical activity (Dietz & Gortmaker, 2001).

**Figure 2: The Socio-Ecological Model**



## 2.4 Role of childcare centers in preventing overweight and obesity

The number of child care facilities in the United States jumped from less than 25,000 in 1977 to 40,000 in 1987 and then to more than 117,000 in 2007 keeping pace with rising rates of employment among mothers of young children (Children's Foundation and the National Association for Regulatory Administration). Based on results of the National Education Survey conducted by the US Department of Education and the Survey of Income conducted by the US Census Bureau, as of 2006, it is estimated that 12 million, or 61%, of the 19 million US children 5 years of age and younger are in some form of child care on a regular basis (Iruka & Carver, 2006). There are a total of 740,000 children ages 0-5 years in Georgia (US Census Bureau, 2009a). A recent study by Georgia State University and the University of Georgia estimated that the early care and education industry in Georgia serves more than 380,000 children (51%) each year (Child Policy Partnership, 2008).

By spending much of their day in child-care, pre-school children consume a majority of their daily intake in child care (Bruening, Passannante & McClowry, 1999; Parker, 2000; Padgett & Briley, 2005). Previous studies have shown that children in child-care do not meet dietary intake recommendations (Bollella et al., 1999; Briley, Jastrow, Vickers & Roberts-Gray, 1999;

Padget & Briley, 2005; Ball, Benjamin, Ward, 2008). Therefore, nutrition in child-care is in need of improvement. To achieve goals for healthy children today and healthy adults tomorrow, it is essential that health professionals work in partnership with child care providers and with children's families to ensure that meals and snacks consumed in child care settings meet children's nutrition needs and provide them with excellent opportunities to learn healthful dietary patterns.

Child care centers offer "untapped opportunities" for implementing obesity-preventing initiatives because the infrastructure needed to incorporate more nutrition and physical activity programs for children and parents already exists in child care centers (Story, Kaphingst, & French, 2006). Because most health behaviors are initiated in childhood, influencing the health behavior of individuals when they are children is reasonable and practical (Crockett, Mullis & Perry, 1988). It is well recognized that food habits and patterns of nutrient intake acquired in childhood tracks into later childhood and adulthood (Skinner, Carruth, Bounds, Zeigler & Reidy, 2002). Consequently, effecting behavior change when individuals are children is critical. Child-care centers can shape children's dietary intake and eating habits. It is reasonable to assume, therefore, that achieving recommended benchmarks for nutrition programs in child care settings today will have major impact on the health of Americans well beyond the year 2020.

Recommended strategies for improving child care settings include implementing state policies addressing nutrition and physical activity that include required training for staff; implementing local child care center written policies following the *Dietary Guidelines for Americans*; and ensuring appropriate levels and types of physical activity (Story et al., 2006).

## **2.5 Dietary recommendations and guidelines for pre-schoolers**

Childcare providers are responsible for providing nutritionally adequate, healthful food to children, but may receive little guidance in this area. Guidelines from the American Heart Association (Gidding et al, 2006) and the American Dietetic Association (Nicklas & Johnson, 2004) outline healthful eating recommendations for young children. The Position of the American Dietetic Association (ADA): *Benchmarks for Nutrition Programs in Child Care Settings* (2005) and the Head Start Program Performance Standards for Nutrition are unique in that they are intended to guide nutrition programs in child-care settings. The ADA position provides guidance and information about resources for nutrition professionals, health care

practitioners, child care providers, and parents regarding meal plans, food preparation and food service, physical and social environment, and nutrition consultation and training for child care (American Dietetic Association, 2005). The Head Start Program Performance Standards regulates nutritional services offered by Head Start programs. It offers specific guidelines to program staff for implementing a nutrition program, meeting the needs of special dietary requirements, and involving the parents and the community in evaluating the nutritional programs. Both the ADA and the Head Start Program emphasize that foods served at child-care centers must be high in nutrients and low in fat, sugar, and salt and that menus should be nutritionally adequate and consistent with the Dietary Guidelines for Americans.

Because full-day child care programs usually cover the period of time that includes half to two thirds of daily meals and snacks (e.g., breakfast or morning snack, lunch, and afternoon snacks; or, afternoon snack, supper, and evening snack), it is recommended that child care menus provide their proportional share of the child's daily nutrient requirements (American Dietetic Association, 2005). A child in a part-day program (4 to 7 hours) should receive food that provides at least one third of the daily nutrition needs, whereas those in a full-day program (8 hours or more) should receive foods that meet at least half to two thirds of the child's daily nutrition needs (American Dietetic Association, 2005; Head Start Program Performance Standards). The Recommended Dietary Allowances and MyPyramid for pre-schoolers can be used to guide child-care meal planning (Dietary Reference Intake, 2010; United States Department of Agriculture, My Pyramid Plan).

### **2.5.1 Dietary Reference Intakes and Recommended Dietary Allowances**

The specific macronutrients and micronutrients needs of children aged 1 to 3 years and 4 to 8 years are listed in the Dietary Reference Intakes (National Academy of Sciences, Dietary Reference Intakes and Recommended Dietary Allowances, 2010). The Dietary Reference Intakes reflect corresponding increases in the amounts of energy and nutrients recommended depending on age, gender and activity level (Table 2).

**Table 2: Nutrient Recommendations in children age 4-8 years old**

<b>Nutrient</b>	<b>Recommendation*</b>	<b>1/2 of recommendation</b>	<b>2/3 of recommendation</b>
Calories (Kcal)	1400**	700 kcal	938 Kcal
% Carbohydrates from calories	45-65%	At least 45%	At least 45%
Protein (g)	19 g	9.5g	12.7g
% protein from calories	10-30%	At least 10%	At least 10%
% total fat from calories	25-35%	35% or less	35% or less
% saturated fat from calories	<10%	<10%	<10%
Cholesterol (mg)	<300 mg	<150mg	<200mg
Fiber (g)	20 g	10g	13 g
Calcium (mg)	1000 mg	500mg	670 mg
Iron (mg)	10 mg	5mg	6.7g
Sodium (mg)	< 1400 mg	<700mg	<933 mg
Vitamin A (mcg)	400 mcg	200 mcg	267 mcg
Vitamin C (mg)	25 mg	12.5 mg	16.75mg

\*Based on the Dietary Reference Intakes; Dietary Guidelines for Americans 2010; \*\*Based on moderately active 4 year old male

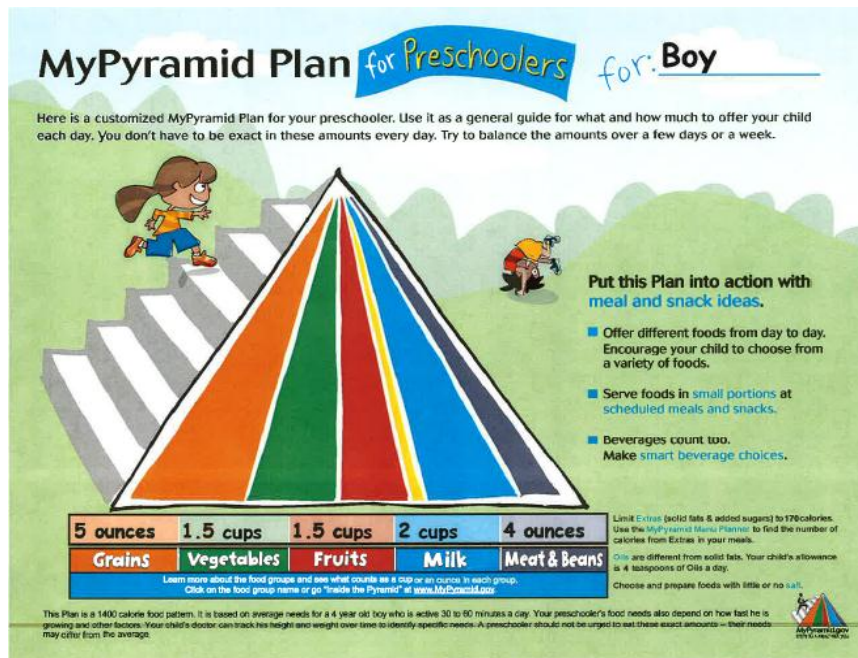
### **2.5.2 MyPyramid**

MyPyramid guidelines provide recommendations for daily amounts from the five main food groups (grains, vegetables, fruits, milk, and meat/beans) by age, sex, and activity level (United States Department of Agriculture, My Pyramid Plan; Figure 3). Components of meals and snacks for children older than 2 years of age should be planned so that they are appetizing and provide adequate servings from the milk, yogurt, and cheese group; meat, poultry, fish, dry beans, eggs, and nuts group; vegetable group; fruit group; and bread, cereal, rice, and pasta group.

Key recommendations of the Dietary Guidelines for Americans specify that at least half the grains consumed by children should be whole grains, that children ages 2 to 8 years should consume 2 cups per day of fat-free or low-fat milk or equivalent milk products, and that children ages 2 years of age and older consume sufficient amounts of fruits and vegetables while staying within energy needs. Each child should receive sufficient servings of fruits and vegetables to ensure that good sources of vitamin C are provided every day and that a good source of vitamin A is served at least three times a week. The Food and Nutrition Board of the National Academy of Sciences recommends that children aged 2 years and older should have carbohydrate intake that is 55% or more of total calories. Five or more servings of a combination of vegetables and

fruits, especially green and yellow vegetables and citrus fruits should be eaten every day. At least six servings should be consumed daily of a combination of breads, cereals, and legumes. Whole-grain products such as whole-wheat bread, brown rice, and oatmeal should be consumed whenever possible to ensure a good supply of dietary fiber.

**Figure 3: US Department of Agriculture Food Guide Pyramid for Pre-schoolers**



The plan is a 1400 calories food pattern. It is based on average needs for a 4 year old boy who is active 30 to 40 minutes a day.

By making a standard practice of having child care menus consistent with the *Dietary Guidelines for Americans*, the Recommended Dietary Allowances and MyPyramid for pre-schoolers, caregivers can help to ensure that, while children are in their early and formative years, they have opportunities to eat nutritious foods that promote proper growth and health and enable them to learn food preferences and dietary habits that prevent disease and support a lifetime of good health



## 2.6 Child-care Centers Licensing Regulations

A collaborative effort from the American Academy of Pediatrics, the American Public Health Association, and the US Department of Health and Human Services, provides standards related to injury and disease prevention and health promotion for children in child-care facilities (Caring for Our Children, 2002). This resource includes menu standards for child-care facilities that are based on the best available evidence for planning healthful menus. Specifically, these guidelines suggest that (a) menus must be posted or made available to parents, (b) menus must be dated, (c) menus must reflect food served, (d) menus must be planned in advance, (e) menus must be kept on file, and (f) menus are reviewed by a nutrition professional. Adhering to these standards is voluntary; child-care facilities are not required by law to meet these standards.

Child-care facilities are however required to comply with their state regulations. In each of the 50 states and the District of Columbia, child-care facilities are licensed and governed by a state agency responsible for enforcement of state regulations (US General Accounting Office, 2000). Regulations regarding menus in child care vary substantially by state. Benjamin et al. (2009) compared individual state regulations regarding menus for child-care centers and family child-care homes with national menu standards. For all 50 states and the District of Columbia, state regulations were compared with menu standards found in the CFOC. For child-care centers, seven states (14%) included regulations on all five standards, and 13 states (25%) had regulations on four of the five menu standards. Ten states (20%) did not have any regulations on the five menu standards. For family child-care homes, only three states (6%) had regulations on all five menu standards; four states (8%) had regulations on four of the five menu standards. Twenty-seven states (53%) did not have any regulations on the five standards for menus. Within the same state, regulations for child-care centers and family child-care homes often did not match. Overall, great discrepancies were found between model child-care menu policies and current state regulations in most states. States have the opportunity to improve regulations regarding menus to ensure that child-care providers develop accurate, specific, and healthful menus.

### **2.6.1 Child and Adult Care Food Program (CACFP)**

Child and Adult Care Food Program (CACFP) is a federal entitlement program authorized in section 17 of the National School Lunch Act (42 U.S.C. 1766). Program regulations are issued by the U.S. Department of Agriculture (USDA) under 7 CFR part 226. USDA's Food and Nutrition Service (FNS) administers CACFP through grants to States (US Department of Agriculture' Food and Nutrition Service: Child and Adult Care Food Program). Eligible public or private nonprofit child care centers, outside-school-hours care centers, Head Start programs, and other institutions which are licensed or approved to provide day care services may participate in CACFP, independently or as sponsored centers. For profit centers must receive title XX funds for at least 25 percent of enrolled children or licensed capacity (which ever is less) or at least 25 percent of the children in care must be eligible for free and reduced price meals. Meals served to children are reimbursed at rates based upon a child's eligibility for free, reduced price, or paid meals. CACFP provides nutrition education and reimbursement for meals and snacks to eligible childcare facilities. CACFP serves 3.2 million children in child care centers and day care homes (US Department of Agriculture' Food and Nutrition Service: Child and Adult Care Food Program).

Centers that participate in CACFP, which include all Head Start Program centers, must provide copies of menus to ensure compliance with CACFP program requirements (Head Start Program Performance Standards). Participants are required to date their menus and to ensure that menus reflect actual foods served.

CACFP program governs meal patterns and portion sizes, and offers sample menus to help child-care providers develop comprehensive, accurate menus (Child and Adult Care Food Program Meal Patterns; Table 3). However, CACFP sets some minimal nutrition standards that are not nutrient-based and do not require compliance to the Dietary Guidelines; therefore there are no limitations on fat, sodium, and sugar. Because of the nonspecific guidelines and the small serving sizes required by CACFP, it is possible for child-care centers to be in compliance with CACFP regulations without necessarily serving children appropriate food to meet their energy and nutrient requirements.

**Table 3. CACFP Child Meal Pattern (Lunch or Supper)**

<i>Food Components</i>	<i>Ages 1-2</i>	<i>Ages 3-5</i>
<b>1 milk</b>	1/2 cup	3/4 cup
<b>2 fruits/vegetables</b> juice, <sup>1</sup> fruit and/or vegetable	1/4 cup	1/2 cup
<b>1 grains/bread<sup>2</sup></b> bread or	1/2 slice	1/2 slice
cornbread or biscuit or roll or muffin or	1/2 serving	1/2 serving
cold dry cereal or	1/4 cup	1/3 cup
hot cooked cereal or	1/4 cup	1/4 cup
pasta or noodles or grains	1/4 cup	1/4 cup
<b>1 meat/meat alternate</b> meat or poultry or fish <sup>3</sup> or	1 ounce	1 1/2 ounces
alternate protein product or	1 ounce	1 1/2 ounces
cheese or	1 ounce	1 1/2 ounces
egg or	1/2 egg	3/4 egg
egg or	1/4 cup	3/8 cup
cooked dry beans or peas or		
peanut or other nut or seed butters or	2 Tbsp.	3 Tbsp.
nuts and/or seeds <sup>4</sup> or	1/2 ounce	3/4 ounce
yogurt <sup>5</sup>	4 ounces	6 ounces
<sup>1</sup> Fruit or vegetable juice must be full-strength. <sup>2</sup> Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified. <sup>3</sup> A serving consists of the edible portion of cooked lean meat or poultry or fish. <sup>4</sup> Nuts and seeds may meet only one-half of the total meat/meat alternate serving and must be combined with another meat/meat alternate to fulfill the lunch or supper requirement. <sup>5</sup> Yogurt may be plain or flavored, unsweetened or sweetened.		

Adapted from Child and Adult Care Food Program. Retrieved March 25, 2011, from <http://www.fns.usda.gov/cnd/care/>

### **2.6.2 Wellness Policies**

In 2004, Section 204 of Public Law 108-265, the Child Nutrition and WIC Reauthorization Act, was signed into law. The law includes a provision that requires each local educational agency participating in the National School Lunch Program (NSLP), School Breakfast Program (SBP), Special Milk Program (SMP), and Summer Food Service Program (SFSP) to establish a local wellness policy for schools under the local educational agency by school year 2006-2007 (Child Nutrition and WIC Reauthorization Act of 2004). The goal of this mandate is to promote wellness and health by focusing on nutrition education, physical activity, and other school-based activities to create healthy school nutrition environments; to reduce childhood obesity; and to prevent diet-related chronic diseases. While this requirement was applied to K-12 public schools, child-care centers were not included in this law.

In the child-care setting, CACFP is not included in the federal mandate to establish wellness policies. A child care center could, however, voluntarily choose to develop, adopt, and implement a wellness policy to include standards listed in the Dietary Guidelines supporting the five key Team Nutrition messages: 1. eat a variety of foods; 2. eat more fruits, vegetables and whole grains; 3. eat lower fat foods more often; 4. eat calcium-rich foods; and 5. be physically active. A strategy recommended by Story et al. (2006) for improving child care settings is for child care centers to develop, adopt, and implement written “wellness” policies that comply with the *Dietary Guidelines for Americans 2005* and ensure appropriate levels and types of physical activity.

### **2.7 Childcare environment assessment**

A broad spectrum of environmental factors in childcare setting can influence a child’s propensity to become overweight. To create, implement, or evaluate childhood obesity prevention interventions, an accurate assessment of the nutrition and physical activity environment of child care settings is required. The Environment and Policy Assessment and Observation instrument (EPAO) is the first measure of its kind to assess critical components of a healthy weight environment, including the type of food served to children, staff meal interactions, physical activity opportunities (both indoor and outdoor), sedentary opportunities,

and visible support for physical activity in child care centers (Ward et al., 2008). The EPAO is a validated instrument that assesses child-care nutrition and physical activity environments, policies, and practices. It was created to evaluate the Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) program, an environmental nutrition and physical activity intervention in child care (Ammerman et al, 2007). The EPAO is an expansion of the self-assessment component of the NAP SACC program created following an extensive review of the nutrition and physical activity literature, recommendations and standards from credible organizations, as well as input from a number of experts in the fields of measurement, nutrition, physical activity, and child care.

## **2.8 Bright from the Start: Georgia Department of Early Care and Learning**

Bright from the Start: Georgia Department of Early Care and Learning (Bright from the Start) is the department of state government responsible for meeting the early child care and education needs of Georgia's children from birth to age five and for administering federal nutrition programs for children and adults in day care settings. These diverse responsibilities place Bright from the Start in a unique position to encourage and support child care centers to introduce Georgia's youth and their families to best practices regarding nutrition and physical activity espoused by federal nutrition programs.

Georgia child care licensing regulations require child care centers to obtain nutrition-related training pertaining to food preparation, food nutrition planning, preparation, serving, proper dish washing, and storage. Four hours of this training are required only for the director and the person primarily responsible for food preparation. While child care center staff must annually attend ten hours of task-focused training in early childhood education, child development, or subjects relating to their job assignment, training addressing the *Dietary Guidelines for Americans 2005* and healthy eating for young children is not required by the state. State policies that include minimum training on nutrition and physical activity are steps in the right direction but a caregiver attending one training session related to nutrition and/or physical activity once or twice a year may not translate into positive effects in the early care classroom.

## **2.9 Caregivers Promoting Healthy Habits project**

Bright from the Start interacts with more than 10,000 child care facilities in Georgia, more than 5,000 of which participate in the CACFP. These numbers indicate the extent to which Bright from the Start can communicate with and provide training to caregivers and other organizations to influence and actively promote healthy eating habits and increased physical activity among young children. Bright from the Start believes that regular nutrition and physical activity education for child care staff and the implementation of wellness policies in child care settings can help address the health issues of the overweight and obesity epidemic in Georgia's youth.

Bright from the Start is implementing a one-year wellness policy implementation program in twenty-four child-care centers in Southwest Georgia. Research supports that children living in rural areas are about 25% more likely to be overweight or obese than their metropolitan counterparts (Lutfiyya et al., 2007). Overall higher rates of obesity are due in part to lack of resources and the high poverty level. The most critical levels of poverty in Georgia are found in the southwestern corner of the state (U.S. Census Bureau, 2009a), also considered a rural region with averages of 10-30 people per square mile (average population density for Georgia = 141.4 people per square mile) (U.S. Census Bureau, 2009b). This area of Georgia also has the highest prevalence of adult obesity at 29.5% (Georgia Department of Human Resources, 2009). All of these statistics support that the southwest region of Georgia is one of the neediest in the state. Therefore, Bright from the Start chose the southwest area of the state to pilot the Caregivers Promoting Healthy Habits project.

The program encourages child care centers to voluntarily adopt and implement wellness policies focusing on nutrition and physical activity. Bright from the Start provided support to participating child-care centers through training, technical assistance, and funding to develop and implement a wellness policy. First, Bright from the Start developed and delivered a Wellness Policy Workshop to introduce child care centers to the concept of a wellness policy and to encourage them to participate in the project. Second, a pre-application/bidders conference was held to explain the process for applying; to help applicants complete the application to participate in the project; and to introduce them to available resources. Third, Bright from the Start provided four intensive, focused training sessions focused on nutrition, physical activity, menu planning

and healthy habits. Throughout the project, Bright from the Start provided technical assistance to support providers as they implement their wellness policies (Appendix 1).

The goal of the program is to improve children's lifelong eating and physical activity habits by creating a healthier child care environment by training caregivers and educating parents on the importance of nutrition and physical activity to help reverse the trend of overweight and obesity among Georgia's children. Georgia State University, Institute of Public Health is providing program evaluation consultation to Georgia Department of Early Care and Learning through instrument development, data entry and analysis.

One component of the standard wellness policy developed by Bright from the Start that child care centers can choose to implement relates to the recommendations of the current *Dietary Guidelines for Americans*. Therefore, Bright from the Start provided training and technical assistance to child nutrition food service professionals on all aspects of planning, preparing, and serving nutritious meals that appeal to students and meet the recommendations of the *Dietary Guidelines for Americans*. Improving our understanding of nutrition determinants in the childcare setting will ultimately lead to the development of more effective strategies for promoting nutrition among preschool children.

Therefore, the purpose of this thesis is to describe the baseline dietary practices in preschool-aged children attending child-care centers in Southwest Georgia before the implementation of the one-year wellness policy implementation program. Baseline menus were compared to the Dietary Reference Intakes (DRIs), the Dietary Guidelines for Americans and MyPyramid food group recommendations for children 3 to 5 years of age. Additionally, the study will determine the relationship between the nutrition environment in childcare centers and dietary practices in child-care centers.

## **Chapter III**

### **Methods and Procedures**

#### **3.1 Participants**

This study is part of the Caregivers Promoting Healthy Habits project, a one-year wellness policy implementation program in 24 child-care centers in Southwest Georgia. The objectives of the project are to 1) introduce child care providers to the concept of a wellness policy and the benefits of creating and adopting a wellness policy for their child care center, 2) help child care providers develop a relevant wellness policy and a practical plan for implementing the policy in their child care centers, 3) support child care centers through training, technical assistance, and funding to implement their wellness policy and 4) evaluate the impact of a wellness policy on children and staff in a child care environment.

Baseline participants are twenty-four licensed child-care centers in Southwest Georgia and all of the centers participated in CACFP. The study was conducted over a 12-month period. Baseline data was collected between April 2010 and June 2010.

The study was approved by the Institutional Review Board of Georgia State University.

#### **3.2 Assessment of dietary practices**

##### **3.2.1 Menu analysis**

The children consumed two meals and one snack while at the child-care centers. One 5-day menu was collected from participating centers at baseline and on a quarterly basis (Quarter 1-4). A registered dietitian coded, standardized and analyzed all the menu items. NutriKids nutrient analysis software (LunchByte Systems, Inc, Rochester, New York; [www.nutrikids.com](http://www.nutrikids.com)) was used for menu analysis. The menu items which represents the meal patterns components were analyzed using the minimum portion sizes for children 3 to 5 years required in the CACFP program (Child and Adult Care Food Program Meal Patterns; Table 2). Minimum portion sizes for lunch or supper were as follows: milk:  $\frac{3}{4}$  cup fluid milk; meat/meat alternates:  $1^{1/2}$  ounces of meat or poultry or fish or cheese or 1 egg or  $\frac{3}{4}$  cup cooked dry beans or 6 ounces of yogurt or 3



tablespoons of peanut butter; fruits/vegetables: ½ cup fruits and/or vegetables (must include at least 2 servings per day); bread: ½ slice of bread or equivalent alternatives (Child and Adult Care Food Program Meal Patterns; Table 2). Each 5-day menu was analyzed quantitatively for energy and 11 nutrients (carbohydrate, protein, total fat, saturated fat, cholesterol, fiber, sodium, calcium, iron, vitamin A and Vitamin C) (Appendix 2).

### **3.2.2 Menu rubric**

The menus were also analyzed qualitatively using a menu rubric developed by the researchers and a registered dietitian (Appendix 3). The menu rubric was based on Dietary Guidelines for Americans, my Pyramid for pre-schoolers, RDAs for 4 to 6 years old children, the Position of the American Dietetic Association: *Benchmarks for Nutrition Programs in Child Care Settings* (2005) and the American Academic of Pediatrics Policy Statement. The rubric evaluated the number of child-sized servings of whole grains, vegetables, fruits, meats and meat alternatives, milk and milk alternatives, high fat or high sugar foods, sugar sweetened or artificially sweetened beverages and an excellent source of vitamin C. A registered dietitian filled the rubric based on the 5-days menus provided at baseline and on a quarterly basis.

### **3.3 Assessment of the childcare environment**

The child-care environment was assessed using the Environment and Policy Assessment and Observation instrument (EPAO) which is a validated instrument (Ward et al., 2008). Observations in twenty-four child-care centers took place between May and September 2010. The EPAO protocol consists of one full day visit to each child care center and includes direct observation of the nutrition and physical environment and document review activities. The observation is conducted from early in the morning before the first eating occasion of the day and continues until all of the children in that classroom leave for the day.

During the observation day, a registered dietitian observed all activities of a randomly selected classroom of 3-5 years old children during the morning snack, lunch and afternoon snack. The observation sections of the EPAO were divided into 7 sections: 1. Eating occasions-Foods; 2. Eating Occasions-Beverages; 3. Eating Occasions-Staff Behaviors; 4. Physical Activity-Child Behaviors; 5. Sedentary Activities-Child; 6. Physical Activity-Staff Behaviors; and 7. Center Environment (Appendix 4). Observations for the nutrition section of the EPAO

consist of food and beverages served, staff-child meal interactions, staff support for nutrition, the nutrition environment (e.g., how children are fed). During nap time, general information about the center was collected. The document review involves an evaluation of the teacher's lesson plan for that week, past or future fund-raising documents, menus for up to one month that include the week of the visit, parent handbook, staff handbook, nutrition training documents, nutrition curricula, and written nutrition policies (e.g., food brought from home, and education/training for staff).

Response options for EPAO items were converted to a 3-point scale (0, 1, 2) and recorded on a EPAO scoring guidelines document (Appendix 4). Scores were then averaged within a given subscale and multiplied by 10. The nutrition section of the EPAO scoring guideline consists of 8 sub-areas: fruits and vegetables; Whole grains and low fat meats; High sugar/high fat foods; beverages; nutrition environment; staff behaviors nutrition; nutrition training and education; nutrition policy (Ward et al., 2008). Each center was then categorized as having a high or low EPAO nutrition environment score based on a median split of the total nutrition environment score.

### **3.4 Statistical Analysis**

Descriptive statistics for energy, macronutrient and micronutrient intakes were determined. For the menu analysis, means were compared against one-third and two-third of the RDAs for 4 to 6 years old children. Percentage of energy from carbohydrate, protein and fat was calculated for comparison to the recommendations of the Dietary Guidelines for Americans concerning those nutrients. Data from the menu rubric were assessed to determine the mean quantity of food served for each food group.

A t test was used to compare nutrient contents of dietary patterns with recommendations. Differences in mean values of servings, energy and nutrients between centers were tested using independent T-test.

Associations between dietary practices and environment were explored using correlations. All statistical analyses were done using SPSS statistical software (PASW Statistics 18, 2010, Chicago, Illinois). Differences with a p-value of 0.05 (two-tailed) were considered to be statistically significant

## **Chapter IV**

### **Results**

#### **4.1 Centers Characteristics**

A total of twenty-four child care centers serving a total of 2042 children participated in the study (Mean number of children: 85; Range: 20-245). All centers are licensed and participated in the CACFP and had a written policy on nutrition and food services.

Twenty (20) centers (83%) had a full kitchen in the same building as the classrooms for food preparation. Seventy percent 70% of the centers (n=17) reported the cook as the person responsible for menu planning. The director of the center (n=5), and staff members (n=2) were also reported as the menu planner. Only 25% of the centers (n=6) reported consulting a dietitian for menu planning.

Breakfast was mainly delivered in bulk and proportioned by staff in two-thirds of the centers and delivered and served in prepared portions in one-third of the centers. Lunch was served family style in one-third of the centers (n=9), delivered in bulk and proportioned by staff in seven centers (29%) and delivered and served in prepared portions in 9 centers (37%). A family serving style consists of providers serving food at table to all children and children serving themselves at from serving dishes.

#### **4.2 Dietary intakes at child-care centers**

Meals served at the participating centers include breakfast, lunch and an afternoon snack. A total of 360 meals were analyzed for energy and nutrient contents. Table 4.1 shows the mean total energy, macronutrient and micronutrient values for the 5-day menus provided by the twenty-four participating centers. The mean energy content of the menus was 883 kcal/day (Table 4.1). When compared to the RDA for the 4- to 6-year-old children, it was found that the meals served provided one-third to two-thirds of the RDA for energy, carbohydrate, protein, Vitamin A and Vitamin C. However, the meals served were high in saturated fat and sodium. Less than 1/3 of the centers (n=7) met the requirements for saturated fat content of <10% of total

calories. As for sodium content, none of the centers met half the recommendations of <1400 mg sodium/day and only 3 centers (12%) met two-thirds the recommendations for sodium content. Additionally, the meals served were low in fiber, iron and calcium. None of the centers met half or two-thirds of the recommendations for fiber content (Table 4.1).

Mean number of servings provided by the 24 participating centers were calculated for all main food groups and several subgroups. With the exception of milk and fruits, children were served less than the recommended amounts for grains, vegetables and meat/beans. Although children consumed adequate amounts of milk, 75% of the centers serve whole or 2% milk and only 25% of the centers (n=6) serve the recommended 1% milk. As for fruits, only 7 centers (30%) served fresh fruits on a daily basis. Only 1 center served 50% or more of total grains as whole grains. Only 9 centers (37%) served vegetables on a daily basis. Starchy vegetables were more common than dark/green/orange vegetables. Two-thirds of the centers served fried vegetables 1-2 times per week. Also noteworthy, 75% of the meat consumed was either high-fat or fried. Effectively, all centers served fried and high fat meats at least 2 times per week. Most centers (55%) did not serve lean proteins and all centers served beans and/or lentils less than 2 times a week. 25% of the centers (n=6) served 100% fruit juice on a daily basis but none of the centers served a sweetened beverage (e.g., flavored milk, lemonade, fruit punch). 85% of the centers served high fat and high sugar foods more than 3 times per week. All centers served a sweet snack (e.g., cookies, donut, pastries, cookies, muffins,) and 70% a high-sugar or high-fat condiment (e.g., butter, dressing, syrup, jelly).

**Table 4.1. Mean nutrients contents of baseline menus at 24 childcare centers in Georgia and number of centers meeting one half and two thirds of the recommendations of the dietary reference intake for young children during childcare**

Nutrient	Recommendation*	Mean Content $\pm$ Standard Deviation (N=24)	$\frac{1}{2}$ rec.		$\frac{2}{3}$ rec.	
			No.	%	No.	%
Calories (Kcal)	1400**	883 $\pm$ 98	24	100%	9	37%
Carbohydrates (g)	-	122 $\pm$ 13	-	-	-	-
% Carbohydrates from calories	45-65%	55.5 $\pm$ 3.8	24	100%	24	100%
Protein (g)	19 g	37 $\pm$ 4	-	-	-	-
% protein from calories	10-30%	17 $\pm$ 2	24	100%	24	100%
Total Fat (g)	-	29 $\pm$ 7	-	-	-	-
% total fat from calories	25-35%	29.8 $\pm$ 4.2	22	92%	22	92%
% saturated fat from calories	<10%	12 $\pm$ 2	7	30%	7	30%
Cholesterol (mg)	<300 mg	91 $\pm$ 31	24	100%	24	100%
Sodium (mg)	< 1400 mg	1210 $\pm$ 192	3	12.5%	0	0%
Fiber (g)	20 g	7.5 $\pm$ 0.7	0	0%	0	0%
Calcium (mg)	1000 mg	690 $\pm$ 68	24	100%	17	70%
Iron (mg)	10 mg	6.3 $\pm$ 1.0	21	87%	14	58%
Vitamin A (mcg)	400 mcg	870 $\pm$ 422	24	100%	24	100%
Vitamin C (mg)	25 mg	46 $\pm$ 14	24	100%	24	100%

\*Based on the Dietary Reference Intakes; Dietary Guidelines for Americans 2010 ; \*\*Based on moderately active 4 year old male

### 4.3 Nutrition environment

A mean of 13.7 children (Range: 5-20) were present in the classroom during the observation day and the children observed were aged between 3-5 years old.

The average EPAO nutrition environment total score ( $\pm$ SD) was  $11.95\pm 1.84$  (median=11.56). Mean subscale scores ranged from 8.17 (Nutrition Training and Education) to 15.14 (Staff Behavior). Correlations among the nutrition environment subscales were moderate to strong ( $r=0.45$  to  $0.66$ ). The most highly correlated subscales were Nutrition Policy and Staff Behavior ( $r=0.66$ ) and Nutrition Environment and Grains (Whole grains and low fat meats) ( $r=0.54$ ) (data not shown).

Comparisons of EPAO subscale scores between centers with high and low nutrition environment scores are displayed in Table 4.2. Mean differences were statistically significant for grains, staff behavior, nutrition environment, nutrition training and education and nutrition policy (Table 4.2).

In most centers ( $n=22$ ), the menu was consistent with the food served on the day of the observation. In half of the centers ( $n=13$ ), staff ate together with the children, and they mostly ate the same food as children (data not shown). In 4 centers (17%), staff ate and/or drank less healthy food in front of the children. In 3 centers, children were stimulated to eat more than they wanted to (e.g. 'clean your plate', 'you won't get desert until you finish), for an average of 2 eating occasions. In 54% of the centers ( $n=13$ ), children were encouraged to try an alternative option at most on two eating occasions (e.g. 'We're out of apples, don't you want to try this tasty pear?'). In most centers ( $n=17$ ), staff talked about healthy foods to children for an average of 2 eating occasions. In only one center, staff served children second helpings without being asked for more by the child and staff used food to control behavior. In only one-third of the centers ( $n=7$ ), a formal nutrition education for children was observed (data not shown).

**Table 4.2: Means, standard deviations and p-values comparing centers with high and low nutrition environment scores**

	High EPAO n=12	Low EPAO n=12	<i>P</i> value
<b>Number of children at the center</b>	91.7 (65.3)	78.5 (32.3)	<b>0.540</b>
<b>Nutrition environment total score</b>	13.4 (1.3)	10.5 (0.9)	<b>&lt;0.001</b>
<b>Fruits and vegetables score</b>	12.5 (2.01)	11.3 (3.2)	<b>0.281</b>
<b>Grains score</b>	13.1 (3.4)	8.3 (2.5)	<b>0.001</b>
<b>High fat/High sugar score</b>	12.8 (2.2)	11.1 (2.2)	<b>0.078</b>
<b>Beverage score</b>	12.7 (2.7)	13.0 (2.5)	<b>0.777</b>
<b>Staff behavior score</b>	16.8 (2.7)	13.5 (3.4)	<b>0.014</b>
<b>Nutrition environment score</b>	15.0 (3.0)	10.0 (3.5)	<b>0.001</b>
<b>Nutrition training and education score</b>	11.0 (3.9)	5.3 (3.1)	<b>0.001</b>
<b>Nutrition policy score</b>	<b>13.3 (0.9)</b>	<b>11.4 (3.0)</b>	<b>0.035</b>

High EPAO: centers with total nutrition environment scores above the median; Low EPAO: centers with total nutrition environment scores below the median

#### 4.4 Menu contents and environmental factors

Centers with a larger number of children had menus lower in total fat, saturated fat and sodium ( $r: 0.385-0.467$ ;  $p<0.05$ ) (Table 4.3). A family serving style was associated with menus with higher saturated fat and lower calories, carbohydrate, sodium and iron content (Table 4.4).

Centers with staff talking to children about healthy foods had menu contents lower in energy, total fat and saturated fat. EPAO total nutrition score was associated with menu contents lower in calories and higher in fiber and iron (Table 4.3).

**Table 4.3: Correlates of environmental factors and energy, macronutrients and selected micronutrients content of menus served at the 24 participating child-care centers**

Environmental Factors	Energy (Kcal)	Carbohydrate (g)	Total Fat (g)	Saturate d Fat (g)	Fiber (mg)	Sodium (mg)	Iron (mg)
Number of children at the center		0.464**	-0.467**	-0.408**		-0.385*	
Lunch: family serving style	-0.365*	-0.351*		0.537**		-0.387*	-0.532**
Staff talked with children about healthy foods	-0.402**		-0.366*	-0.370*			
Formal nutrition education for children	-0.456**	-0.471**		-0.517**			-0.416**
EPAO Fruits and Vegetables score					0.467**		
EPAO Total Nutrition score	-0.681**				0.424**		0.505**

\*  $p<0.1$ ; \*\*  $p<0.05$



## Chapter V

### Discussion and Conclusion

The purpose of the study was to assess the dietary practices and environment of twenty-four child-care centers in Southwest Georgia. Analysis of the combined menus from the participating child-care center shows that the menus, as served, provide at least half of the RDA for the 4- to 6-year-old age group for energy, protein and carbohydrate and some vitamins (Vitamin A and C). These menus reflect breakfast, lunch and snack items served. The American Dietetic Association recommends that day-care meals for children in full-time care should provide half to two-thirds of the RDA for nutrients (The Position of the American Dietetic Association, 2005).

However, the percent of energy from saturated fat (12%) exceeds the 10% recommendation, findings similar to those reported by Bollela et al. (1999) and the third National Health and Nutrition Examination Survey (NHANES III) (12% and 12.6% respectively). The high sodium content of the menus is of concern. The mean value of sodium was 1210 mg/day and all centers exceeded the half RDA estimated minimum requirement of sodium (< 700 mg) for 2 to 5 years old. The high sodium content may be influenced both by salt used in food preparation and by the frequent use of commercially prepared food items and canned vegetables, which tend to contain substantial amounts of sodium (Table 5). Another particular concern is that the menus served at all the participating centers failed to meet half or two-thirds of RDA for fiber. Additionally, the menus fell short on fiber, calcium and iron which are key nutrients essential for normal growth and development. Our findings are consistent with other research in day-care centers that have demonstrated that the food served for children was below the recommendations for fiber, iron and calcium (Bollella et al., 1999; Briley et al., 1999; Padgett & Briley, 2005; Ball et al., 2008). This may be due to the inadequate serving of whole grains, beans, dark green vegetables and fresh fruits (Table 5).

The Food Guide Pyramid for pre-schoolers recommends the number of servings from the 5 food groups as the basis of a healthful diet. Although the data presented in our study shows that menus at the majority of the centers are meeting the requirements of macro-nutrients and some micro-nutrients, the majority of the centers are not meeting the requirements of the Food Guide Pyramid for pre-schoolers. Our data suggest that children are not consuming recommended amounts of whole grains, fresh fruits or vegetables while attending child care. Instead, children are consuming excessive amounts of added sugars from sweet snacks, sodium, and saturated fat from whole milk and high-fat or fried meats (Table 5).

With the exception of milk, children at all participating centers were served less than the recommended amounts for grains, vegetables, meat/beans and fresh fruits. It is important to consider food sources that may explain the discrepancy between adequate macro- and micronutrient intakes and inadequate food groups intakes. To promote bone health and contribute to an overall healthful diet, the 2010 Dietary Guidelines stress the importance of consuming fat-free and low fat milk and milk products, especially during childhood and adolescence. Although children consumed adequate amounts of milk, 75% of the centers serve whole or 2% milk and only 25% of the centers (n=6) served the recommended 1% milk. White bread and ready to- eat (RTE) cereal, food sources that are often fortified with vitamins and minerals, were among the most frequently reported foods on the menus. The apparent popularity of sweetened RTE cereals in day-care menus and in children's breakfasts may provide day-care centers with opportunities to increase children's consumption of whole grains. Currently, no standards exist for the type of cereals allowed in day-care meals. Requirements related to the whole-grain content of RTE cereals can help centers substitute current cereal offerings with ones that may have greater potential to contribute more positively to children's daily intake of whole grains. Although day-care meals have increased offerings of fruits and vegetables, improvements can be made to the type and variety of fruits and vegetables offered. For example, very few daily menus provided berries, melons, or other colorful fruits, and menus were more likely to include starchy vegetables (e.g. potatoes, corn, peas) than any other vegetable subgroup (e.g. dark/green and orange vegetables). Changes in the types of fruits and vegetables offered in day-care menus can help meals more closely align with

the 2010 Dietary Guidelines, which recommend a variety of fruits and vegetables each day.

Children not meeting the MyPyramid recommendations have also been reported in other samples of preschoolers. Several studies have attempted to look at the nutrient content of child-care facility meals (Briley et al., 1989; Drake, 1992; Oakley et al., 1995; Bollella et al., 1999; Briley et al., 1999; Bruening et al., 1999; Padget & Briley, 2005). Although most children were served something from the main food groups, amounts are much less than recommended levels for all groups but milk. In a recent study by Ball et al. (2008), preschool children attending full-time child care centers in North Carolina consumed less than the recommended amounts of fruits, vegetables, and whole grains. Similar results were noted by Padget and colleagues (2005) in a sample of Texas child-care centers and Mier and colleagues (2007) in a sample of Texas, Mexican-American preschoolers. Dietary intake at the child-care centers was recorded through direct observation of children (Ball et al., 2008; Mier et al., 2007; Padget et al., 2005). The type and amount of food served was recorded for each child, as well as any food dropped, traded, or added. In general, children are consuming between 50% to 100% of all foods served, suggesting that the problem is not with child behavior or quantity of food consumed, but with quality—children are not being served enough nutrient-rich foods and may be filling up on calorie-dense, nutrient-poor foods. Furthermore, just because foods are served in appropriate quantities does not guarantee that they are appealing to children or of high nutritional value. Although it is possible to make up for these dietary deficiencies through intake at home, researchers have found that a child's diet at home often does not compensate for poor daytime intake of vegetables and grains (Padget & Briley, 2005) and may also contain large quantities of added fats and sugar (Briley, 1999; Mier et al., 2007).

**Table 5: Contributing factors affecting the quality of the menus served at the 24 participating child-care centers**

Contributing Factors	Menu Characteristics					
	High in Saturated Fat	High in Sodium	High in Sugar	Low in Fiber	Low in Iron	Low in Calcium
<b>Canned Fruits</b>			✓	✓	✓	
<b>Canned Vegetables</b>		✓		✓	✓	✓
<b>Commercially prepared food</b>	✓	✓		✓	✓	✓
<b>Whole &amp; 2% milk</b>	✓					
<b>Fried/Pre-fried Meat</b>	✓	✓			✓	
<b>High fat meat</b>	✓					
<b>Deserts &amp; Sweets</b>	✓		✓	✓	✓	
<b>Lack of fresh F &amp;V</b>		✓	✓	✓	✓	✓
<b>Lack of variety of F&amp;V</b>				✓	✓	✓
<b>Lack of beans</b>	✓			✓	✓	✓
<b>Lack of whole grains</b>				✓	✓	✓

All the centers were participating in the CACFP which provides structure for meals and snacks (Table 2). There is, however, a great deal of flexibility in eligible foods, and foods are required to meet only minimal nutrition standards. Because of the nonspecific guidelines set by the state of Georgia and the small serving sizes required by CACFP, it is possible for child-care centers to be in compliance with all regulations without necessarily serving children appropriate food to meet their energy and nutrient requirements. The impact of CACFP on children's diets has not been extensively examined, but the few studies that have evaluated the program have found mixed results (Bruening, Passannante & McClowry, 1999; Oakley et al., 1995). Forty 3- to 5-year-old black children from 2 day-care centers participated in a study by Bruening et al. (1999). One center participated in the CACFP and at the other center, children brought all their meals and snacks from home. Children receiving CACFP meals at day care had significantly higher mean daily intakes of vitamin A, riboflavin and calcium than the children who brought all of their meals and snacks from home. Children who received CACFP meals also consumed significantly more servings of milk and vegetables and significantly fewer servings of fats/sweets. Children from the center participating in the CACFP have significantly fewer days of illness than children from the nonparticipating center. The findings of this study might not necessarily mean that the centers participating in the CACFP serve the appropriate quality of food. Instead, it may be that, CACFP meals are better compared to the meals and snacks brought from home.

Our findings were similar to the results of the study by Oakley et al. (1995). Centers participating in CACFP had menus lower in macronutrients (energy, carbohydrate and protein), micronutrients (vitamin A, Vitamin E, niacin and zinc) and higher in fat and sodium compared to non-participating centers (Oakley et al., 1995). CACFP food component guidelines have not been updated recently. Policymakers should utilize evidence from this study and our findings to recommend program revision, with improved nutrition standards that are more nutrients-based. With the high prevalence of obesity among children and adolescents, it is important for day-care centers to limit low-nutrient, energy dense foods (e.g., desserts, snack-type items, and juice drinks), which tend to compete with healthier options within the centers' meals. Based on this and similar data, we would recommend substituting whole fruit or vegetables for 100% fruit

juice and substituting wholegrain items such as crackers and other bread products for sweet snacks like cookies.

Specific features of the child-care environment may explain our findings. Centers with larger number of children had menus lower in total fat, saturated fat and sodium. This might be due to the fact that centers with large number of children had more resources and food availability that help them implement healthy menus. A family serving style was associated with menus with higher in saturated fat and lower in calories, carbohydrate, sodium and iron content. In a recent study by Gubbel et al. (2010), a family serving style was also associated with higher saturated fat and dietary fiber intake. This might be due to the fact that centers that serve lunch as family style include meals that are more appealing to children (e.g. a variety of colorful fruits and vegetables) in order to encourage the children to serve themselves from the food offered. Family serving style provides an important learning activity to children and the freedom to make decisions and be exposed to new foods. Children often want to try new foods when they see the other children and adults eating them.

On the other hand, centers with staff talking to children about healthy foods had menu contents lower in energy, total fat and saturated fat. In the study by Gubbel et al. (2010), talking about healthy foods was associated with higher fiber intake (Gubbel et al., 2010). In our study, there was a correlation between nutrition policy at the centers and staff behavior ( $r=0.41$ ;  $p=0.038$ ). Additionally, centers with high EPAO scores had significantly higher staff behavior score ( $16.8 \pm 2.7$ ) and staff nutrition training and education score ( $11.0 \pm 3.9$ ) compared to the centers with low EPAO scores ( $13.5 \pm 3.4$  and  $5.3 \pm 3.1$ , respectively) (Table 4.2). Therefore, nutrition policy, staff education and training and staff behavior appear to influence menu quality at the participating centers.

To our knowledge, this is the first study to examine dietary practices and environment at child-care centers in Georgia and the first study to assess children's intake in child-care using the 2010 Dietary Guidelines for Americans and the Food Guide Pyramid for young children. This study, however, is not without limitations, and results should be interpreted with some caution. This study was limited to child-care centers in

rural areas and small cities, and this may not reflect the situation in other child-care centers or in other central locations. The sample included child-care centers only, not family childcare homes, which also provide care to a substantial number of US children. Future studies may want to assess dietary intake in this population. In addition, we chose only one classroom for observation and, although no data exist stating that children are differentially served by classroom, future studies may want to assess multiple classrooms per facility. This study relied on menus to assess dietary intake in child care and might not accurately reflect the quantity of food consumed by children. However, other studies that used a researcher-based observation system to collect data and thus ensure the most accurate representation of dietary intake by children at the child-care center have found similar results to our study (Bollella et al., 1999; Ball et al., 2008).

The present study underlines the importance of childcare in determining children's dietary intake. Although analyses of day care center menus indicates that adequate energy and macro-nutrients are available through the breakfast, lunch and snack served each day, the data presented in this study suggest that children attending child-care centers in Southwest Georgia are consuming excessive sodium and saturated fat and are not meeting the Food Guide Pyramid for Young Children recommendations. The diet quality of young children in the United States has improved marginally over the past few decades (Kranz, Siega-Riz & Herring, 2004). However, emerging studies are suggesting that pre-school age children consume excessive amounts of fat, sodium, added sugars, fruit juices, and dairy, while consuming inadequate amounts of fruits, vegetables, and whole grains (Kranz, Siega-Riz & Herring, 2006; Nicklas & Johnson, 2004). Because 57% of young children spend time in child-care centers, foods provided by these facilities have a significant effect on children's overall diet quality. Although more research is needed, this study lends evidence to the need for more and improved dietary recommendations and regulations in child-care facilities.

Child care center menu planners need technical assistance in reducing saturated fat and sodium without reducing the energy and nutrients provided to preschool children. Dietetics professionals and other health professionals can advocate for enhancing the type and variety of foods offered in day-care meals to include even more fresh fruits,

vegetables, whole grains, and fat-free or low-fat milk and milk products. Registered dietitians need to assist the Child and Adult Care Food Program in menu development and planning and help participating child-care centers develop menus with appropriate nutrient content while dealing with budgetary, staff, and other constraints.

Additionally, parents have an important role to play in reducing children's intakes of fat, saturated fat, and sodium. Briefel and colleagues (2009) found that most of the energy children consume from foods that are low in nutrients and high in energy (including salty snacks and baked goods and other snacks that are high in fat) were consumed at home (Briefel, Wislon & Gleason, 2009). Child-care centers providers can share their menus with parents, as a medium of nutrition communication, which can help foster a partnership between the childcare center and household on food and nutrition efforts.

Based on results of day-care centers' dietary practices before the intervention, Caregivers Promoting Healthy Habits project has the potential to decrease the prevalence of overweight and obesity by significantly increasing overall diet quality and physical activity through its objectives of increasing fruit and vegetable intake, decreasing sweetened beverage intake, increasing physical activity, and decreasing screen time. We anticipate that by the end of the one-year implementation of the wellness policies, day-care centers in Southwest Georgia will be better equipped to foster healthy lifestyles and improve the quality of food served to this population of children. Additionally, more research is needed to examine the mechanisms underlying the association between child-care environment and children's dietary intake.



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## APPENDICES

### Appendix 1: Proposed Voluntary Wellness Policies for Child Care Centers in Georgia

**R = Required for participation in Wellness Policy Initiative; E = Encouraged.**

<p><b>Policy #1. Breastfeeding is promoted and adequately supported.</b></p> <ul style="list-style-type: none"> <li>• Provide refrigeration for storing expressed breast milk and feed this milk to the child as requested by the parent /guardian. <b>(R)</b></li> <li>• Use thawed breast milk within 24 hours and fresh breast milk within 48 hours. <b>(R)</b></li> </ul>
<p><b>Policy #2. Foods served to children exceed the USDA Child and Adult Care Food Program (CACFP) guidelines and meet the Dietary Guidelines for Americans/My Pyramid for Preschoolers recommendations.</b></p> <ul style="list-style-type: none"> <li>• Children in a part day child care center receive meals/snacks that provide ⅓ of the child’s nutritional needs, while children in a full day child care program must receive meals/snacks that provide ½ to ⅔ of the child’s nutritional needs. <b>(R)</b></li> <li>• Children are served foods and beverages that promote acceptance of a variety of foods. <b>(R)</b></li> <li>• Children are served fresh fruits and vegetables daily. <b>(E)</b></li> <li>• Children are offered healthful beverages such water, 100% juice with no added sugars, artificial sweeteners, flavoring, and colors and low-fat or fat-free milk for children older than age two. <b>(R)</b></li> <li>• Children are served new and familiar foods. <b>(R)</b></li> <li>• A dietitian is consulted to ensure that a variety of nutritious, appealing, and age appropriate foods are served. <b>(E)</b></li> </ul>
<p><b>Policy #3. Children always have access to safe drinking water and are encouraged to drink water frequently throughout the day.</b></p> <ul style="list-style-type: none"> <li>• Adults model frequent drinking of water instead of drinking other fluids. <b>(R)</b></li> </ul>
<p><b>Policy #4. The daily schedule promotes a relaxed and adequate period for meals and snacks.</b></p> <ul style="list-style-type: none"> <li>• Quiet time precedes meals to promote relaxed eating. <b>(R)</b></li> <li>• Meal schedules are long enough to allow for conversation and for serving food to the children several times, if necessary. <b>(R)</b></li> </ul>
<p><b>Policy #5. Food and physical activity are not used as incentives or punishment.</b></p> <ul style="list-style-type: none"> <li>• Children are neither rewarded nor punished with physical activity. <b>(R)</b></li> </ul>
<p><b>Policy #6. Children serve themselves during meals and snacks with adult supervision.</b></p> <ul style="list-style-type: none"> <li>• Food is served in a manner that allows children to select amounts and varieties of foods they will eat. <b>(R)</b></li> <li>• Food is served in a form that young children can eat without assistance, when appropriate. <b>(R)</b></li> <li>• Adults eat with children and model good eating habits by consuming only healthful foods and beverages in the presence of children. <b>(R)</b></li> </ul>
<p><b>Policy #7. Nutrition and physical activity are taught as specific learning objectives and woven into activities throughout the day.</b></p> <ul style="list-style-type: none"> <li>• A nutrition and/or physical activity curriculum is adopted. <b>(E)</b></li> <li>• Books are read relating to food, eating, and physical activity to children before or after meals and snacks. <b>(E)</b></li> <li>• Activities and games that increase knowledge and acceptance of a variety of foods and physical activities are planned. <b>(R)</b></li> <li>• Children are engaged in planning and preparing food when appropriate. <b>(E)</b></li> <li>• Educational tools are used to promote healthy eating and physical activity. <b>(R)</b></li> </ul>
<p><b>Policy #8. Parents are partners in the task of fostering healthy eating and physical activity habits for children.</b></p> <ul style="list-style-type: none"> <li>• Daily information is provided to parents about their child’s activities and needs including eating and</li> </ul>

<p>physical activity. <b>(R)</b></p> <ul style="list-style-type: none"> <li>• Information and ideas are provided to families that discuss how they can support healthy nutrition and physical activity practices. <b>(R)</b></li> <li>• A written policy on nutrition, food service, and physical activities is shared with parents before a child enters provider care. <b>(R)</b></li> <li>• Information is provided to parents about being healthy role models for their children. <b>(E)</b></li> </ul>
<p><b>Policy #9. Sanitation, hygiene, and food handling are monitored to ensure a healthy environment.</b></p> <ul style="list-style-type: none"> <li>• A policy is developed and shared with parents regarding food brought from home that addresses food safety and nutrition and requires prior approval of any foods brought for sharing. <b>(R)</b></li> <li>• Hand washing is stressed as the first defense against spreading germs. Adults and children wash their hands frequently. <b>(R)</b></li> <li>• When appropriate, sinks, soap, and paper towels are placed at children’s height so hand washing is easy and comfortable. <b>(R)</b></li> <li>• Adults are trained and monitored on procedures for preparing, serving, and storing food and on sanitizing and disinfecting dishes, equipment, and surfaces. USDA food sanitation standards are observed. <b>(R)</b></li> <li>• Toys and playground equipment are regularly cleaned. <b>(R)</b></li> </ul>
<p><b>Policy #10. At least 60 minutes of physical activity are scheduled daily, and screen time will be limited for toddlers and preschoolers.</b></p> <ul style="list-style-type: none"> <li>• Physical activity is scheduled throughout the day as recommended by the National Association for Sport and Physical Education in the physical activity guidelines for infants and toddlers and is a part of the regular schedule. <b>(R)</b></li> <li>• Unstructured playtime and planned movement experiences, both indoor and outdoor, are included in the schedule. <b>(R)</b></li> <li>• Center will limit television and video viewing to less than one hour per day, including educational programs, for children older than age two. <b>(R)</b></li> <li>• Center will ensure that children younger than age two are not viewing television or videos. <b>(R)</b></li> </ul>
<p><b>Policy #11. Physical activities, equipment, and facilities are developmentally appropriate and safe and meet the National Association for Sport and Physical Education guidelines for young children.</b></p> <ul style="list-style-type: none"> <li>• Activities focus on age appropriate motor skills. Children have the opportunity to practice important skills. Cooperation is stressed while competition is avoided. <b>(R)</b></li> <li>• Equipment and facilities are routinely monitored for safety. <b>(R)</b></li> <li>• Activities and equipment are age appropriate, and all children, regardless of age, have equipment to play on that provides them the chance to have fun and be active. <b>(R)</b></li> <li>• Staff participate in and model physical activities for the children and facilitate/encourage children’s movement and exploration of their environment. <b>(R)</b></li> </ul>
<p><b>Policy #12. Staff is adequately trained about nutrition and physical activities for young children.</b></p> <ul style="list-style-type: none"> <li>• Wellness information and/or activities for employees are provided. <b>(R)</b></li> <li>• Staff are provided with training about nutrition and physical activity for young children. <b>(R)</b></li> </ul>



## Appendix 2: Menu analysis sample

## Bright From the Start

Monday		Tuesday		Wednesday		Thursday		Friday		Nutrients	
Apr - 5		Apr - 6		Apr - 7		Apr - 8		Apr - 9		Avg Nutrients	Target
Cereal Bar RAISINS Milk, 2%, CACFP PIZZA WITH CHEESE T CORN FRUIT COCKTAIL Pretzels Animal Crackers FRUIT JUICE, ASSORTE		French Toast, frz SYRUP, PANCAKE Orange slices Milk, 2%, CACFP CHICKEN NUGGET Macaroni and Cheese, dr MIXED VEGETABLES APPLESAUCE, SWEETE MUFFIN SQUARES FRUIT JUICE, ASSORTE		Eggs, Scrambled Bread, White PEARS Milk, 2%, CACFP Fish Sticks MASHED POTATOES GREEN BEANS Roli, White (USDA Avera) Moon Pie, Banana FRUIT JUICE, ASSORTE		Cereal, Corn Flakes BANANA SLICES Milk, 2%, CACFP SPAGHETTI AND MEAT SALAD, TOSSED Mandarin Oranges, cnd Garlic Bread, frz OATMEAL COOKIES FRUIT JUICE, ASSORTE		Pop-tarts, strawberry RAISINS Milk, 2%, CACFP HAMBURGER ON A BU Tater Tot PEACHES Pickle slices CINNAMON ROLLS FRUIT JUICE, ASSORTE			
Nutrients	Target	Nutrients	Target	Nutrients	Target	Nutrients	Target	Nutrients	Target		
Cals...	1069	Cals...	848	Cals...	1137	Cals...	931	Cals...	1226	1042	149%
Chol...	66 mg	Chol...	116 mg	Chol...	287 mg	Chol...	99 mg	Chol...	80 mg	129 mg	63%
Sodium	1077 mg	Sodium	1145 mg	Sodium	1535 mg	Sodium	725 mg	Sodium	1540 mg	1204 mg	201%
Fiber..	10.3 g	Fiber..	6.8 g	Fiber..	6.8 g	Fiber..	7.7 g	Fiber..	7.7 g	7.8 g	63%
Iron...	7.6 mg	Iron...	3.9 mg	Iron...	5.9 mg	Iron...	9.5 mg	Iron...	8.3 mg	7.0 mg	141%
Calcium	162.5 mg	Calcium	664.0 mg	Calcium	651.7 mg	Calcium	524.0 mg	Calcium	591.0 mg	718.6 mg	180%
Vit A	2275 IU	Vit A	3091 IU	Vit A	1565 IU	Vit A	3065 IU	Vit A	1556 IU	2310 IU	350%
Vit C	34.1 mg	Vit C	101.3 mg	Vit C	39.4 mg	Vit C	71.5 mg	Vit C	32.2 mg	485 RE	368%
Prot	38.8g	Prot	30.0g	Prot	40.5g	Prot	39.4g	Prot	40.2g	55.7 mg	446%
Carb	185.0g	Carb	123.8g	Carb	152.5g	Carb	129.5g	Carb	185.3g	155.2g	59.6%Cal
T.Fat	24.3g	T.Fat	26.7g	T.Fat	39.8g	T.Fat	30.4g	T.Fat	38.3g	31.9g	27.5%Cal
S.Fat	11.8g	S.Fat	9.2g	S.Fat	18.1g	S.Fat	12.6g	S.Fat	14.0g	13.1g	11.3%Cal

	Average	Target	% of Target	Average	% of Calories	Target
Calories	1042	700	149%	Protein	37.55 g	14.41%
Cholesterol	129 mg	600	201%	Carbohyd	155.22 g	59.56%
Sodium	1204 mg	600	201%	Tot. Fat	31.89 g	27.54%
Fiber	7.85* g	12.50	63%	Sat. Fat	13.14 g	11.34%
Iron	7.05 mg	5.00	141%			
Calcium	718.64* mg	400.00	180%			
Vitamin A	2310* IU	660	350%			
Vitamin C	485* RE	132	368%			
Vitamin C	55.71* mg	12.50	446%			

NOTE: \* - Denotes missing or incomplete Nutrient Data.

### Appendix 3: Menu rubric

<b>Caregivers Promoting Healthy Habits Menu Rubric</b>		<b>Center:</b>
		<b>Rater:</b>
<b>Grains</b>		
<b>2</b>	<b>A. Whole grains are served</b> (oatmeal, whole grain cereal, brown rice, whole wheat bread, whole wheat crackers)	
0	25% or less of total grains are whole grains	
1	26-49% of total grains are whole grains	
2	50% or more of total grains are whole grains	
<b>Fruits and Vegetables</b>		
<b>2</b>	<b>B. Vegetables, not including fried vegetables or beans, are served</b>	
0	0-4 times per week	
1	5-7 times per week	
2	8+ times per week	
<b>1</b>	<b>C. Dark green vegetables are served</b> (broccoli, spinach, collard greens, turnip greens, mustard greens)	
0	0 times per week	
1	1+ times per week	
<b>1</b>	<b>D. Orange vegetables are served</b> (carrots, sweet potatoes, squash)	
0	0 times per week	
1	1+ times per week	
<b>2</b>	<b>E. Fried vegetables are served</b> (French fries, hashbrowns, tater tots, fried okra, fried zucchini)	
0	3+ times per week	
1	1-2 times per week	
2	0 times per week	

1

<b>2</b>	<b>F. Fruits, not including 100% juice, are served</b>	
0	0-3 times per week	
1	4-6 times per week	
2	7+ times per week	
<b>2</b>	<b>G. 100% fruit juice is served</b>	
0	5+ times per week	
1	3-4 times per week	
2	0-2 times per week	
<b>2</b>	<b>H. Fresh fruits and/or vegetables are served</b>	
0	0-2 times per week	
1	3-4 times per week	
2	5+ times per week	
<b>Milk</b>		
<b>2</b>	<b>I. Type of milk served to children ages 2 years and older</b>	
0	Whole	
1	2%	
2	1% or Skim	
<b>Protein</b>		
<b>2</b>	<b>J. Yogurt or Cheese is served</b>	
0	0 times per week	
1	1 time per week	
2	2 times per week	

2

<b>1</b>	<b>K. Beans or Lentils are served</b>	
	0	0 times per week
	1	1+ times per week
<b>2</b>	<b>L. Lean proteins are served</b> (baked chicken and fish, tuna, deli turkey, eggs, nuts, beans, lentils, lowfat yogurt)	
	0	0-2 times per week
	1	3-4 times per week
	2	5+ times per week
<b>2</b>	<b>M. Fried or pre-fried meats are served</b> (chicken or steak nuggets, chicken patty, fish sticks, corn dogs)	
	0	3+ times per week
	1	1-2 times per week
	2	0 times per week
<b>2</b>	<b>N. High fat meats are served</b> (sausage, bacon, bologna, salami, ham, hot dogs, ground beef)	
	0	3+ times per week
	1	1-2 times per week
	2	0 times per week
<b>Other</b>		
<b>2</b>	<b>O. High fat or high sugar foods are served</b> (donuts, pastries, cookies, muffins, sugary cereals, biscuits, pizza)	
	0	3+ times per week
	1	1-2 times per week
	2	0 times per week
<b>2</b>	<b>P. Sugar sweetened or artificially sweetened beverages are served</b> (flavored milk, sports drinks, soda, sweet tea)	
	0	1+ times per week
	1	0 times per week

3

<b>2</b>	<b>Q. A variety of different foods are served</b>	
	0	Less than 30 different menu items
	1	30-39 different menu items
	2	40+ different menu items
<b>2</b>	<b>R. An excellent source of vitamin C is served (at least 20% of RDA for children)</b>	
	0	0-2 times per week
	1	3-4 times per week
	2	5+ times per week
<b>33</b>	<b>Total Score:</b>	<b>/33</b>
		<b>Percent:</b>
<b>Additional Notes:</b>		

## Appendix 4: Environment and Policy Assessment and Observation instrument (EPAO) scoring guideline

**Total Nutrition** = (FV+ Grains+ HSHF+ Bev+ NutrEnv+ SBnutr+ NutrTE+ NutrPol)/8

### Sub-Areas

1. Fruits and Vegetables = FV
2. Whole grains and low fat meats = Grains
3. High sugar/high fat foods = HSHF
4. Beverages = Bev
5. Nutrition Environment = NutrEnv
6. Staff Behaviors-Nutrition = SBnutr
7. Nutrition Training and Education = NutrTE
8. Nutrition Policy = NutrPol

1. FV = (sum of question scores/9) x 10

Variable	Question	Answer	Score (0, 1, or 2)
Observation 5	How many times fruit was served the day of observation?	0	0
		1	1
		2	2
		3	2
		4	2
		5	2
Doc review 1c	How many total times does fruit appear on the menu for that full week	0-3	0
		4-6	1
		7-10	2
Observation 6	How many times was fruit served fresh, frozen or canned in own juice the day of observation	0	0
		1	1
		2	2
		3	2
		4	2
		5	2
Observation 8	How many times were vegetables (not including French fries or fried	0	0
		1	1

	vegetables) served the day of observation	2	2
		3	2
		4	2
		5	2
DRV2c	How many total times do vegetables appear on the menu for that full week	0-3	0
		4-6	1
		7-10	2
ORF9	How many times were dark green, red, orange or yellow vegetables served the day of observation	0	0
		1	2
		2	2
		3	2
		4	2
		5	2
DRV3c	How many total times do dark vegetables appear on the menu for that full week	0-3	0
		4-10	2
ORF10	Was margarine, butter, or meat fat visible on vegetables	No	1
		Yes	0
		No vegetables served	missing
ORF11	Are vegetables typically served with added fat?	No	1
		Yes	0
		Unsure	missing
DRV4a	Is added meat fat, margarine, or butter specified on the menu for cooked vegetables	0	2
		2	2

2. Grains = (sum of question scores/6) x 10

Variable Name	Variable Label	Answer	Score (0, 1, or 2)
ORF14	How many times were lean meats/fish served the day of observation	0	0
		1	2
		2	2
		3	2
DRV8c	How many total times do lean meats/fish appear on the menu for that full week	0	0
		1 or greater	2
ORF16	How many times were beans/lentils served the day of observation	0	0
		1	2
		2	2
		3	2
DRV9c	How many total times do beans/lentils appear on the menu for that full week	0	0
		≥ 1	2
ORF19	How many times were high fiber grains served the day of observation	0	0
		1	2
		2	2
		3	2
DRV13c	How many total times do whole grains appear on the menu for that full week	0	0
		1-3	1
		4-10	2

3. HFHS = (sum of question scores/10) x 10

Variable Name	Variable Label	Answer	Score (0, 1, or 2)
ORF12	How many times were fried or pre-fried vegetables served the day of observation	0	2
		1	1
		2	0
		3	0
DRV6c	How many total times do fried or pre-fried vegetables appear on the menu for that full week	0	2
		1-3	1
		4-10	0
ORF13	How many times were fried or pre-fried meats served the day of observation	0	2
		1	1
		2	0
		3	0
DRV5c	How many total times do fried or pre-fried meats appear on the menu for that full week	0	2
		1	1
		≥ 2	0
ORF14	How many times were high fat meats served the day of observation	0	2
		1	1
		2	0
		3	0
DRV7c	How many total times do high fat meats appear on the menu for that full week	0	2
		1	1
		≥ 2	0
ORF17	How many times were high sugar and/or high fat foods (not condiments) served the day of observation	0	2
		1	1
		2	0
		3	0
		4	0

		5	0
DRV14c	How many total times do high sugar and/or high fat foods (not condiments) appear on the menu for that full week	0	2
		1-3	1
		4-10	0
ORF18	How many times were high sugar and/or high fat condiments served the day of observation	0	2
		1	2
		2	1
		3	0
		4	0
		5	0
DRV15c	How many total times do high sugar and/or high fat condiments appear on the menu for that full week	0	2
		1-3	1
		4-10	0

4.  $Bev = (\text{sum of question scores}/11) \times 10$

Variable Name	Variable Label	Dataset Variable	Score (0, 1, or 2)
ORF7	How many times was 100% fruit juice served the day of observation	0	2
		1	1
		2	0
		3	0
		4	0
		5	0
DRV10c	How many total times does 100% fruit juice appear on the menu for that full week	0-1	2
		2	1
		≥ 3	0
ORF20	Was drinking water for children visible in the classroom?	No	0
		Yes	2
ORF20b	If no, is there a water fountain	Yes	1



	in a nearby hallway?	No	0
ORF21	Did you witness teachers prompting children throughout the day to drink water?	Yes, regularly	2
		Yes, at specific times only	1
		No	0
ORF38	Was drinking water for children available outdoors?	Yes	2
		No	1
		No outdoor time observed	0
ORF39	While outdoors, did you witness teachers prompting children to drink water?	Yes	2
		No	1
		No outdoor time observed	0
ORF22	How many times were sugar drinks served the day of observation	0	2
		1	0
		2	0
		3	0
		4	0
		5	0
DRV11c	How many total times do sugar drinks appear on the menu for that full week	0	2
		≥ 1	0
ORF23	How many times was milk served the day of observation	0	0
		1	1
		2	2
		3	2
ORF24	What type of milk was served to the majority of children at a	Whole	0
		2%	1

	majority of meals	1%	2
		Skim	2
		Whole, flavored	0
		Lower fat, flavored	1
		Rice milk	2
		Soy milk	2
		Lactaid	2
DRV12c	How many total times does milk appear on the menu for that full week	0-3	0
		4-6	1
		7-10	2

5.  $SB_{nutr} = (\text{sum of question scores}/6) \times 10$

Variable Name	Variable Label	Answer	Score (0, 1, or 2)
ORF26	Did staff push children to eat more than they wanted to?	Yes	0
		No	2
ORF27	Did staff serve children second helpings without being asked for more by the child?	Yes	0
		No	2
ORF28	Did staff positively and gently encourage children to try new or less favorite foods	Yes	2
		No	0
		No children resisted eating	Do not score
ORF29	Was food used to control behavior	Yes	0
		No	2
ORF30	Did staff sit with children during lunch	Yes	0
		No	0
ORF30a	Did staff consume the same food as children	Yes	2
		No	1

ORF31	Did staff eat and/or drink less healthy foods in front of children	Yes	0
		No	2
		Did not observe staff eating	1

## 6. NutrEnv (sum of question scores/3) x 10

Variable Name	Variable Label	Answer	Score (0, 1, or 2)
ORF3	How was lunch served?	Family style	2
		Delivered and served in prepared portions	0
		Delivered in bulk and portioned by staff	0
		N/A	0
ORF54	Where were soda and other vending machines located	In entrance or front	0
		In public areas, but not front	0
		Out of sight of parents and kids	0
		No vending machines on sight	2
ORF54a	Did they contain only healthy options?	Yes	2
		No	0
**ORF54 and 54a are combined questions and should be scored as one question			
ORF61	Are any posters, pictures or books about nutrition displayed in observation room	No	0
		Yes	2

## 7. NutrTE = (sum of question scores/5) x 10

Variable Name	Variable Label	Answer
ORF32	Did staff talk with children about healthy foods	No
		yes
ORF33	Was any formal nutrition education for kids observed	No
		Yes

DRV23	Does the center have a documented nutrition curriculum for kids?	No
		Yes
DRV24	Does the center have documentation of parent nutrition education/workshop materials?	No
		Yes
DRV22	Does the center provide nutrition training for staff?	No
		Yes
		No documents received
DRV22a	If yes, how often	2 times/year or more
		1x/year
		Less than 1x/yr

\*\*DRV22 and DRV22a are combined questions and should be scored as one question.

8. NutrPol = (sum of question scores/3) x 10

Variable Name	Variable Label	Answer	Score (0, 1, or 2)
DRV17	Does the center have written guidelines addressing holiday/celebration foods?	No	0
		Yes	0
		No documents received	missing
DRV17a	Healthier items encouraged	No	0
		Yes	2
**DRV17a and DRV17a1 are combined questions and should be scored as one question.			
DRV18	Did you review past/future fundraising projects or guidelines?	No	0
		Yes	2
		Center doesn't do fundraising	2
DRV18a	If yes, how many were non-food only	All	2
		More than half	2
		Half	1
		Less than half	0

		none	0
**DRV18a and DRV18a1 are combined questions and should be scored as one question.			
DRV19	Does the center have a written policy on nutrition and food service?	No	0
		Yes	0
		No documents received	Set as missing
DRV19a1	*These are filled/not filled questions. If one of 19a1-19a9 is filled (1) then score as 1, if more than one are filled (1) then score as 2. If DRV19a=1, but none of the 19a1-19a9 is filled then score as a 0.		
DRV19a2			
DRV19a3			
DRV19a4			
DRV19a5			
DRV19a6			
DRV19a7			
DRV19a8			
DRV19a9			