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**FARM TO FORK: A CULINARY- AND FARM-ENHANCED NUTRITION
EDUCATION PROGRAM**

by

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A dissertation in practice submitted in partial fulfillment of the requirements
for the Degree of Doctor of Education
in the College of Education and Human Performance
at the University of Central Florida
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ABSTRACT

With obesity in adolescents becoming a major health problem in the United States, there has been an expansion in the use of nutritional education programs as intervention. Effective nutrition education can decrease the incidence of obesity and other diet-related chronic diseases, type-2 diabetes, cardiovascular disease, and hypertension. This dissertation in practice proposes to design a nutrition education program, integrating farm and culinary activities into a nutrition education curriculum. The program is designed as a stand-alone program, but for this practice, implementation integrates the nutrition education program into the *Film @ 6* after-school program – a STEM-focused program designed to assist sixth graders in their first year of middle school – at Southeast Middle School in Salisbury, Rowan County, North Carolina (NC). This experiential nutrition education program will provide instruction and activities in order to increase nutritional knowledge, improve culinary techniques, and increase consumption of fruits, vegetables, and minimally processed foods of sixth grade students as a means to address the overweight and obesity risks of middle school children. Children and adolescents are considered the priority population for intervention strategies because 70% of obese adolescents become obese adults and it is difficult to reduce excessive weight once established (Dehghan, Akhtar-Danesh, & Merchant, 2005).

“Obesity is almost entirely preventable through diet and exercise, as are the health problems that come with it.” – Richard Carmona, Former U.S. Surgeon General

“Every time you eat or drink, you are either feeding disease or fighting it.” – Heather Morgan,
MS, NLC

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LIST OF ACRONYMS/ABBREVIATIONS

BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
DGA	Dietary Guidelines for Americans
ELT	Experiential Learning Theory
F2F	Farm to Fork Nutrition Education Program
HHS	United States Department of Health and Human Services
NEP	Nutrition Education Program
RDA	Recommended Dietary Allowance
SCT	Social Cognitive Theory
USDA	United States Department of Agriculture
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION TO THE PROBLEM AND LITERATURE REVIEW

Problem Statement

Because obesity in adolescents has become a major problem in the United States, the problem of practice this Dissertation in Practice will address is the lack of nutritional knowledge held by middle school students. The Dissertation in Practice aims to determine the effect of nutrition education as a means to increase nutritional knowledge and reduce diet-based obesity risks in middle school students in an urban Title I school.

The Problem Defined

Obesity is a serious and prevalent nutritional disorder in the United States. With 300,000 premature deaths in the United States, obesity and its complications are second only to cigarette smoking in preventable causes of death (Merck Manuals, 2014). Obesity is an important public health problem that has reached epidemic proportions, with the number of children suffering from obesity tripling in the past two decades (CDC, 2014). According to the American Academy of Child and Adolescent Psychiatry (2011), between 16% and 33% of children and adolescents are obese.

There are several definitions for obesity:

- 1) A complex disorder involving an excessive amount of body fat (Mayo Clinic, 2014).
- 2) Excess adipose tissue or excess body fat beyond a threshold of a norm or a reference value (Kuczmarski, 2007, p. 25).
- 3) Abnormal or excess fat accumulation that may impair health (WHO, 2015).
- 4) An unhealthy excess of body fat, which increases the risk of medical illness and premature mortality (as cited by Kuczmarski, 2007, p. 25).

When discussing obesity for this practice, the meaning is an incorporated version of the previous definitions – a complex disorder involving an excessive amount of body fat, which increases the risk of medical illness.

There are also several methods available in order to establish what is considered “excessive body fat.” These techniques include body mass index (BMI), densitometry (underwater weighing), bioelectrical impedance analysis (BIA), magnetic resonance imaging (MRI), skinfold thickness (using calipers), and isotope dilution. BMI is the most common method to establish body fat percentage because “it is inexpensive and easy to use for clinicians and for the general public” (CDC, 2015).

Merriam-Webster’s definition (2015) of an index is “something that serves to indicate a value or quantity; a number derived from a series of observations and used as an indicator or measure.” Specifically, BMI is a simple index calculated from a person’s weight and height used to help determine whether a person is obese or overweight. BMI is calculated by taking a “person’s weight in kilograms divided by the square of his height in meters (kg/m^2)” (WHO, 2015). BMI for children and adults is calculated the same way, but the results are interpreted differently. The variance in interpretation occurs

because the amount of body fat changes with age and varies between girls and boys (CDC, 2015). BMI-for-age-percentiles are used when calculating BMI for children and adolescents. Percentile is defined as “a value on a scale of 100 that indicates the percent of a distribution that is equal to or below it” (Merriam-Webster, 2015). Children, grouped by age and sex, are placed in one of four categories (CDC, 2014):

1. Underweight – BMI below the 5th percentile
2. Normal weight – BMI at the 5th percentile and less than the 85th percentile
3. Overweight – BMI at the 85th percentile and below the 95th percentile
4. Obese – BMI at or above the 95th percentile

Figure 1 illustrates how two boys with the same BMI but of different ages are classified in separate BMI percentile ranges.

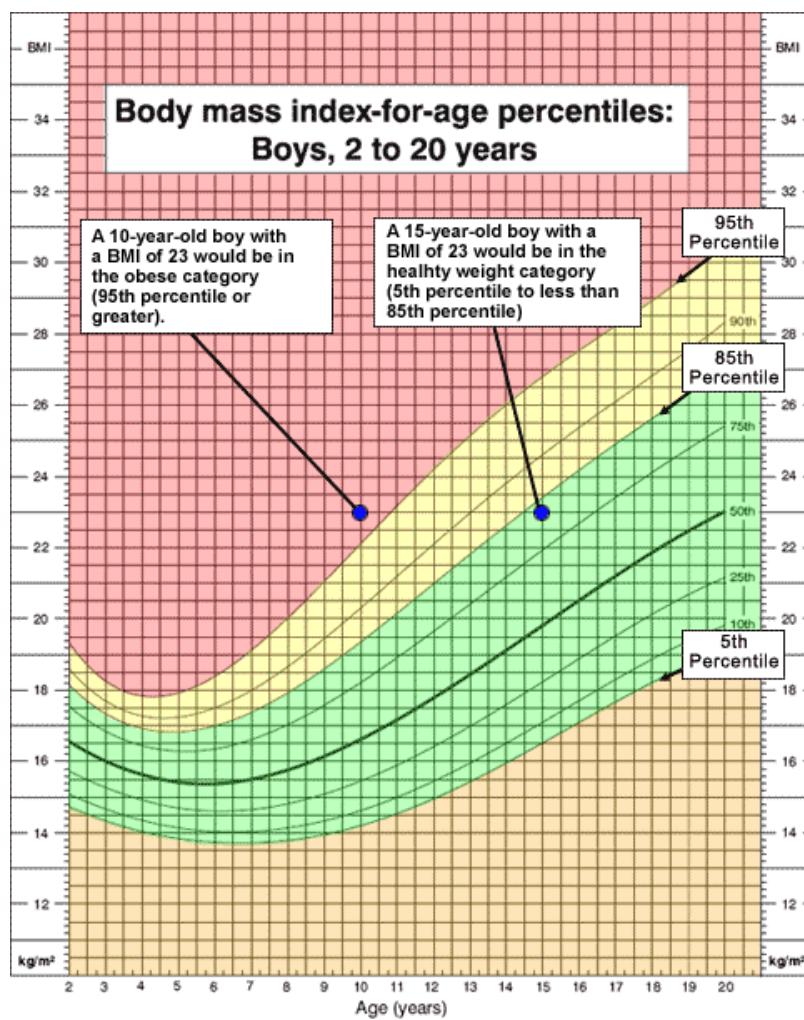


Figure 1: Boys BMI for age Chart
(Centers for Disease Control and Prevention, 2015)

Affected Populations

While this practice focuses on adolescents, the problem of obesity has been well researched and data has proven that a problem exists across ethnic, gender, and age groups. Rates of obesity are as follows (CDC, 2014):

- Non-Hispanic blacks (47.8%)

- Hispanics (42.5%)
- Non-Hispanic whites (32.6%)
- Men (26.4%)
- Women (24.8%)
- Ages 2-5 (8.4%)
- Ages 6-11 (17.7%)
- Ages 12-19 (20.5%)

Figure 2 shows the rate of self-reported obesity among adults by state.

Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

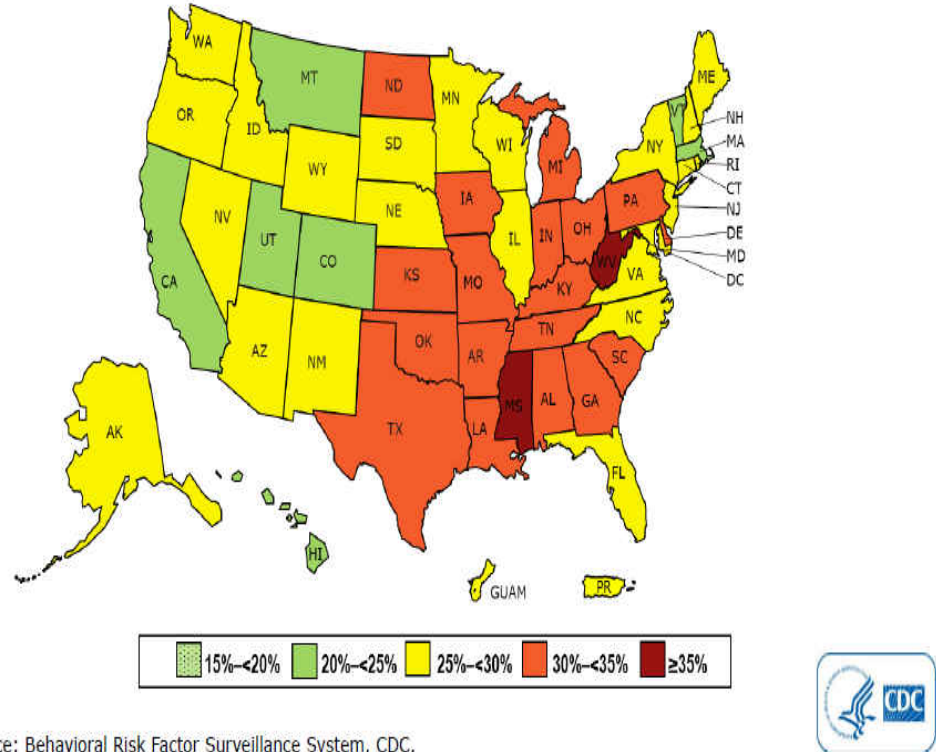


Figure 2: Self-Reported Obesity Among U.S. Adults by State and Territory (Centers for Disease Control and Prevention, 2014)

While the overall rate of obesity among adults nationwide is 34.9% and no state has an obesity rate of less than 20% (CDC, 2014; National Center for Health Statistics, 2010), the highest concentration of obesity is in the Midwest and Southeast. Higher incomes in women result in lower levels of obesity, whereas higher incomes in non-Hispanic black and Mexican-American men result in higher levels of obesity (CDC,

2015). Regardless of income, individuals and families are susceptible to obesity risk when experiencing economic hardship or over-indebtedness (Munster, Ruger, Ochsmann, Letzel, & Toschke, 2009).

The focus of this problem of practice is on sixth graders, even with the widespread risk of obesity across several populations, because in adolescents weight gain prevention is a key strategy and is a more reasonable goal than weight loss (Dehghan, Akhtar-Danesh, & Merchant, 2005; Merck Manuals, 2014). More specifically, the concentration is on middle school students in Rowan County, NC. The rate of overweight and obesity for children ages 10-17 in North Carolina is 33.5% (NICH, 2007). In Rowan County, North Carolina, 27.5% of children 2-18 years of age are classified overweight and obese (North Carolina Nutrition and Physical Activity Surveillance System, 2009, p. 4).

Risks, Effects, and Significance of the Problem

With childhood obesity in the United States reaching epidemic proportions, it has become a major concern for many community stakeholders such as parents, school officials, caregivers, health care professionals, community leaders, and policy makers. The main reason for the concern is that childhood obesity is known to have adverse psychosocial, health, and financial consequences (Fowler-Brown & Kahwati, 2004). Risk associations of overweight children and adolescents include the risk for developing high cholesterol, hypertension, respiratory ailments, orthopedic problems, depression, and type 2 diabetes (Deckelbaum & Williams, 2001, p. 241S).

A study by Becque and coworkers (1988) evaluated the incidence of risk factors for coronary heart disease in a group of obese adolescents and documented that 80% had elevated systolic blood pressure, diastolic blood pressure, or both. Furthermore, they found that 97% of the adolescents had four or more of the following cardiovascular risk factors (Becque, Katch, Rocchini, Marks, & Moorehead, 1988):

- Elevated serum triglyceride levels (more than 100 mg per deciliter).
- Low levels of high-density lipoprotein cholesterol (below the 10th percentile for age and gender).
- Increased total cholesterol levels (more than 200 mg per deciliter)
- Elevated systolic blood pressure, diastolic blood pressure, or both (above the 90th percentile for age and gender).
- Diminished maximal oxygen consumption (less than 24 ml per kilogram of body weight per minute).
- A strong history in the immediate family of coronary heart disease, myocardial infarction, angina pectoris, or high blood pressure.

Obese children also have a higher prevalence of insulin resistance and type 2-diabetes. As the prevalence of childhood obesity increased between 1982 and 1994, the incidence of type 2-diabetes increased by nearly a factor of 10, according to one report by Pinhas-Hamiel et al. (1996). The authors also observed that in 1996, one-third of all new cases of diabetes in children 10-19 years of age could be classified as type 2, resulting in an age-specific incidence of 7.2 per 100,000 children per year. This is an increase attributed to changing dietary patterns and increasing rates of obesity among these

children. In some areas, type 2-diabetes has become the dominant form of diabetes in children and adolescents (Pinhas-Hamiel et al., 1996).

Epidemiologic evidence from the past 20 years demonstrates that the increasing incidence of type 2-diabetes in children parallels the increasing prevalence of obesity (Rosenbloom, Joe, Young, & Winter, 1999). This epidemiologic data considered in conjunction with both the current worldwide epidemic of childhood obesity and the evidently high incidence (greater than 20%) of impaired glucose tolerance in severely obese children, exhibits that there is an emerging pediatric epidemic of type 2-diabetes. If these developing trends cannot be averted, the full public health effect will be experienced as affected children become adults and the long-term complications of diabetes develop.

As overweight adolescents have a high probability (70%) of becoming overweight or obese in adulthood, there is an increased probability of developing the same diseases which were risks during adolescence, in addition to asthma and arthritis (Bishop, Middendorf, Babin, & Tilson, 2005). Being overweight also increases the risk of cataracts, gallstones, infertility, pregnancy complications, and depression in adults. Obese individuals have more office visits (24% higher) and hospitalizations (74% higher) than non-obese individuals. The current numbers estimate obesity-related deaths between 112,000 to 365,000 per year (Colditz & Stein, 2007, p. 74). If nothing is done to impede this rate of growth, obesity will likely become the leading preventable cause of death. (Parks, 2008).

The adverse financial effects of obesity are just as impactful as the medical risks. In 1995, indirect costs of obesity were 48 billion dollars with 48% of those costs due to

coronary heart disease (Colditz & Stein, 2007, p. 78). Estimated hospital costs related to childhood obesity during the years 1997 – 1999 was estimated at \$127 million. Obesity costs continued to rise, with the total cost of obesity for children and adults in the United States in 2000 being \$117 billion (\$61 billion in direct medical costs) (Bishop, Middendorf, Babin, & Tilson, 2005). The direct and indirect costs of obesity in North Carolina youth were nearly \$16 million per year (North Carolina Department of Commerce, 2014).

School absenteeism is also an obesity-associated risk for adolescents. Overweight and obese youth were 1.5 times and 1.7 times, respectively, more likely to miss school than normal-weight youth (Echeverria, Velez-Valle, Janevic, & Prystowsky, 2014). Obese children have an increase of associated medical conditions that may lead to higher school absentee rates. Social stigmas and bullying may also contribute to absenteeism in obese children (Geier et al., 2007, p. 2160).

In addition to increased health risks and costs, increased school absenteeism, and increased social stigma, the need to address the obesity rates of adolescents in Rowan County is significant because the county 2009 Community Health Assessment listed obesity issues as its number one priority. The target populations though, were K-5 students and adults. These populations identified by the Rowan County Health Department do not address the adolescent subset population of the 27.5% overweight and obese children in Rowan County. Although obesity is acknowledged as an issue in Rowan County, more value needs to be assigned to investigating and addressing the overweight and obesity rates of adolescents in Rowan County.

Furthermore, the county 2012 Community Health Assessment listed Medical Care and Chronic Disease as its numbers two and three priorities respectively. The Chronic Disease Initiative promotes farmer's markets, healthy eating, and physical activity; addresses food deserts; and provides food preparation demonstrations. The Medical Care Initiative addresses diabetes management. As described above, obesity is a significant precursor to chronic disease and medical care costs, and the leading cause of diabetes. Although obesity was removed from the list of county health priorities, obesity is still addressed in order to undertake the task of resolving medical care and chronic disease issues.

Some of the initiative activities include promotion of physical activity, healthy eating, and nutrition; training elementary school teachers on USDA *MyPlate* curricula and integration of nutrition into the classrooms; and participating in the USDA Fresh Fruit & Vegetable program, which serves fresh fruits and vegetables in the classroom (Rowan County Board of Health, 2012). However, eliminating obesity from the list of Rowan County Community Health Assessment priorities may cause the misconception that it is no longer significant and can lead to a missed opportunity to resolve obesity issues and its associated psychosocial, medical, and financial costs and risks.

Organizational Context

Southeast Middle School in Salisbury, Rowan County, North Carolina will host the nutrition education program during the school's *Film @ 6* afterschool program. While Southeast Middle School is in an urban area of Salisbury, a significant portion of Rowan

County (41.3%) is considered rural. The county is composed of 11 cities and towns, is home to 983 farms, and comprises a total area of 524 square miles. Salisbury, its largest metropolitan area, is 42 miles north of Charlotte and 50 miles south of Greensboro. There are 20,000 students at 35 public schools in Rowan County – 20 elementary schools, 7 middle schools, and 8 high schools – and 6 private schools (Rowan- Salisbury Schools, 2014). The county also houses three colleges: Rowan-Cabarrus Community College (which is part of the North Carolina Community College System); Catawba College, a private liberal arts college founded in 1851; and Livingstone College, a private liberal arts college founded in 1879 (Rowan County Board of Health, 2012, pp. 5-8). The population for Rowan County is 138,180 people with the largest population for the county being children ages 0-19 years of age (NC Department of Commerce, 2013, p. 1).

Southeast Middle School has 712 students (comprising 20 different nationalities), 60% of which are considered low income (North Carolina State Board of Education, 2013). The school motivates students with its purpose “Striving for Excellence, Motivating for Success” (Rowan-Salisbury Schools, 2014). The school website lists its mission as “To nurture a collaborative, positive educational environment” and its vision as “A place where all SAIL (Students Are Independent Learners).”

Rowan-Salisbury Schools (the county school system) has a strategic plan with the motto “E3 – Extraordinary Education Every Day” (Rowan-Salisbury Schools, 2014). The strategic plan for its schools focuses on two areas - literacy and student engagement. Instruction guides students to be fully engaged, to think critically, and to apply real world meaning to their learning.

The curriculum for the nutrition education program incorporates lessons to practice the areas of focus outlined in the Rowan-Salisbury Schools' strategic plan. The lessons also include skills and objectives that meet North Carolina Common Core Standards for mathematics, science, and language arts. Additionally, the curriculum uses the farm and culinary activities to integrate nutrition, health, environmental studies, and history disciplines. The culinary and farm nutrition education program uses an experiential learning model structured around direct participation -- experiencing, thinking, discussing, and applying what the adolescents have learned to their daily lives. It is a learner-centered approach to nutrition education, focusing on the experiences, interests, talents, and needs of the learner to facilitate learning.

As a hands-on culinary and farm nutrition education program, the Farm-to-Fork program provides: enhanced reading skills through reading labels and recipes, enhanced math skills through recipe conversions and farm planning, enhanced science skills through culinary activities and farm development, a strong nutritional knowledge of content foods, an understanding of regional cuisines, and sound teamwork abilities. The lessons – from the most current nutrition and health guidelines - will increase the nutritional knowledge of the students, will enhance students' culinary skills, and will encourage students to make healthy food choices via experiential learning activities that include food tasting, identification of fruit and vegetables, learning total food use, and healthy meal preparation. In addition to improving nutritional knowledge, agricultural understanding, and culinary techniques, the nutrition education program expects to improve connection to and understanding of food sources, grocery-shopping skills, understanding of food labels, confidence in cooking abilities, and food presentation skills.

History and Conceptualization

A Look into Obesity

With the excess of commercials, websites, stores, and products inundating individuals with so much differing information about what to eat and how to eat it, it is hard to believe that in 1894 when the United States Department of Agriculture (USDA) published the first dietary recommendations, certain vitamins and minerals were yet to be discovered (Davis & Saltos, 1999, p. 33). Now, a wealth of information is available at the fingertips, yet nutrition knowledge remains low (Guthrie, Derby, & Levy, 1999).

Food guides, historically, have been used to provide consumers with a set of principles for translating dietary recommendations into behavioral terms (Guthrie, Derby, & Levy, 1999, p. 254). The initial food guide, *Food for Young Children*, was constructed to provide families with the information necessary to ensure the proper intake of daily nutrients. During the 1970s, research grew indicating there was an overconsumption of fats, sugars, cholesterol, and sodium by the public. *Nutrition and Your Health: Dietary Guidelines for Americans* was a guideline recommended by the U.S. Surgeon General in 1980. This guideline was a first effort to address the need of the public to consume the proper amount of nutrients and attempt to maintain recommended body weight (Davis & Saltos, 1999, pp. 35-37).

Many guidelines are currently available, including:

- The Recommended Dietary Allowances (RDA), which are intake levels of vitamins and minerals ensuring nutritional adequacy for healthy individuals
- The Reference Daily Intakes (RDI), which are intake levels based on the RDAs shown for adults and children four or more years of age.

- The Dietary Guidelines for Americans (DGA), which became a mandatory report under the 1990 National Nutrition Monitoring and Related Research Act. The 2010 Dietary Guideline for Americans has become more specific with 29 key dietary recommendations. Recommendations have become more specific in order to address the rise in dietary-based disease and to provide statutes for such federal nutrition programs as the National School Lunch Program (Watts, Hager, Toner, & Weber, 2011).
- The USDA MyPlate is a nutrition education tool used to provide guidelines on the proportion of food needed to meet dietary needs. The first such iconographic tool, the Food Guide Pyramid (1990), changed to MyPyramid in 2005, and then adapted to MyPlate in 2010. These guides serve as visual recommendations for the daily number of servings to be consumed from each food group (Haack & Byker, 2014).

Even with these guidelines and resources, obesity is a public health crisis. The prevalence of obesity has increased gradually throughout this century, and it has risen sharply in the last 10 years despite improvements in the quality of the American Diet (Jeffery & French, 1998). Obesity prevalence increased from 13% to 32% between the 1960s and 2004, according to researchers at the John Hopkins Bloomberg School of Public Health Center for Human Nutrition (Wang & Beydoun, 2007). Approximately 65% of adults in the United State are either overweight or obese and projections are that by 2015, 75% of adults will be overweight and 41% will be obese. In Healthy People 2010, the Centers for Disease Control and Prevention (CDC) established a national objective to reduce the proportion of adults who are obese (BMI>30) from 31% to 15%.

According to data from the Third National Health and Nutrition Examination Survey (NHANES III), one-third of the United States population is overweight and over one-fifth of the population is considered obese. (King & Fitzhugh, 2001). Figures 3 and 4 show the rate of obesity in children in the United States from ages 6-11 has increased from 4.2% in 1963 to 18% in 2010. The rate for adolescents ages 12-19 has increased from 4.6% in 1963 to 18.4% in 2010 (CDC, 2014).

Although the United States has the highest rates of overweight and obesity, there are 500 million obese adults and 43 million overweight and obese preschoolers worldwide (Harvard School of Public Health [HSPH], 2015). Figure 5 shows a global increase in the prevalence of childhood obesity. Noteworthy increases are seen in countries such as Australia, Brazil, and Egypt. In the 2014 *Obesity Update* by the Organization for Economic Cooperation and Development (OECD), it is cited that 30% of children in Greece and Italy are obese. High obesity rates among children aged 5-17 also exist in New Zealand, Slovenia, Mexico, Hungary, and Portugal. As such, several countries “have adopted policies to prevent obesity from spreading further” (OECD, 2014).

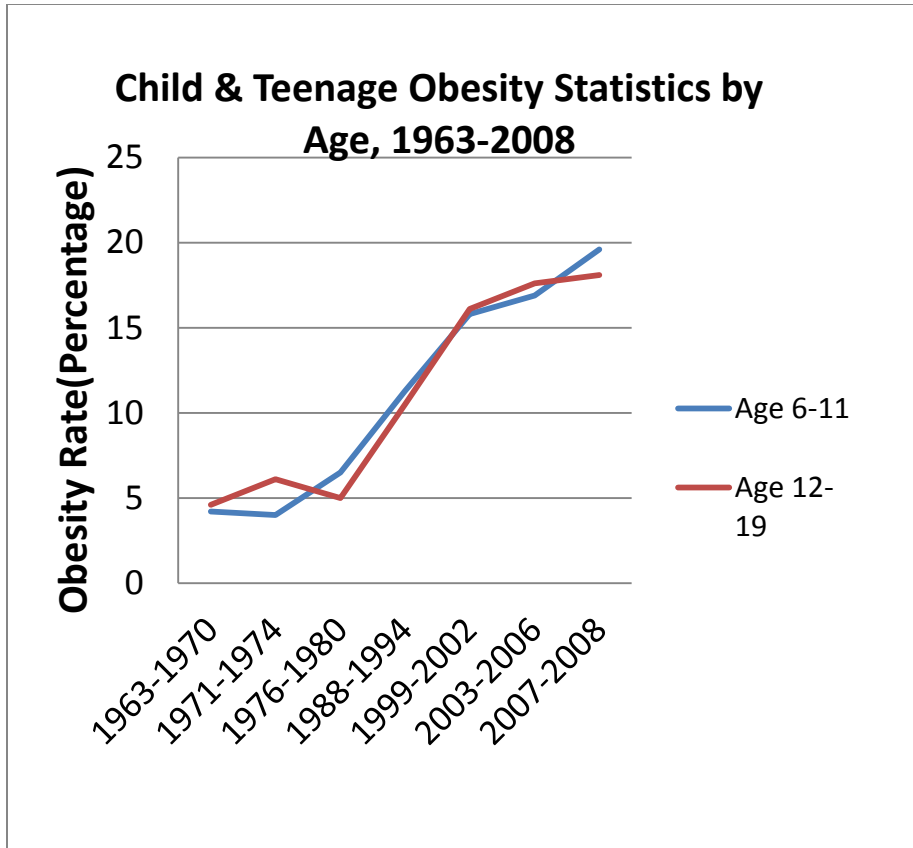


Figure 3: Child & Teenage Obesity Rates, 1963-2008
 (Centers for Disease Control and Prevention, 2010)

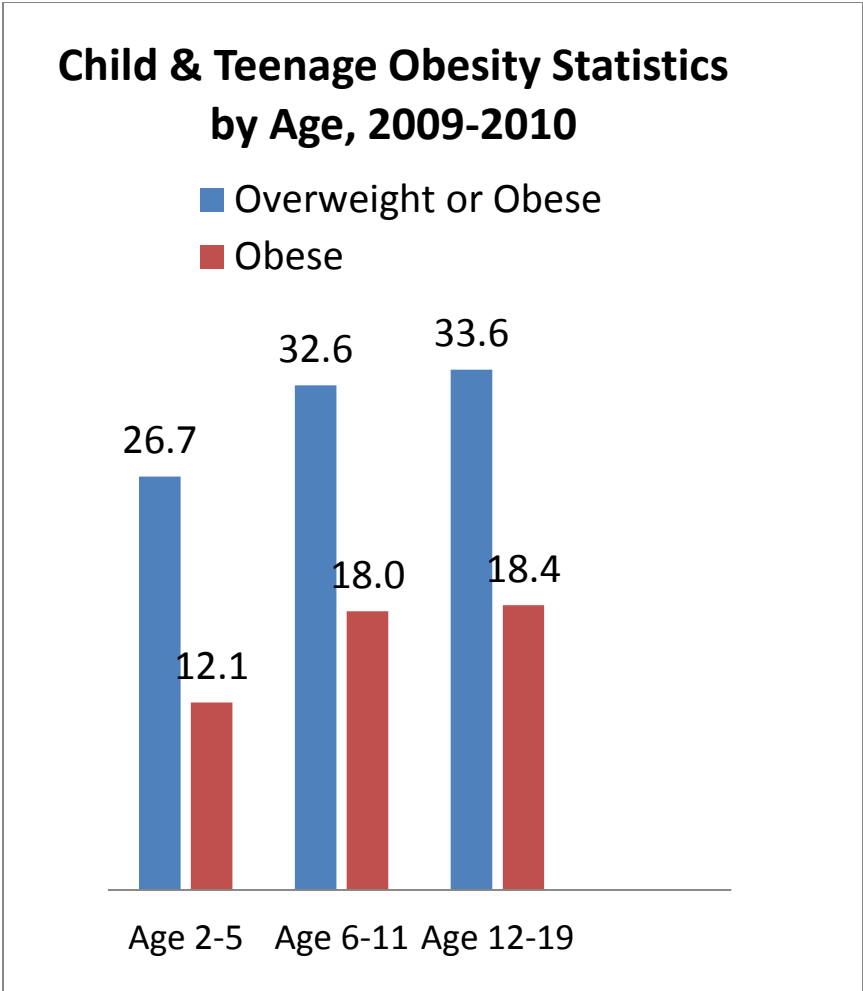


Figure 4: Child & Teenage Obesity Rates, 2009-2010
(Centers for Disease Control and Prevention, 2012)

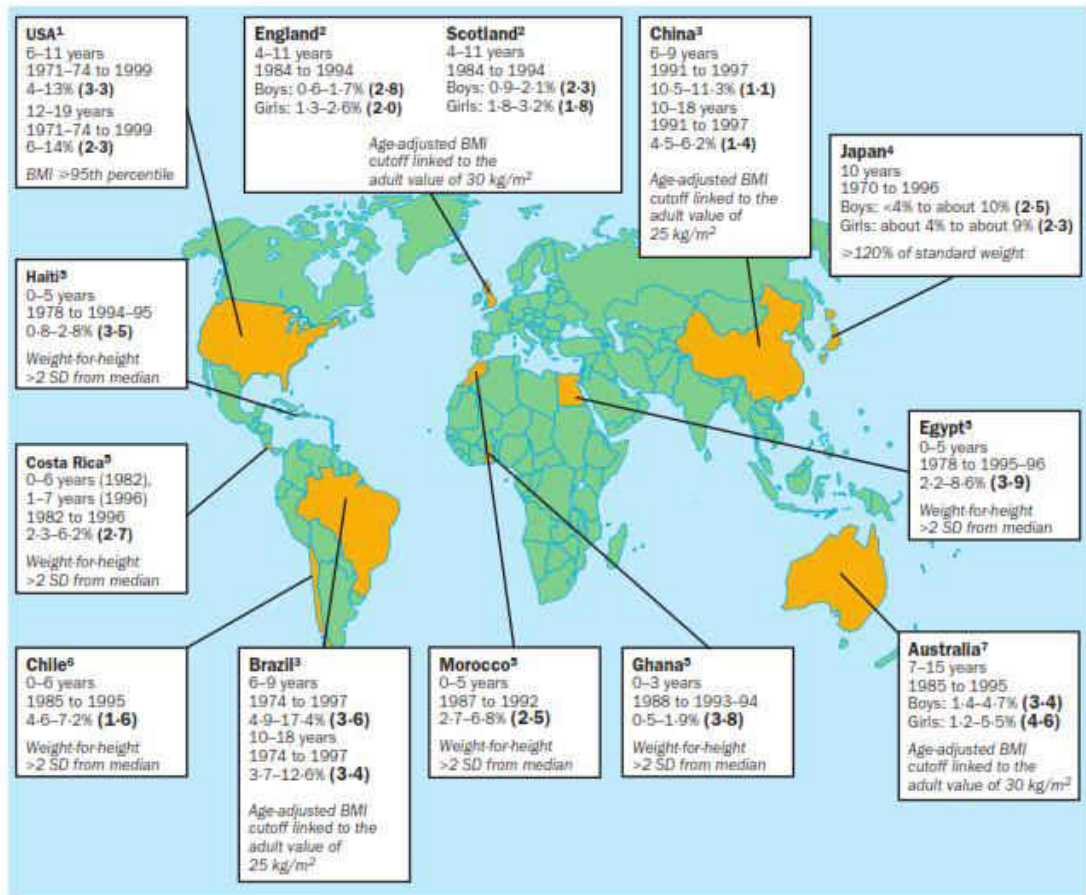


Figure 5: Global increases in prevalence of childhood obesity

Change factors are listed in bold for increases in prevalence over specified time intervals. Definitions of overweight and obesity in italics. (2002)

How Did We Get Here?

The question then becomes “How did we get here?” The rise of obesity is not just in one or two communities, or a few states, or even a small number of nations. The rise of obesity to epidemic proportions has affected the world (OECD, 2014;

Caballero, 2007; HSPH, 2015). If there was one evident cause, strategies and solutions could be more focused and potentially more effective. Unfortunately, there is no singular cause of obesity. Many dynamics contribute to current obesity rates -- agricultural, physical, social, psychological, behavioral, environmental, nutritional, and governmental (Anderson & Butcher, 2006; Caballero, 2007; Zimmerman & Snow, n.d; Lake & Townshend, 2006). The translation is people are eating more and exercising less; foods have more additives; beverages and convenience foods with high calorie and high sugar content are consumed more frequently; transportation methods have changed; and there is an increase in sedentary activities (Anderson & Butcher, 2006; Caballero, 2007; Zimmerman & Snow, n.d; Lake & Townshend, 2006).

An adolescent watching TV in his room while eating a fast food dinner is an example of how potential sources of obesity are so integrated. Anderson and Butcher (2006) provide the following explanations:

- In 1999, 77% of sixth graders had a TV in their bedroom, whereas in 1970 65% of homes had just one TV.
- Watching TV equates to less physical activity and therefore less energy expenditure while eating during television watching equates to more energy intake.
- During television watching, children's programming had 11% more commercials per hour in 1993 versus 1987 with half of the advertisements focusing on food and beverages at an expenditure of \$12.4 billion.

- The fast food portion sizes increased 60 times in the late 1990s, with soda consumption for children changing from 5 ounces in the 1970s to 21 ounces in the 1990s.

Before these more modern occurrences though, there were fundamental shifts in human behavior. These shifts are called “nutrition transitions” (HSPH, 2015). Table 1 outlines the five patterns of behavior. The behaviors evolve from highly active, hunter-gatherer lifestyles with high plant intake to sedentary, technology-driven work and leisure activities with high caloric, fat, and sugar intake. The final pattern is a result of a need to change behaviors in order to see a reduction in obesity and obesity-related chronic disease.

Table 1: Nutrition Transition Patterns

PATTERN	PATTERN TYPE	PATTERN BEHAVIOR
PATTERN 1	HUNTER-GATHERER	Highly active, hunting, food foraging, high plant and lean protein diet
PATTERN 2	EARLY AGRICULTURE	Less travel, famine common, decrease in body fat, stunted growth
PATTERN 3	END OF FAMINE	Labor-intensive work, income rises, starchy, low variety food
PATTERN 4	OVEREATING, OBESITY-RELATED DISEASE	Shift in technology, income continues to rise, less active, increased fat, sugar, and calorie intake, increased obesity and chronic disease
PATTERN 5	BEHAVIOR CHANGE	Purposeful diet and activity change, behavior change promoted, reduced obesity, improved health

(Harvard School of Public Health, 2015) (Popkin, 2003)

Schools, Nutrition, and Obesity

“Schools have been recognized as important environments that can shape and influence health related habits of young people” (Lake & Townshend, 2006). The federal government has six child nutrition programs administered by the USDA through its Food and Nutrition Service (FNS). The programs are designed to end hunger and obesity, and improve nutrition and health. Two of the food-assistance programs -- the School Breakfast Program (SBP) and the National School Lunch Program (NSLP) – provide nutritionally balanced, low-cost, or no-cost meals to children each school day. Participating school districts receive a cash and commodity subsidy for each meal they serve, and in turn, they serve meals that must meet minimum dietary standards (USDA, 2015). Children from families with income at or below 130% of the federal poverty level qualify for free meals. Children from families with income between 130% and 185% of the federal poverty level qualify for reduced-price meals. In Rowan County, NC, the location of the nutrition education program, 56.1% of Pre-K through early college students receives free or reduced price meals (North Carolina Department of Commerce, 2014).

In the United States, 50% of daily calories are consumed by children at school with 12.5 million children eating breakfast at school and 31 million children eating lunch at school (Levi et al., 2013). These students are reliant upon the school system to provide healthy meal options during the school day. “Provision of healthy food should go hand in hand with...the necessary knowledge and skills in relation to purchasing, preparation, cooking, and enjoyment of healthy food” (Mikkelsen, Rasmussen, & Young, 2005, p.

12). Gaining cognitive and practical, hands-on nutritional knowledge that can be applied to tangible experiences, in tandem with healthy meals obtained at school, can provide the self-efficacy -- “the domain-specific belief that indicates a person is able to orchestrate outcomes and meet task-related goals” (Hoffman, 2014) -- needed to take a more active role in making healthier food choices. The applied knowledge can validate schoolchildren’s abilities to build a high-nutrient meal into their lifestyles away from school. “Young children’s food preferences and food acceptance are strongly influenced by associative conditioning from their direct experience with food...preference or taste is shaped by repeated exposure to food or familiarity” (Liquori, Koch, Contento, & Castle, 1998, p. 303).

Strategies

“Improving food, diet, and nutrition at schools can constitute an important element in a strategy towards healthier eating among children and adolescents” (Mikkelsen, Rasmussen, & Young, 2005, p. 8). With many causes of obesity, there is a multitude of strategies to address obesity. Strategies range from focusing on offering children nutrition education to providing parental workshops on better shopping practices to increasing the physical activity level of children. Many programs offer a multifaceted method to intervention.

A review of 220 studies on nutrition education interventions found that “...nutrition education was a significant factor in improving dietary practices when behavior change was set as a goal and when the education strategies were directed to that goal” (Contento, Randell, & Basch, 2002, p. 2). Garden-based nutrition interventions

show potential, but there is limited research in the area. The results of an 11-study review of garden-based nutrition programs received mixed outcomes, but supported the concept that these programs can increase fruit and vegetable intake, improve preference for fruits and vegetables, strengthen a willingness to taste fruits and vegetables, and increase fruit and vegetable knowledge. The study was only 12 weeks, so long-term behavior change cannot be presumed (Robinson-O'Brien, Story, & Heim, 2009).

The Integrated Nutrition Project integrated psychological and educational theories with hands-on activities taught by special resource teachers, public health nutritionists, and trained parent volunteers. The project reported changed lunchroom diet behavior of students and improved teacher attitudes about nutrition education in schools (Auld, Romaniello, Heimendinger, Hambidge, & Hambidge, 1998). In a school-based garden program in the southeast United States, an increase in nutrition knowledge was reported among the study treatment groups. The study consisted of 115 students assigned to two treatment groups and one control group. The treatment groups were divided into nutrition education only and nutrition education with gardening activities. While both treatment groups saw an increase in nutrition knowledge, only the nutrition education with gardening treatment group reported students were more likely to consume vegetables in a lunchroom setting (Parmer, Salisbury-Glennon, Shannon, & Struempfer, 2009).

Unlike the other study reviews, one review felt that the gains made by many of the school-based interventions had too many ineffective interventions to establish conclusive results as to the success of these intervention types. This 38-school-based study review encompassed students ages 4-18 years of age from a variety of gender, race, and socioeconomic backgrounds. The study lengths varied from 12 weeks to 22 years.

The results indicate that 33% of the diet-based studies, 33% of the physical activity-based studies, and 45% of the combined diet-and-physical-activity-based studies demonstrated a significant difference between intervention and control groups for BMI. The results are from short-term studies and validate the need for better assessment measures and adequate data (Brown & Summerbell, 2009).

Factors that Impact the Problem

The earliest available data on obesity is from 1963 (CDC, 2014). Many factors are considered when trying to determine the cause of childhood obesity. Some factors include increase in caloric intake, decrease in consumption of fresh fruits and vegetables, increase in consumption of processed foods, more sedentary lifestyle, increased meals outside of the home, and food preference. Parental attempts at influencing feeding contribute to food preference. “Parents who attempt to encourage the consumption of food(s) may inadvertently cause children to dislike the food(s). Whereas parents that attempt to limit food(s) may actually promote increased preference and consumption of the limited food(s) in children” (Bishop, Middendor, Babin, & Tilson, 2005).

Other research has indicated that economics and demand on time are factors in overweight and obesity in children. More families have women in the homes working, incomes have increased, and the price of food has fallen; consequently, more people purchase and consume food away from home or buy pre-packaged and processed foods for consumption at home. (Anderson & Butcher, 2006; Cawley, 2006). It should be noted

though that while the price of processed food is historically less expensive, fresh produce is more expensive and these prices are a contributor to poorer families not purchasing and consuming as many fruits and vegetables.

Fast Food Restaurants

Food away from home is a large and growing component of U.S. food expenditure. Over the last 20 to 30 years, meals away from home has drastically increased from 16% in 1977 to 29% in 1995 (Evangelista, Ortiz, Rios-Soto, & Urdapilleta, 2004) to 47% in 2003 (Binkley, 2006). Given this change in food consumption, there is a considerable need to identify the determinants of fast food consumption (Fanning, Marsh, & Stiegert, 2003). The FDA (2006) argues that preparing foods at home has a relatively high time cost and that the effect is low percentage of home-cooked meals.

Since fast food is one of the primary sources of meals for American children, it is important to discuss the impact of fast food in children. Recently, the restaurant industry, especially the fast food segment of the industry, has been cited as a major contributing factor to obesity in the United States. The reasoning being the high levels of calories and fats found in these foods increase the risk for obesity (Dehghan, Akhtar-Danesh, & Merchant, 2005).

Previous studies have shown that fast food is one possible factor which causes obesity in children (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; "Clear link between fast food, obesity," 2004; Evangelista, Ortiz, Rios-Soto, & Urdapilleta, 2004). Fanning, Marsh, & Stiegert (2003) conducted a study to determine the nutritional

dietary quality and caloric intake among children in the United States. The study examined the dietary intake data of six thousand children, ages four to twelve. Based on this study, U.S. children, who ate fast food, compared with those who did not, consumed more total calories, more calories per gram of food, more total and saturated fat, more total carbohydrate, more added sugars and more sugar-sweetened beverages, but less milk, fiber, fruit and non-starchy vegetables. More specific results from other studies showed that children and adolescents who ate fast food had an average intake of over 187 calories more than those who had not eaten fast food. One reason for this problem is that both children and young adolescents are susceptible to the high energy density of fast food as a result of a lack of cognitive dietary restraint development (Prentice & Jebb, 2003). Binkley (2006) posited that due to the relatively high fat and caloric content of the most popular fast food items, fast food in general might tend to have a negative perception.

Personal Influences

One can argue that the increase in fast food consumption in the United States is attributable to large social challenges and problems. That is, family structure, parents' educational, socioeconomic, and time resource background, and the environment at large. Other studies on obesity also identified a range of related factors that contribute to childhood obesity including family practices, socioeconomic status, role of race, marital status, maternal education, and parental occupation (Armstrong & Reilly, 2002; Strauss & Knight, 1999). Of these studies, household income and parental occupation were the

most significant predictors of childhood obesity. Other key indicators for potential childhood obesity were children whose parents were unemployed or were a non-professional.

Additionally, obesity has been shown to be genetic (Deckelbaum & Williams, 2001; Anderson & Butcher, 2006). Depending on the study, obesity is anywhere between 25 – 70% genetic. Although, there is no information on the inheritableness of pediatric obesity -- obesity is considered an individual, preventable behavioral issue. The individual responsibility to take the most effective measures to combat obesity is predicated on one's access to a healthy lifestyle. The World Health Organization (2013) recommends that society must play a role in implementing obesity prevention measures with "sustained political commitment" and support of public and private stakeholders to make affordable physical activity and healthy dietary options accessible to all.

Obesogenic Environment

In addition to environments constructed by families, obesogenic environments create opportunities to promote obesity in individuals and populations (Lake & Townshend, 2006). An obesogenic environment comprises factors in our environment that support being obese and are not conducive to weight loss (Powell, Spears, & Rebori, 2010). In order to counter the effects of obesogenic environments, community members should take steps to change their built and food environments.

A built environment is the buildings and space created that form the physical characteristics of a community (Powell, Spears, & Rebori, 2010). The built environment consists of physical design, land use patterns, and transportation systems (Lake &

Townshend, 2006). Food environments take into account the availability and accessibility of food as well as the advertising and marketing of food to a community (Lake & Townshend, 2006).

The processes that lead to an obesogenic environment have accelerated due to urbanization (Popkin, 2005). Historically, community planners and developers built communities based on the need to eradicate and prevent communicable diseases. Now, urban planning is more focused on esthetics and economics with little collaboration with health professionals (Lake & Townshend, 2006). Effectual changes to combat obesogenic environments include: healthy food access, access to areas to be physically active, centers and agencies that support healthy behavior, parks, green spaces, community gardens, bike paths, walking trails, and easy access to supermarkets (Lake & Townshend, 2006; Popkin, 2005).

The numerous studies, seminars, conferences, institutes, and alliances committed to finding the causes and effects of obesity find there is no singular cause of childhood obesity (Anderson & Butcher, 2006; Armstrong & Reilly, 2002; Deckelbaum & Williams, 2001). There are multiple risks attributable to this diet-based disease. The common thread among research is that prevention is the best method to reduce obesity rates (Levi et al., 2013).

CAUSES OF OBESITY MODEL

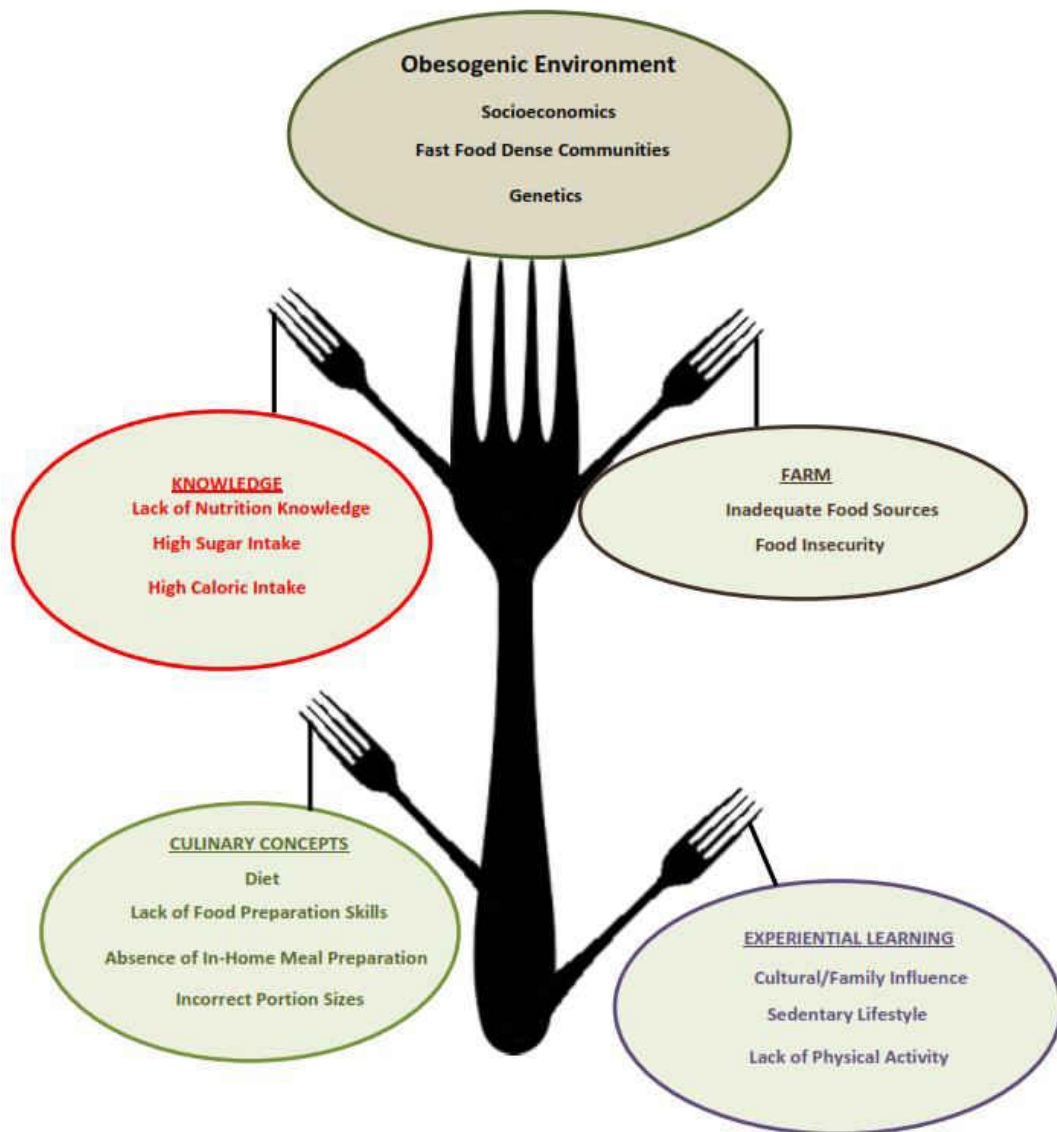


Figure 6: Causes of Obesity Model

The Program Design and Scope

Nutrition Knowledge: The Gap between Dietary Decisions and Health

Prevention is a key strategy to reduce obesity rates in adolescents (Dehghan, Akhtar-Danesh, & Merchant, 2005). The reduction in obesity could also result in the reduction of other risks associated with obesity such as diabetes, asthma, and hypertension. In order to prevent obesity, individuals should have the proper nutrition knowledge to make informed dietary choices.

The field of nutrition is a well-established biological science. The correlation between nutrition and health was first recognized in Egypt around 6000 years ago (Cannon, 2005). The modern connotation of nutrition science began around 1850. Its initial use was to increase plant and animal yield to provide energy and provide proper nutrition to human workers (Cannon, 2005). In fact, since nutrition was viewed as an integral component of health, Johnson and Kennedy explain, “nutrition education programs and food labeling came about because of government concern about the health of the citizens” (as cited by Berkoff, 2005).

Human nutrition, as defined by the National Institute of Health (1998) is “the science of food, the nutrients, and other substances therein, their action, interaction, and balance in relation to health and disease, and the processes by which the organism ingests, absorbs, transports, utilizes, and excretes food substances.” In short, nutrition is the interaction between diet (energy intake) and how the body uses energy to maintain function.

When considering nutrition, knowledge is the health and food practices and principles learned through awareness or experience. Declarative knowledge is knowledge

about facts and things. Procedural knowledge is knowledge about the way in which actions are performed (Dickson-Spillmann & Siegrist, 2010). Nutrition knowledge, in the declarative sense, includes demonstrating health-oriented and food-related principles. This includes understanding the effects nutrients have on health and concepts such as which foods contain cholesterol. In the procedural sense, an example of nutrition knowledge is identifying low-fat cooking methods.

However, singular knowledge is not the solution for improving dietary decisions and health of individuals. A review of 31 studies showed that adherence to nutritional guides is low and there is no positive relationship between nutrition guide adherence and declarative nutrition knowledge (Haack & Byker, 2014). Therefore, delivering procedural knowledge is key to connecting declarative knowledge and adherence.

The Farm to Fork (F2F) design aims to increase the declarative and procedural nutritional knowledge, improve the culinary techniques, and increase the consumption of fruits, vegetables, and minimally processed foods of sixth grade students participating in a nutrition education program. An approach to nutrition education using an experiential nutrition education curriculum integrated with farm and culinary activities can support and expand points about the significance of eating nutrient-dense, whole foods and cooking at home as a means to reduce obesity rates in adolescents. This approach allows the presentation of evidence that nutrition education can provide participants with an increase in nutritional knowledge; farm activities can result in a preference for fruits and vegetables and increase levels of physical activity; culinary training can result in better food choices, food preparation skills, and menu planning.

Theoretical Context

The components of the program design address the factors of adolescent health-related behaviors as seen in the Social Cognitive Theory (SCT), Experiential Learning Theory (ELT), and the three measures of Nutritional Knowledge. Social Cognitive Theory (SCT) explains, “Exposure to food in a positive affective context can enhance preference, which, in turn, is highly correlated with consumption” (Liquori, Koch, Contento, & Castle, 1998, p. 303). Essentially, people learn what to eat as part of socialization experiences. Children imitate role model behavior and learn new skills and behaviors by watching others. The theory addresses the factors that influence children’s health-related behaviors:

- Behavioral (skills): Nutrient-dense food intake
- Personal (knowledge): Taste preference
- Environmental (visual reinforcement): Availability, repeated exposure

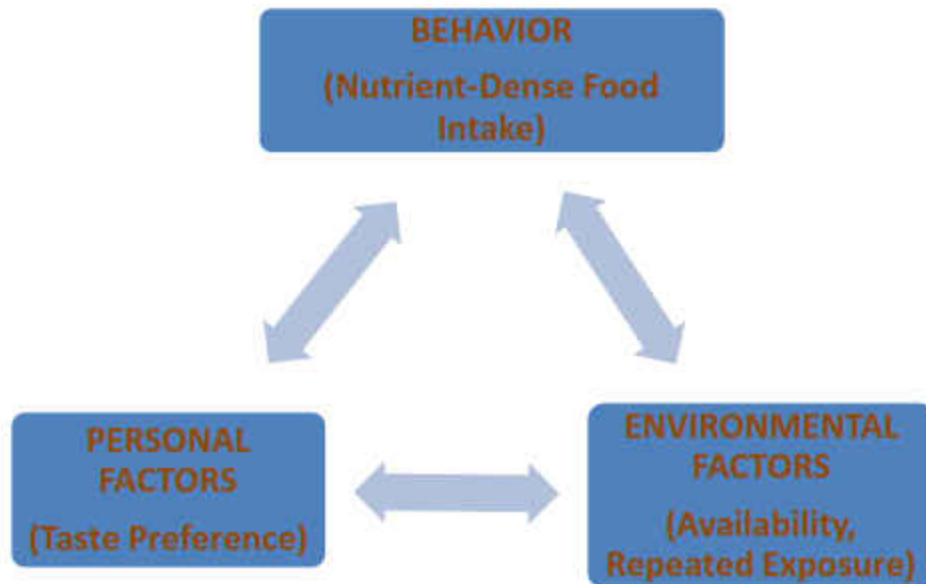


Figure 7: Social Cognitive Theory Model

Research based on Piaget's cognitive developmental theory as applied to food has suggested that nutrition education with elementary school-aged children needs to emphasize concrete experiences with food rather than focus on an abstract concept (Liquori et al., 1998).

Experiential Learning Theory (ELT) is defined as learning from experience and hands-on activity. When a student applies this learning to his own life, it deepens his understanding. As a nutrition education concept, nutrition knowledge, food preference, and food acceptance is actively constructed through experience. Kolb's ELT model asserts, "A learner is able to gain deep understanding and achieve the best learning

outcomes when he/she adheres to all four components of the learning cycle” (Ka & Chan, 2012, p. 413). The four stages of the ELT model are:

- Concrete Experience (experience/feel): Active experience
- Reflective Observation (reflect/observe): Reflect and draw conclusions
- Abstract Conceptualization (think/conceptualize): Generalize theory concepts to engage in further action
- Active Experimentation (act/apply): Plan and perform

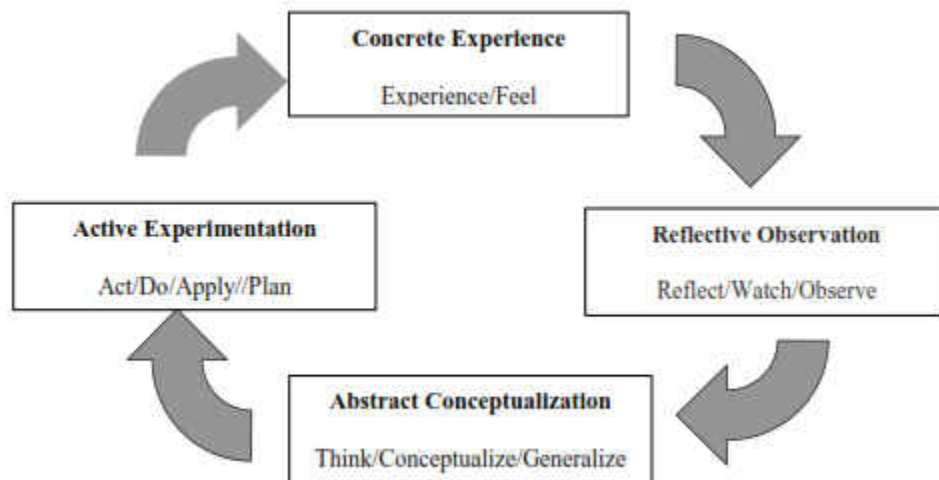


Figure 8: Kolb's Experiential Learning Theory Model

The three levels of nutrition knowledge as described by Guthrie, Derby, & Levy (1999) are awareness, knowledge of principles, and how-to knowledge. The knowledge levels are expressed as follows:

- Cognition (awareness): Aware of diet-health and diet-disease relationships
- Declarative (knowledge of principles): Encompasses both health-oriented and food-related principles
- Procedural (how-to knowledge): Interpret nutritional information, follow recipe

The knowledge levels mirror three stages of Bloom’s Knowledge Dimension – Factual Knowledge, Conceptual Knowledge, Procedural Knowledge -- in the *Taxonomy of Educational Objectives* (Anderson et al., 2001). The factual knowledge dimension, as defined by Bloom, indicates an ability to recall, recognize, or summarize information. The conceptual knowledge dimension specifies the ability to classify and differentiate information. The procedural knowledge dimension signifies a comprehension of criteria for determining appropriate techniques or procedures to use in actual situations. In order for students to achieve the last stage of the taxonomy – meta-cognitive knowledge -- they must exhibit synthesis. Synthesis is exhibiting proficiency at utilizing individual skills learned to create a new concept or alternate solution. In the context of the program design, a student would be required to plan, prepare, and plate a nutrient-rich meal in order to demonstrate synthesis.

Additional Design Factors

The Farm to Fork (F2F) program design is also based on the concept of immersion. Immersion is “intense mental focus... which causes feelings of joy and satisfaction while working on a task...” (Lidwell, Holden, & Butler, 2010, p. 134, 2010).

The immersion design of F2F will include a learner-centered approach that focuses on the experiences, interests, talents, and needs of the learner to facilitate learning. The culinary lessons will occur in a full-service kitchen environment that permits students to learn and execute the procedures typical of culinary professionals. The student experience for the farm activities will take place on a one-acre plot of land on the Livingstone College Farm. A design bonus of the farm space is the biophilia effect, the notion that “environments rich in nature views and imagery reduce stress and enhance focus and concentration” (Lidwell, Holden, & Butler, 2010, p. 36).

Additional design considerations are the concepts of advance organizer and chunking. As outlined in *Universal Principles of Design*, “Advance organizers are brief chunks of information—spoken, written, or illustrated—presented prior to new material to help facilitate learning and understanding” (Lidwell, Holden, & Butler, 2010, p. 18). The culinary training intervention is a skill-based curriculum, therefore, the subject matter and skills should be presented linearly. Eighty percent of the information will be new and use expository advance organizers. Twenty percent of the concepts will be familiar and can be presented comparatively, i.e. offering new knife cutting skills as compared to those habits developed at home.

“Chunking” instructional material provides teachers with an opportunity to format information to be more easily processed by students. Lidwell (2010, p. 40) cautions that this technique should not be used to simplify design. Rather, it is occasion to compress material into manageable and retainable units. This is notably significant when presenting information on nutritional knowledge. Nutritional knowledge includes a set of information that students either expressly do not know or claim to know but do not have a

true grasp of the concepts. Chunking will also assist with student assessments.

Information that is presented in a matter for easier retention can in turn prove understanding by applying acquired knowledge to new scenarios.

The emphasis of the program curriculum is to house farm activities, culinary concepts, and food presentation techniques as nutrition education in one platform. The experiential farm activities and culinary workshops are integrated with cognitive content that demonstrate how to address nutritional needs using clean, whole foods from the farm in order to reduce risk factors for obesity and other diet-based disease. The activities also teach students:

- About nutritional needs
- How to implement whole food choices
- The nutritional benefits of various foods
- The diet-based diseases associated with poor nutrition
- How to plant, grow, and harvest produce
- Culinary techniques
- Food presentation skills

The curriculum reflects the most current nutrition and health guidelines as outlined by the USDA. The lessons will teach the students applicable skills that increase nutrition knowledge and that reduce risk for diet-based disease. Skills learned through experiential learning activities include knife-cutting, identification of fruit and vegetables, learning total food use, culinary techniques, healthy meal preparation, and food tasting. Additionally, the nutrition education program will develop: teamwork,

reading skills enhanced by reading labels on food items, understanding of regional cuisines, how to follow directions, math conversion for recipes, and science skills. The goal of the program is students being able to plan, execute, and present a meal that satisfies the USDA *MyPlate* food recommendation guidelines. By learning how to build a high-nutrient meal into their lifestyles, adolescents will take a more active role in making healthier food choices. (Liquori, Contento, & Castle, 1998, p. 310).

The program design serves as a planning tool and resource for teachers and related service providers. The 12-week curriculum – based upon the Harvard Medical School *6-Week Plan for Healthy Eating* and the California Department of Education *Nutrition to Grow On* curriculum – incorporates the North Carolina Common Core and Essential Standards for sixth graders and outlines instruction plans, farm and culinary activities, and culinary skills evaluations. Each program lesson provides expected student outcomes, instructor’s essential information, preparation instructions, supplies, lesson time, handouts, and guiding questions for reflection by the students. Farm to Fork is applicable in different settings for varying student populations.

The Stakeholders

The researcher is Vivian Ray, a professional educator in the state of North Carolina. With thirty years’ experience as a chef and an instructor, culinary arts, nutrition education, and culinary program development are strengths that Ms. Ray brings to the program. Ms. Ray is able to draw on industry proficiencies to provide students with an inside understanding of how culinary standards and expectations should be executed in real-life applications. Her industry experience ranges from planning and coordinating

catering events for up to 7,000 people to food and beverage operations to being an Executive Chef in hotels and restaurants.

Ms. Ray's educator experience includes successfully developing and implementing culinary programs at both the community college and university levels. She began teaching to provide students that are traditionally not considered successful students (minority, low socio-economic status, and former low academic performance) with the tools and the foundation to succeed in their chosen field. She believes any student can achieve given the correct resources, opportunity, and commitment.

Rowan Salisbury School System houses the four middle schools that participate in the *Film @ 6* afterschool program that serves as the setting for the Farm to Fork nutrition education program. The four middle schools are North Rowan, Southeast, China Grove, and Corriher Lipe. The participating school for the nutrition education program is Southeast Middle School. The *Film @ 6* afterschool program at Southeast Middle School serves 30 sixth grade students that will participate in the nutrition education program. The North Carolina State University and North Carolina Agricultural & Technical Cooperative Extension Agency uses *Film @ 6* to teach students about agriculture. As part of the *Film @ 6* program, the nutrition education program will be fully documented using still photos and videography.

Parents are integral to the program as well. Parents will attend a monthly meeting with the students and the program developer in order to discuss student goals and to discuss support roles at home. During the meeting, students will execute culinary demonstrations for parents. Throughout the program, parents will assist students with planting and harvesting crops.

The farm location is at Livingstone College in Salisbury, NC. Livingstone College is a private, historically black, four-year college affiliated with the African Methodist Episcopal Zion Church. The cornerstone of the college is the design of a holistic learning environment that encompasses academic, intellectual, and spiritual growth in order to develop students’ potential for leadership and service to a global community.

Table 2: Farm to Fork Program Stakeholder List

<u>STAKEHOLDERS</u>	<u>ROLE</u>
Vivian Ray	Researcher, Program Developer, Culinary Instructor
Sandra Buechler	Film @ 6 Project Director
Henry Diggs	Film @ 6 Site Director, Southeast Middle School
Jennifer Lentz	Principal, Southeast Middle School
Chris Boylan	Assistant Principal, Southeast Middle School
Rick Dunlap	Assistant Principal, Southeast Middle School
Darrell Blackwelder	Master Gardner
Joe Fowler	Livingstone College Farm Manager
Cynthia Dillingham	Assistant Nutrition Education Instructor
Sixth Grade Students	Program Participants
Parents/Caregivers/Teachers of Students	Support and Assistance
Livingstone College	Farm Plot, Full Service Kitchen
Salisbury Housing Authority	Transportation
<i>Salisbury Post</i> Newspaper	Marketing, Media, Publicity
Local and State Businesses and Politicians	Resources, Volunteers, Support

Data Collection Instruments

Three of the data collection instruments for Farm to Fork design include a nutrition knowledge questionnaire, an observation tool (knife cutting rubric), and a practical (a skills evaluation test).

Surveys are one of the most important data collection tools available for evaluations (Fitzpatrick, Sanders, and Worthen, 2011, p. 427). Questionnaires help determine the effectiveness of the program design and activities used to produce desired outcomes. Evaluation of nutrition education programs measures efficiency of programs. A way of achieving this is by using pre-and post-testing. In nutrition programs, pre-and post-testing has been used to measure changes in knowledge (most common), attitudes, and behaviors among participants (Oshaug, 1997). The questionnaire used for this program evaluates the student pre-and post-program nutritional knowledge. This instrument measures the immediate outcome, 'Increased Nutritional Knowledge.'

The survey questionnaire is based on an existing nutrition knowledge assessment questionnaire on the *Catch Kids Club After-School Student Questionnaire*. The Catch Kids Club questionnaire was chosen as a source after considering the overall structure of the survey, the number of questions, the simplicity of the questions, and the readability of the survey. The survey includes questions about food consumption and preferences, recommended food serving sizes, physical activity levels, which foods should be limited in order to lose weight, and food labeling. In addition to the knowledge and dietary questions, the questionnaire also will collect basic demographic information targeted to the participant group of sixth grade students.

Observation is a tool employed to learn about program operations and outcomes, and participants' reactions and behaviors (Fitzpatrick, Sanders, & Worthen, 2011, p. 423). Observations are especially useful during initial phase of evaluation to examine and evaluate implementation of the program. Comprehending program delivery contributes to the understanding of program successes and failures (outcomes). Observation is also a good instrument for improvement recommendations (program design). Observation allows an opportunity to examine and choose program features that most directly address program quality and are most likely to affect participant learning and understanding (Fitzpatrick, Sanders, & Worthen, 2011).

A knife-cutting rubric will serve as the observation tool to be used in intervals throughout the program. Knife skills are an important observation because the knife is one of the most valuable tools for a chef; and knife cutting the most important skillset. The rubric used is a combination of standard rubrics used by the American Culinary Federation and other nutrition education programs. This instrument will be used to measure the immediate outcomes, 'Better Food Preparation Skills' and 'Total Food Use.'

A practical evaluates whether participants can apply the skills learned throughout the program in a way that demonstrates the desired outcomes. This instrument will help measure the effectiveness of the program activities. The practical will require participants to prepare meal at the end of the program that meets the United States Department of Agriculture (USDA) *MyPlate* guidelines and demonstrates skill sets in knife cutting, food label reading, food preparation and presentation, juicing and blending, heat transfer, flavor profiling, total food use, and nutrition knowledge. The two figures

below are examples of some of the concepts and skills that are part of a practical culinary skills test.

Concept:
Nutrition

The six categories of nutrition

- Define the six categories of nutrition: carbohydrates, proteins, fats, vitamins, minerals, water
- Cite two examples of each nutrient found in the foods to be prepared
- Cite alternate sources of these nutrients and how they can be incorporated into a daily menu

USDA food guidelines

- Explain the categories and portion sizes recommended by the USDA's *MyPlate*.
- Analyze meal prepared and compare it with the USDA *MyPlate*

Figure 9: Sample Nutrition Concepts Test

Concept:
Vegetable and Fruit Identification and Cooking

Properly cut and trim a variety of fresh vegetables and fruits

- Demonstrate the proper trimming and cutting techniques for fresh vegetables and fruits in the recipe, stressing the importance of accuracy and consistency

Identify the classifications of vegetables

- Use (3) different classes of vegetables in meal preparation such as: squash, roots, tubers, seeds, pods, cabbage, stems/stalks/shoots, onion family, fruit-vegetables, leafy greens
- During preparation explain grade and size of vegetables used

Vegetable cooking methods

- Match vegetables and the cooking methods that best suit them

Preparation of edible and non-edible garnishes

- Add (2) edible garnishes to meal using classical garnishing techniques

Figure 10: Sample Vegetable and Fruit Cutting Skills Test

CHAPTER TWO: PROGRAM DESIGN DETAILS AND RATIONALE

FARM TO FORK NUTRITION EDUCATION PROGRAM DESIGN MODEL

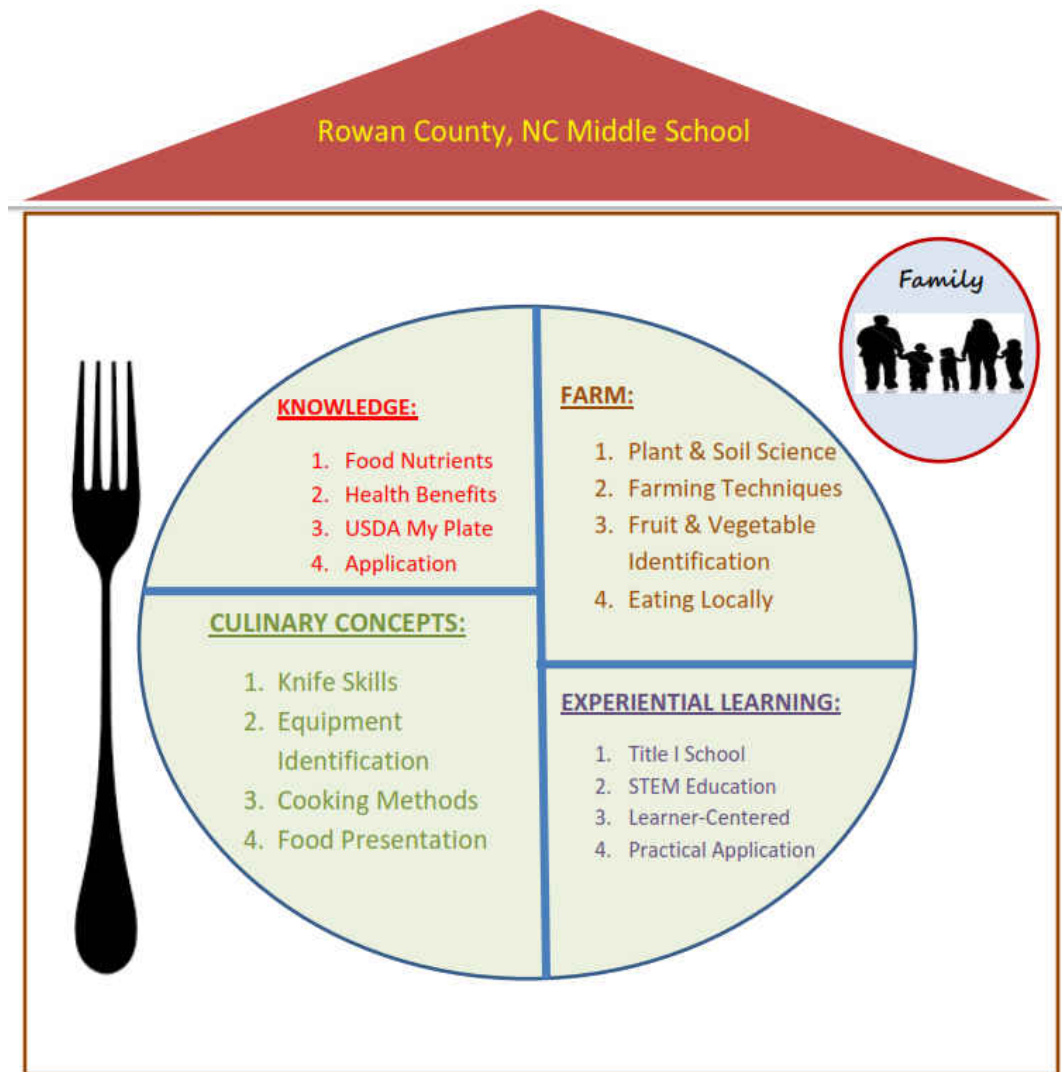


Figure 11: Farm to Fork Nutrition Education Program Essential Design Elements

Because obesity in adolescents has become a major problem in the United States, the problem of practice this Dissertation in Practice will address is the lack of nutritional knowledge held by middle school students. The Dissertation in Practice aims to determine the effect of nutrition education as a means to increase nutritional knowledge and reduce diet-based obesity risks in middle school students in an urban Title I school.

Necessary Intervention

Obesity is an important public health problem that, in recent years, has become epidemic. The number of children aged 6 to 11 suffering from obesity tripled, going from 6.5% in 1980 to 19.6% in 2008, and the number of adolescents aged 12 to 19 suffering obesity also tripled, going from 5% in 1980 to 18.1% in 2008 (CDC, 2014). There is no single factor for the rise in obesity. There is a mix of factors that cause obesity -- genetics, socioeconomic status, ethnicity, sedentary lifestyle, obesogenic environment, food marketing, and lack of physical activity (Bishop, Middendor, Babin, & Tilson, 2005). Although there are numerous expounding factors that explain the source of obesity, the United States Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) agree with Anderson and Butcher (2006, p. 29) "...it is clear that more food, without a concomitant increase in energy expenditure, will result in weight gain."

Additionally, children are not meeting the current Dietary Guidelines for America recommendations for fruit and vegetable intake (Scherr et al., 2014). The recommended

intake is 2.5 cups daily of a variety for fruit and vegetables. In particular, all five vegetable subgroups (dark green, orange, legumes, starch vegetables, and other vegetables) should be chosen several times a week (USDA, 2010). On average, the American diet intakes 59% of recommended vegetables and 42% of recommended fruits. Unfortunately, most Americans over four years of age consume their recommended fruit intake through fruit juice, which lacks the appropriate amount of fiber and increases daily sugar and caloric intake (USDA, 2010).). Results from the School Nutrition Dietary Assessment (SNDA) Study – III show that 80% of public school children exceed recommended saturated fat intake and 92% exceed recommended sodium intake.

Furthermore, the connection to the foods children are eating is lost, “as the number of people directly involved in agriculture has decreased, the general public’s basic understanding of the food and fiber industry has declined” (Trexler & Meischen, 2002, p. 68). More specifically a study on agricultural knowledge of youth found that, “elementary students were unable to convey an understanding of basic agricultural production” (Trexler, 2000, p. 99). This underscores the findings of the National Academy of Sciences that Americans have a minor understanding of the social and economic significance of agriculture or its link to human health and environmental quality (National Research Council, 1988).

Because the root of the obesity epidemic is multifaceted, effective prevention and intervention should be just as multidimensional in order to address each source of the problem. Incorporating multiple delivery channels increases the intensity of the intervention (Scherr et al., 2014, p. e16). The design of the program for this problem of practice encompasses a multi-intervention model in order to address the issues outlined

above as obesity risks. The goal of the program design is to assist sixth graders increase nutritional knowledge, expand the knowledge of food sources and farming practices, increase the consumption of fruits and vegetables, and improve culinary techniques using experiential farm education and culinary instruction.

Design Basis and Context

The initial Farm to Fork program design was constructed on the Harvard Medical School *6-Week Plan for Healthy Eating*. The core concepts of the *6-Week Plan for Healthy Eating* – eating unprocessed or minimally processed foods, increasing fruit and vegetable consumption, eating a variety of food, understanding portion sizes, and knowing how to apply this information to daily life -- are still applicable, but another approach is necessary to make the lessons relevant to middle school students. Therefore, concepts from *Nutrition to Grow On: A Garden-Enhanced Nutrition Education Curriculum for Upper Elementary School Children* -- a curriculum developed by the California Department of Education and the University of California at Davis for grades four to six and recognized as a National Cancer Institute Research Tested Intervention Program -- were integrated into the F2F program.

There are five lessons from the *Nutrition to Grow On* curriculum that correspond to the *6-Week Plan for Healthy Eating*. The core concepts are the same as the Harvard curriculum, but are designed for children. The lessons are:

- “Nutrients We Need”

- To learn about the six classes of nutrients and why all six are needed
- To learn how to identify good food sources of selected nutrients

- “My Plate”
 - To identify the food groups that make up the USDA MyPlate
 - To learn the major nutrients in each food group
 - To classify single and combination foods into the appropriate food group(s) on MyPlate

- “Food Math”
 - To identify the recommended daily amounts to eat from each food group
 - To measure and identify standard food portion sizes through the use of visual cues
 - To create a daily menu based on recommendations from MyPlate

- “Food Labels”
 - To create awareness of the Nutrition Facts label
 - To learn how to locate different items of information on the label
 - To learn how to compare foods based on information found on the label

- “Making Healthful Snacks”
 - To learn how to make healthful, low-fat snacks that include all food groups
 - To learn how to use produce from the garden

In addition to the nutrition education component, the *Nutrition to Grow On* curriculum highlights garden-based activities that explain the similarities between plants and humans in the need for nutrients, sunlight, and water; the plant life cycle; soil preparation; pollination; the effects of weather, environment, and insects on plant growth; and how to harvest the vegetation.

While the Harvard and *Nutrition to Grow On* curriculums provide principal concepts for the F2F program curriculum, the curriculum and activities of the Farm to

Fork Nutrition Education Program are formulated using guidelines, standards, and recommendations outlined by the United States Department of Agriculture (USDA), the United States Department of Health and Human Services (HHS), the North Carolina Department of Agriculture and Consumer Services (NCDA&CS), the American Culinary Federation (ACF), the Agriculture Council of America (ACA), and the Rowan County Cooperative Extension. These organizations have differing missions, but they are united in promoting the importance of health and nutrition.

Together, the USDA and HHS developed the Dietary Guidelines for Americans with the intent to synthesize nutritional knowledge into recommendations that can be readily used by the public (USDA, 2010). The USDA Center for Nutrition, Policy & Promotion also created visual tools to communicate nutrition information to the public (Haack & Byker, 2014). The first tool was the *Food Guide Pyramid* created in 1990 then, the department moved to *MyPyramid* in 2005. In 2011, *MyPlate* was created to provide practical information to individuals as a reminder to build healthier diets through mealtime choices (USDA, 2015).

Part of the mission of the North Carolina Department of Agriculture & Consumer Services is “to provide services that promote and improve agriculture” (NCDA&CS, 2015). The ACF provides educational resources and training for culinarians and its guidelines are the core of the principles used for instruction of culinary technique throughout the program. From the civic aspect, ACF created the Chef & Child Foundation, an organization instituted to promote proper nutrition in children and combat childhood obesity (American Culinary Federation, 2015). The ACA is “an organization uniquely composed of leaders in the agriculture, food, and fiber communities dedicated to

increasing the public awareness of agriculture’s vital role in our society” (Agricultural Council of America, 2012). Extension agencies are designed to turn research into action. County extension agencies seek to make positive changes and improve lives by applying modern technology to practical applications; and providing nutrition education, food safety training, and youth leadership development (National Institute of Food and Agriculture, 2015).

The Nutrition Education Program (NEP) culminates these concepts into an integrative, multicomponent design consisting of nutrition education, farming, and culinary arts. The framework for the program design is an experiential, learner-centered, inquiry-based approach that focuses on the experiences, interests, talents, and needs of the learner to facilitate learning and is constructed on the three measures of Nutritional Knowledge.

Design Essentials

As a learner-centered, inquiry-based nutrition education program, the Farm to Fork design aims to assist sixth graders increase nutritional knowledge, expand the knowledge of food sources and farming practices, increase the consumption of fruits, vegetables, and minimally processed foods, and improve culinary techniques using experiential farm education and culinary instruction. F2F addresses the growing need to reconnect students with their food sources and food preparation methods. It also provides some strategies to recognize indicators for necessary diet change such as Body Mass Index (BMI) and blood pressure.

Students will understand that healthful living requires an individual to act on available information about good nutrition, food sources, and culinary concepts, and to apply the information to various conditions. Farming activities help students understand where different foods come from and how they are grown. Farming will also provide an opportunity for the children to experiment with fruit and vegetable tastes and expand preference. Culinary concepts exemplify application of better food choices, better food preparation skills, and better menu planning. Students will use an understanding of nutrition, culinary concepts, and food preparation to plan appropriate meals for themselves and others. They will also consider the benefits of presentation when offering healthy food. Students will apply their acquired nutritional, farming, and culinary knowledge to their current eating patterns in order to change those patterns to improve nutritional content and reduce obesity risks.

An approach to nutrition education with an emphasis on farming proficiency and culinary technique can support and expand points about the significance of eating nutrient-dense, whole foods and cooking at home as a means to reduce obesity risks in adolescents. A research on involvement in home meal preparation revealed, “63% of surveyed children reported helping with meal preparation at least once weekly” (Chu, Storey, & Veugelers, 2013, p. 305) which led to higher consumption rates of fruits and vegetables. This approach allows the presentation of evidence that, as interventions, nutrition education can provide an increase in nutritional knowledge; farming can result in a preference for a wider variety of fruits and vegetables and increase levels of physical activity; and culinary training can result in better dietary decisions, better food preparation skills, and better food presentation techniques.

Key Terms and Concepts

For this practice, the following terms and concepts definitions apply:

Body Mass Index (BMI) - BMI is a simple index calculated from a person's weight and height and is used to help determine whether a person is obese or overweight. BMI is calculated by taking a "person's weight in kilograms divided by the square of his height in meters (kg/m^2)" (WHO, 2015). BMI for children and adults is calculated the same way, but interpreted differently. The variance in interpretation occurs because the amount of body fat changes with age and varies between girls and boys (CDC, 2015).

Clean Eating - In a report on ABC News online, Dr. David Katz of the Yale University Research Center described clean eating as "... real food... and not encumbered with things that compromise health: artificial flavorings, artificial colorings, sugar substitutes" (Torrissi & ABC News, 2014). Others have described clean eating as being mindful of the way you eat, how your body reacts to foods, and the process your food takes from its origin to your plate (Voo, 2014; Sass, 2014).

Epidemic - The occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period.

Experiential Learning - Experiential Learning is defined as learning from experience and hands-on activity. As a nutrition education concept, nutrition knowledge, food preference, and food acceptance is actively constructed through experience with food, farming, and cooking.

Healthy – A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. Also referred to as the general condition of the body and mind of an individual.

Nutrition - Nutrition is “a biological science that addresses our need for nutrients, the sources of these nutrients, and their teamwork in maintaining body health and well-being” (Hodges, 1994, p. 3). Nutrients are chemical substances in foods that act as a team to provide energy and help the body grow, repair, and maintain (Berkoff, 2005, p. 23). Nutrients are classified into six groups –carbohydrates, fats, proteins, water, vitamins, and minerals.

Nutrition Education - Nutrition education is the process by which we assist people in making decisions regarding their eating practices by applying knowledge from nutrition science about the relationship between diet and health (Anderson, 1994, p. 1828S). Contento defined nutrition education as “any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food- and nutrition- related behaviors conducive to health and well-being” (as cited in Hawkes, 2013, p. 2).

Nutrition Knowledge - If nutrition education involves the decisions about diet that affect health, nutrition knowledge is the health-oriented and food-related principles learned through awareness or experience. Nutrition-related knowledge can range from an understanding of the chemical structure of nutrients to low-fat cooking methods (Guthrie, Derby, & Levy, 1999). Knowledge of a health-oriented principle is demonstrated by comprehending the effects differing nutrients have on health. Knowledge of food-related principles is exemplified by understanding concepts such as: which foods contain cholesterol, which types of fat are liquid at room temperature, or what is an appropriate portion size for protein.

Obesity – Obesity is a complex disorder involving an excessive amount of body fat, which increases the risk of medical illness. Obesity for children and adolescents is defined as a body mass index (as defined above) at or above the sex- and age-specific 95th percentile as quantified on the CDC Growth Charts.

Obesogenic Environment - An obesogenic environment comprises factors in our environment that support being obese and are not conducive to weight loss (Powell, Spears, & Rebori, 2010). One such factor is the built environment. A built environment is the buildings and space created that form the physical characteristics of a community and consists of physical design, land use patterns, and transportation systems (Powell, Spears, & Rebori, 2010, Lake & Townshend, 2006). Another factor is food environment. Food environments take into account the availability and accessibility of food as well as the

advertising and marketing of food to a community (Lake & Townshend, 2006).

Individuals living in food deserts or in areas with high concentration of fast food restaurants is an example of food environments being detrimental to attempts at making healthy dietary decisions.

Overweight – Overweight for children and adolescents is defined as body mass index (as defined above) between the sex- and age-specific 85th and 95th percentiles as quantified on the CDC Growth Charts.

USDA MyPlate - The United States Department of Agriculture (USDA) *MyPlate* is a new generation icon, based on practical information, released by the USDA Center for Nutrition, Policy & Promotion as a prompt to consumers on how to build healthier diets (USDA, 2015). The premise of *MyPlate* dietary suggestions is that 50% of the food on your plate should consist of a variety of fruits and vegetables.

Program Outcomes

The program was designed to encourage healthy eating behavior through the acquisition of nutrition knowledge, farming proficiencies, and cooking skills; to develop flavor profiles; to positively impact future food choice; to expand food preference and preparation skills; to have the nutritional knowledge to create meals at home that meet dietary guidelines; and to increase confidence in producing own food source. Table 3, 4, and 5 below outlines specific immediate, intermediate, and long-term program outcomes

and their related program design elements, respectively. The ultimate goal of the Farm to Fork Nutrition Education Program is to provide experiential nutrition education through nutrition lessons, farming instruction, and culinary workshops to increase nutritional knowledge, expand knowledge of plant-based food and farming practices, increase the consumption of fruits and vegetables, improve food preparation confidence and skills as a means to improve diet-based decisions in accordance with USDA *MyPlate* guidelines.

Table 3: Program Immediate Outcomes

IMMEDIATE OUTCOMES	CORRESPONDING DESIGN ELEMENT			
	Knowledge	Farm	Culinary Concepts	Experiential Learning
Increased nutritional knowledge	X	X	X	X
Better food choices	X	X	X	X
Better food preparation skills			X	X
Improved understanding of diet-health relationship	X			
Correctly identify vegetables	X	X	X	
Correctly identify six plant parts suitable for consumption	X	X	X	
Able to explain food sources and plant life cycle	X	X		
Gains in knowledge about agriculture, local foods, and seasonality	X	X		
Demonstrates ability to read and understand nutrition information on food labels	X		X	
Demonstrate how different knife cuts can be used to increase vegetable consumption		X		X
Explain the benefits of juicing or blending fruits and vegetables	X		X	

Table 4: Program Intermediate Outcomes

INTERMEDIATE OUTCOMES	CORRESPONDING DESIGN ELEMENT			
	Knowledge	Farm	Culinary Concepts	Experiential Learning
Increased preference for fruits and vegetables	X	X	X	X
Increased use of farm produce and locally sourced foods		X		X
Differentiate SKUs and their meaning for produce	X			
Better shopping practices	X			X
Demonstrates how to increase meal nutrition values	X		X	X
Regularly use nutrition knowledge and nutrient-dense food to apply USDA <i>MyPlate</i> recommendations	X		X	X
Prepares food at home more frequently than consuming fast food or food from local restaurants	X	X	X	X

Table 5: Program Long-Term Outcomes

LONG TERM OUTCOMES	CORRESPONDING DESIGN ELEMENT			
	Knowledge	Farm	Culinary Concepts	Experiential Learning
Decrease obesity and chronic disease risk factors	X	X	X	X
Reduce reliance on others for food		X		X
Increase food confidence	X	X	X	
Engage in healthy lifestyle modifications	X	X	X	X

Program Significance and Impact of Addressing the Multiple Factors of Obesity

As discussed, the problem of obesity is a widespread epidemic that breaches into the child and adolescent population categories. There are multiple factors that cause obesity therefore, multiple interventions are necessary to address the problem. Several interventions types exist: nutrition lessons, food sampling and preparation experiences, garden-based programs, physical activity series, school-meal service modification, and food journaling. It is becoming imperative though to combine intervention methods, with food preparation training as one of the method constants. In a discussion on the federal government's call to solve childhood obesity in one generation, the importance of culinary skills education was considered:

Teaching youths how to cook can prevent childhood obesity. Combining culinary skills with nutrition education can enhance cooking-related factors, such as knowledge, attitudes, and self-efficacy. Culinary skills education offers a unique opportunity for experiential learning. Acquisition of culinary skills as a strategy for childhood obesity prevention is consistent with socioecological models of obesity. Culinary skills interventions appear to be a logical target for obesity prevention in youths because such skills impact both individual and environmental determinants of behavior (Nelson, Corbin, & Nickols-Richardson, 2013).

Multiple Interventions

The above discourse underscores the significance of this program design. The design importance lies in its synthesis of three separate nutrition education interventions into one multicomponent intervention that addresses the multiple factors that influence the obesity rates of middle school students. The emphasis of the program curriculum is to house nutrition lessons, farm instruction, and culinary workshops as an experiential nutrition education in one platform. The hands-on farm activities and culinary workshops are integrated with cognitive content that demonstrate how to address nutritional needs using clean, whole foods from the farm in order to reduce risk factors for obesity and other diet-based disease.

The program curriculum is designed with a singular food item as the theme for each intervention of the lesson. For example, if the food item for the day is citrus fruits, the nutrition lesson will provide information on the nutrients contained in citrus fruits; the most nutrient-dense portion of the fruit; and how vitamin c and fiber affect the body. The farming activity will have students learn the steps to grow the produce from the seeds of the fruit. The culinary workshop then teaches the students to use the appropriate knife cuts to produce the yield necessary for the recipe, as well as how to get the most food product. A student may learn to cut an orange to use the juice and zest to flavor chicken, to use the juice to create a dressing for salad, and to use the rind as a plate garnish. This model makes the program curriculum memorable and gives the students the skills to transfer the knowledge to use at home.

The curriculum reflects the most current nutrition and health guidelines as outlined by the USDA. Topics covered in each lesson of the program curriculum are all relevant to the target population. The lessons will teach the students applicable skills that will increase the nutritional knowledge of the students, will enhance students' culinary skills, and will encourage students to make healthy food choices via experiential learning activities that include fruit and vegetable planting and identification, food tasting, learning total food use, and preparing healthy meals. Additionally, the nutrition education program will develop enhanced reading skills through reading labels and recipes, enhanced math skills through farm planning and recipe conversions, enhanced science skills through farm development and culinary techniques, a strong nutritional knowledge of content foods, an understanding of regional cuisines, and sound teamwork abilities. The goal of the program is students being able to plan, execute, and present a meal that satisfies the USDA *MyPlate* food recommendation guidelines. By learning how to build a high-nutrient meal into their lifestyles, adolescents will take a more active role in making healthier food choices. (Liquori, Contento, & Castle, 1998, p. 310).

STEM Education

The enhanced and additional skills acquired by students underscore the STEM (science, technology, engineering, and mathematics) focus of the *Film @ 6* after-school program. STEM education is an integrative, interdisciplinary process that encourages students to learn about the natural world through exploration, inquiry, and problem-solving experiences (Asghar, Ellington, Rice, Johnson, & Prime, 2012). It is a strategy

that is intended to be an integrated component of a curriculum, not a replacement of core subjects (Roberts, 2013). The focus is to have students experience learning through exploration, critical thinking, and project-based learning. Schools need to shift from isolating STEM disciplines and teaching them individually to engaging students in rich, cross-disciplinary experiences, which will increase conceptual understanding of said disciplines (Asghar, Ellington, Rice, Johnson, & Prime, 2012).

As an experiential program, the Farm to Fork Nutrition Education Program undertakes a real-world issue – obesity risks in adolescents -- and has students address it through exploration, inquiry, and problem solving. Both the farming instruction and culinary training present students with the opportunity to apply science and math skills to real-world situations. The farming component addresses technology and engineering aspects through use of farming management information systems, design and construction of the farm plot layout, and operation of irrigation systems. Planting and cultivating plants explores biology, chemistry, and environmental sciences disciplines. Learning culinary skills such as heat transfer, serving size computation, and calorie calculation provide relatable health, chemistry, and math problems to solve. Integrating STEM education in the nutrition education program supports the program curriculum design to meet North Carolina Common Core and Essential Standards.

Exploring the experiential nutrition education program components through the lens of STEM education gives students exposure to career fields they may not have considered, such as: food science, agribusiness, agriscience, food inspection, nutrition, environmental engineering, and public health. According to the National Institute of Food and Agriculture, “experiential learning is a great way to promote youth interest in

adopting science, technology, engineering, and mathematics (STEM) in their future careers (National Institute of Food And Agriculture, 2015).

Comparable Programs

Table 6: Comparable Nutrition Education Programs

PROGRAM	INTERVENTION
HARVARD MEDICAL SCHOOL 6-WEEK PLAN FOR HEALTH	<p style="text-align: center;"><u>Nutrition Lessons</u></p> <ul style="list-style-type: none"> - Translate latest nutrition science into practical steps to establish and achieve healthy eating goals - Help create a healthy eating pattern to lower risk of life-threatening diseases
NUTRITION TO GROW ON GARDEN ENHANCED NUTRITION EDUCATION CURRICULUM FOR UPPER ELEMENTARY SCHOOL CHILDREN	<p style="text-align: center;"><u>Nutrition Lessons, Garden Activities</u></p> <ul style="list-style-type: none"> - Use nutrition education to encourage healthy lifestyle that includes healthy eating, exposure to food sources, and regular physical activity in elementary school children - Directly links nutrition with gardening activities in each lesson
THE COOKSHOP PROGRAM	<p style="text-align: center;"><u>Nutrition Lessons, Environmental Lessons, Cooking Lessons</u></p> <ul style="list-style-type: none"> - Increase exposure to and consumption of minimally processed whole grains and vegetables - Emphasis on plant-based diet as a better dietary choice and more ecologically sustainable
STEPHANIE ALEXANDER KITCHEN GARDEN PROGRAM	<p style="text-align: center;"><u>Garden Activities, Cooking Lessons</u></p> <ul style="list-style-type: none"> - Positively impact the social and learning environment of school using cooking lessons and a gardening program - Improve perception of self-efficacy in cooking skills, improve science achievement, improve food behavior

The programs in Table 6 are interventions similar to the Farm to Fork program design. These programs, regardless of selected activities, all implement interventions in an attempt to effect behavior change as it relates to diet and health. The Harvard Medical

School 6-Week Plan for Health very simply outlines step-by-step, practical dietary changes that can be executed weekly in order to lower risk for diet-based disease.

The *Nutrition to Grow On Garden-Enhanced Nutrition Education Curriculum for Upper Elementary School Children* was developed as a joint effort between University of California, Davis, several California school districts, and the Solano County Master Gardeners program. The curriculum was approved by the National Cancer Institute as a research-tested intervention program. The two main objectives of the curriculum are to teach the importance of healthful food choices and to use the opportunity to work the land and grow produce as a means to improve preference for fruits and vegetables (Morris & Zidenberg-Cherr, 2013). The hypothesis of the program developers was that combining nutrition lessons with planting a garden would have a greater effect on children's vegetable preferences than nutrition lessons alone (Morris & Zidenberg-Cherr, 2002).

Three school sites with a total of 213 participants were used for the study. The school sites were separated into a control group, a nutrition lesson only group, and a garden-based nutrition education group. The lessons were conducted every other week for 17 weeks. Pre- and post- assessments were made using a nutrition knowledge questionnaire and a vegetable preference survey. Nutrition knowledge and vegetable preference scores were significantly higher in the nutrition lesson and garden-based group versus the control group. The garden-based group also showed a continued preference for four out of the five vegetables even though one of those vegetables was not grown in the garden during the intervention. This information suggests that there was an improved preference even though the students were not directly exposed to the

vegetable (Morris & Zidenberg-Cherr, 2002). Additionally, the nutrition knowledge acquired and vegetable preferences developed, were maintained at the six-month follow up. “These results indicate that the garden-enhanced nutrition education curriculum is an effective tool for improving nutrition knowledge and vegetable preference of school-aged children” (Morris & Zidenberg-Cherr, 2002, p. 93).

The Cookshop program was designed as a nutrition education intervention to increase the exposure and the consumption of vegetables by children in grades K – 6. (Liquori, Koch, Contento, & Castle, 1998). The participants were divided into four groups: a control group; a group that received food and environment lessons; a group that received cookshop lessons; and a group that received cookshop and food and environment lessons. The program consisted of ten cookshop lessons and ten food and environment lessons. The program utilized trained parent and college student volunteers to help facilitate the cookshop lessons.

The cookshop lessons were cooking lessons that took place in the classroom. An additional component to the cookshop lessons was the incorporation of 13 of the cookshop focus foods into the school lunchtime-meal service. The food and environment lessons were 45 minutes and consisted of nutrition education and education of bean planting and potato sprouting. The environmental lessons focused on information such as energy use and pollution from food creation, how to reduce food packaging waste, and environmental responsibility. The environmental lessons were experiential as well, but did not include direct experiences with food (Liquori, Koch, Contento, & Castle, 1998).

The Cookshop Program utilized two evaluations. The first was an evaluation questionnaire that reflected on conditions related to food preference, cooking skills,

attitudes, and behaviors. The second evaluation method was a visual estimate of plate waste during lunchtime. A more concrete ability to track lunchtime food consumption may have possibly provided more accurate vegetable intake information. The results indicated that the cookshop, food, and environmental lessons all had a positive effect on knowledge. None of the lessons affected the children's attitudes. The cookshop lessons showed an effect on food preference scores, while the food and environmental lessons did not. The program claimed that food preparation activities "improve the intake of targeted foods...were more effective in bringing about a change in this behavior than use of the more usual kinds of food-related participatory methods" (Liquori, Koch, Contento, & Castle, 1998, p. 309).

The aim of the Stephanie Alexander Kitchen Garden program is to increase children's appreciation and enjoyment of a wide range of fresh, seasonal foods and dishes while developing skills, knowledge, and confidence in the kitchen and garden (Block, et al., 2011, p. 420). Australian chef and restaurateur, Stephanie Alexander, initiated the program. As of 2011, the program was in 180 schools across Australia with participants being students in grades 3-6. The lesson consists of 45-minute garden classes and 1.5 hours at kitchen classes that meet weekly. This program also uses specialist staff and trained volunteers.

The program conducted follow up focus groups 25 months after the baseline intervention. Children expressed enthusiasm about learning to use "real" chef's knives when preparing foods as they valued the opportunity as a symbol of their own capability and trust placed in them (Block et al., 2011). The results of this evaluation were rooted in student engagement, social connections, and confidence. More quantitative data on the

knowledge changes and physical health effects of the program on students would be valuable information since the program has been operational for 10 years at so many locations.

The Program Design

“Backward Design” Process

As a chef/culinary instructor, the developer of the Farm to Fork Nutrition Education Program aptly created a culinary curriculum that would provide participants with the skills necessary to prepare a meal, as well as understand why the meal preparation skills and steps are required in the context of performing the skills. The material question began to revolve around how to assign value to the skills and methods in the context of nutrition education. In order to accomplish the goal of improving dietary choices the students would have to understand when to apply a skill method and why a method works. Because the desired result –increased nutritional knowledge and improved dietary decisions as a process to reduce obesity risks – was already determined, “backward design” was used to develop the program.

Backward design postulates, “The best designs derive backwards from the learnings sought” (Wiggins & McTighe, 2006, p. 14). The tenet of this design process is that specifying desired results first, allows focus on the content, methods, and activities that most likely achieve those results while providing opportunities for students to understand the meaning of the activities and how they relate to the desired outcomes

(Wiggins & McTighe, 2006). This is especially important in skill-based curriculums like culinary arts that can become repetitive without being engaging.

There are three steps to backward design: 1) identify the desired results 2) determine the acceptable evidence and 3) plan the learning experiences and instruction. Table 3, which is the three stages of the backward design process, is a sample of some of the culinary concepts considered while designing the nutrition education program curriculum. This process helped determine what the students would need in order to accomplish the program goals.

In researching the causes of obesity, there were commonplace hindrances to populations making the dietary decisions essential to good health.

- Nutrition knowledge alone appears incomplete without experiential learning via interactions with food and cooking equipment (Nelson, Corbin, & Nickols-Richardson, 2013).
- Individuals prepared less formal meals at home because of a lack of knowledge about use of raw ingredients (Nelson, Corbin, & Nickols-Richardson, 2013).
- Student focus groups in the Gimme 5 programme reported lack of availability, lack of variety, and inconsistency in taste as main barriers to increasing consumption of fruits and vegetables (Perez-Rodrigo & Aranceta, 2001).
- Without an awareness of one's cooking potential and the knowledge of how to prepare easily a wide variety of foods, positive food choices that lead to increased fruits and vegetables, for example, would be less likely for the children (Condrasky, Corr, & Cason, 2007).

Table 7: 3-Stage Program Design Considerations

<u>Stage 1: To what extent does the design focus on the big ideas of targeted content?</u>
Students will understand essential nutrition, culinary, and food presentation concepts.
Students will use an understanding of nutrition, culinary concepts, and food preparation to plan appropriate meals for themselves and others.
Students will understand their own eating patterns and ways in which those patterns can be changed to improve nutritional content.
Students will understand that healthful living requires an individual to act on available information about good nutrition even if it means breaking comfortable habits.
Students will consider how a healthy diet for one person may be unhealthy for another.
Students will consider why there are so many health problems in the U.S. caused by poor eating despite all the information available.
Students will consider the benefits of presentation when offering healthy food.
<u>Stage 2: To what extent do the assessments provide fair, valid, reliable, and sufficient measures of the desired results?</u>
Plan a meal with high nutrient content using learned culinary and food presentation techniques.
Apply appropriate knife skills to properly produce requested yield and presentation.
Take Nutritional Knowledge questionnaire to assess nutritional knowledge level.
<u>Stage 3: To what extent is the learning plan effective and engaging?</u>
The activities should hook students into engaging in healthier culinary concepts and preparation methods.
The activities should provide students with the opportunity to consider the effects of culinary concepts and nutrition on their overall health.
The activities should make students evaluate and understand what <i>Choose My Plate</i> is trying to convey, the reason it conveys that message, and why there are alternatives.
The activities should equip students with the skills to develop a menu, prepare, and present a meal with high nutrient content.
The activities should help students rethink their food habits and consequences on nutrition.

(Wiggins, 2006)

Design Elements

In order to address the barriers to healthy diet decisions and reducing obesity risks, the Farm to Fork design consists of four design elements: nutrition education, farming, culinary instruction, and experiential learning. While the dynamics that create an obesogenic environment are fluent, these three interventions with experiential learning have shown consistent evidence of being successful in increasing nutritional knowledge and improving preference for fruits and vegetables (Wall, Least, Gromis, & Lohse, 2012; Mohd Shariff et al., 2008; Condrasky, M., Corr, A. Q., & Cason, K., 2010). Table 8 below outlines the rationale for each intervention.

Table 8: Program Intervention Rationale

INTERVENTION	INTERVENTION RATIONALE	EXAMPLE
NUTRITION EDUCATION	Assists people make dietary decisions by applying knowledge from nutrition science to the relationship between diet and health.	<ul style="list-style-type: none"> - Discuss plant needs and similarities to the needs of human bodies - Discuss six types of nutrients, what they do, how plants get them, and the foods from which humans get them
FARMING INSTRUCTION	Farming is identified as an intervention that may successfully and cost-effectively address diseases linked to poor diet and nutrition intake and lack of access to fresh fruits and vegetables.	<ul style="list-style-type: none"> - Design the layout and construct model of farm plot - Use mini-greenhouse tray to plant seeds
CULINARY TRAINING	Food preparation skills are essential in order to prepare healthful meals that meet dietary recommendations for youth and hands-on cooking instruction is an effective strategy to teach healthful eating behaviors.	<ul style="list-style-type: none"> - Discuss, demonstrate and practice two types of knife cuts used on fruits and vegetables - Identify four components of salad and various greens used in salad - Discuss and demonstrate how to prepare salad and dressing

Nutrition Education

The World Health Organization (2013) states that nutrition is simply the “intake of food considered in relation to the body’s dietary needs.” This process includes eating and digesting food and absorbing and using, or metabolizing, the nutrients it contains. Individual dietary needs vary, but all humans need proper nutrition to promote cell growth, tissue replacement, strong bones, and physical and mental acuity.

The term 'proper nutrition' implies that we are obtaining from our food all of the essential nutrients in the amounts needed to keep our bodies functioning and to maintain optimum health. It is well known that proper nutrition is essential to good health. Yet, ensuring that foods eaten meet nutrition needs is not always accomplished. Past nutrition intervention programs that have attempted to change dietary behaviors were typically more effective in increasing knowledge than changing food choice behaviors (Contento et al., 1995). Therefore, there is a need to provide assistance taking people from awareness to application.

Nutrition education is a process by which people are assisted in making decisions regarding their eating practices by applying knowledge from nutrition science about the relationship between diet and health. It is a deliberate effort to improve the nutritional wellbeing of the public (Anderson, 1994). Studies of food consumption have found that foods children eat the most are fruit juices, carbonated drinks, pizza, chips, and fried potatoes and foods children eat the least are vegetables. However, with nutrition education, children eat fewer sweets and butter and eat more fruits and vegetables (Baskale & Bahar, 2011, p. 264).

The study of nutrition education programs has become an important aspect of obesity prevention and intervention among youth and adolescents. Research finds that nutrition education interventions not only improve nutritional knowledge but vegetable-related attitudes and self-efficacy in school age children (Wall, Least, Gromis, & Lohse, 2012). The findings of Mohd Shariff et al. (2008) "support the importance of providing children with nutrition knowledge to promote healthy dietary behaviors." Pate & Pratt (1995) investigated the effects of a nutrition education program on dietary behavior and

nutrition knowledge among 1100 elementary school. Children that were placed in the treatment group exhibited significant improvement in overall dietary behavior and nutritional knowledge, such as consumption of fruits and vegetables, as compared to the children in the control group. Pate & Pratt (1995) concluded that nutrition education programs that aim at teaching positive dietary practices could improve dietary behavior and nutritional knowledge in children.

Many studies have revealed that a large cross-section of populations have a lack of nutritional knowledge. Generally speaking, people of all socio-economic classes, professions, health status, and age are not very knowledgeable when it comes to nutrition. (Blaylock, Smallwood, Kassel, Variyam, and Aldrich, 1999; Guthrie, Derby, and Levy, 1999; Nayga, 2000; Obayashi, Bianchi, and Song, 2003; Parmenter, Waller, and Wardle, 2000; Sapp and Jensen, 1997). Specific populations, such as students, physicians, patients, business travelers and other workers have also been surveyed (Allen, Cumming, and Woodward, 1998; Hamm, Schnaak, and Janas, 1995; Kimathi, Gregoire, Dowling, and Stone, 2009; Lee and McCool, 2005; Subratty, Heesambee, Jowaheer, and Doreemiah, 2002; Temple, 1999). People do not recognize foods that are healthiest and the relationship between diet and health (Guthrie, Derby, & Levy, 1999). Additional nutritional knowledge is necessary to provide and choose healthier food choices (Hawkes and Nowak, 1998). A recent survey of American physicians revealed that many more physicians would give dietary counseling to their patients except for the problem of various barriers. Sixty-two percent felt that lack of knowledge about nutrition was one such barrier (Temple, 1999).

In order to overcome this barrier, three types of nutrition knowledge will be taught during the nutrition education program –cognition, declarative, and procedural. Cognition in terms of nutrition knowledge is the awareness of a diet-disease relationship. Students will be able to identify the dietary risk factors associated with specific diseases. The second type of nutritional knowledge, declarative, encompasses knowledge of health-oriented and food related-principles. Students will be able to explain the different characteristics of food and how those characteristics may affect health. Procedural is the third type of nutritional knowledge and it allows students to demonstrate their understanding. The procedural stage signifies being able to apply knowledge to actual situations. Evidence of mastery of this knowledge is exhibited through synthesis.

Synthesis, or meta-cognitive knowledge as defined by Bloom's *Taxonomy on Educational Objectives*, is exhibiting proficiency at utilizing individual skills learned to create a new concept or alternate solution (Anderson et al., 2001). In the nutrition education program context, a student would be required to interpret a recipe and nutritional information to plan and prepare a nutrient-rich meal in order to demonstrate synthesis. Table 7 is a taxonomy chart that illustrates which cognitive and knowledge dimensions a student accesses when achieving certain objectives.

Table 9: Nutrition Education Program Educational Objectives Taxonomy Chart

THE KNOWLEDGE DIMENSION	THE COGNITIVE PROCESS DIMENSION					
	1. REMEMBER	2. UNDERSTAND	3. APPLY	4. ANALYZE	5. EVALUATE	6. CREATE
A. FACTUAL KNOWLEDGE	Activity 1 Activity 2		Activity 2			
B. CONCEPTUAL KNOWLEDGE		Objective 1		Objective 3 Activity 6	Activity 5	
C. PROCEDURAL KNOWLEDGE	Activity 2	Activity 4	Objective 2 Activity 2 Activity 3 Activity 4	Objective 3	Activity 5	
D. META-COGNITIVE KNOWLEDGE	Activity 8	Activity 8	Activity 8	Activity 7 Activity 8	Activity 8	Objective 4 Activity 9

Objective 1- Understand culinary principals and techniques as an explanation for executing a recipe

Objective 2 – Execute an existing recipe

Objective 3 – Adapt an existing recipe

Objective 4 – Develop an original recipe

Activity 1 (for objectives 1-4) – Identify weights, measurements, and equipment needed for recipe

Activity 2 (for objectives 1-4) – Use knife-cutting skills to prepare product for cooking

Activity 3 (for objectives 1-4) – Implement laws of chemical reaction to cook food

Activity 4 (for objective 2) – Prepare the recipe as instructed

Activity 5 (for objectives 2-4) – Taste-test the product; judge quality

Activity 6 (for objective 3) – Review and examine ingredients and measurements

Activity 7 (for objective 3) – Modify culinary and heat transfer techniques to make recipe healthier

Activity 8 (for objectives 3-4) – Choose food ingredients, preparation methods, and quantity

Activity 9 (for objective 3-4) – Produce new recipe

Farming

“Obesity prevention interventions are increasingly moving towards addressing the intermediate steps between food access and healthy eating – planning meals, procuring ingredients, and preparing food at home” (Virudachalam, Long, Harhay, Polsky, & Feudtner, 2014, p. 1022). School garden programs have been identified as an intervention that may successfully and cost-effectively address diseases linked to poor diet and nutrition intake and lack of access to fresh fruits and vegetables (Ratcliffe, Merrigan, Rogers, & Goldberg, 2011, p. 36). The farm component of the nutrition education program provides hands-on education focused on planting, nurturing, and harvesting produce. The activities reinforce nutrition education and help answer the questions:

- What foods are native to the region?
- How are these foods cultivated?
- What factors affect the growth and harvesting of these foods?
- How is food distributed to communities?
- How is food waste minimized?
- What happens to excess harvests?
- How are foods grown on the farm processed into other foods?

The farm instruction for Farm to Fork will take place on a one-acre plot of the Livingstone College Farm. Students will be involved in all stages of the farming process: farm design, soil preparation, crop planting, crop harvesting,

marketing the harvest, and produce sales. The initial stages will have students design and construct a model of their farm plot. Through this, students learn about cooperation and teamwork by making decisions about their land. Students will also chart plant growth, calculate crop costs, determine crop yields, and present after-action reports on more effective land usage. Consequently, students will have a practical understanding of how local agriculture affects the immediate and local environment, the neighboring community, and the regional economy.

Culinary Techniques

Cooking in the United States has declined 40% despite evidence that regular family meals lead to healthier diets and lower BMI in children and adolescents (Virudachalam, Long, Harhay, Polsky, & Feudtner, 2014). Food preparation skills are essential though in order to prepare healthful, palatable meals that meet dietary recommendations for children and young adults (Condrasky, M., Corr, A. Q., & Cason, K., 2007). The F2F culinary component of the curriculum provides these skills in a way that is fun, engaging, adaptable, and easy to implement. Hands-on cooking instruction is an effective strategy to teach healthful eating behaviors and improve mealtime behaviors in youth (Condrasky, M., Corr, A. Q., & Cason, K., 2010).

The culinary lessons will occur in a full-service kitchen environment that permits students to learn and execute the procedures typical of culinary professionals. One of the most important culinary techniques to be learned during the program is knife cutting. The knife is a cook's most important and versatile cooking tool as it is faster and more precise

than a machine. A knife offers a proper cut, ensures even cooking, and enhances the appearance of the food (Gisslen, 2004).

Students will not only have to learn proper knife cutting and the different types of cuts, they will have to identify the parts of the knife and have to identify other types of equipment used in the kitchen. Identifying equipment and understanding use assures operator safety, provides appropriate cooking preparation, proper recipe yield, as well as delivers the desired presentation. Knife cutting, as observed in previous program sessions, has the benefit of increasing the fruit and vegetable intake of participants.

The culinary instruction is designed to reinforce and synthesize the nutrition education component of the program as well as to stimulate interest in the source foods. As indicated in a review of studies on nutrition knowledge, it was recommended that environmental and behavioral strategies that align with nutrition guides such as MyPlate or the Dietary Guidelines of America be taught in conjunction with the content of the guides in order to get optimal adherence to the nutrition information (Haack & Byker, 2014). Figure 12 is a sample of a culinary lesson from the nutrition education program that teaches skills and behaviors that reinforce dietary guidelines recommendations for cooking and flavoring using lower sodium and lower fat methods.

Sample Culinary Lesson

1. Lesson Review. How does heat affect food? What are some types of heat transfer? How are they different?
2. Before we begin, there are some kitchen rules that must be followed:
 1. Wash hands to prevent spreading germs. All students *must* wash their hands.
 2. Follow directions.
 3. Work quietly so everyone can hear the directions.
 4. Handle the food as little as possible and do so only with clean hands.
 5. Handle knives carefully and be aware of hot objects.

3. Knife Skills

Discussion. What are the names of the knife cuts you learned?

1. Have students practice the two knife cuts they learned in the last lesson.
2. Demonstrate knife cutting and how to execute two protein- specific cuts.
3. Have students practice the two specific cuts on protein for the heat transfer practice.

4. Heat Transfer

1. Explain the following cooking methods: poaching, simmering, boiling, steaming, braising, roasting, baking, broiling, grilling, griddling, sautéing, pan frying
2. Using one of the cooking methods listed to demonstrate how to control the effects that heat has on food.
3. Demonstrate three of the methods of heat transfer to food.
4. Allow students to practice three different methods of heat transfer to food and observe the different effects it has on the same type of protein.

5. Flavoring and Seasoning

1. Demonstrate the use of several flavorings in meal preparation such as: juices, garlic, scallions, ginger
 2. Demonstrate the use of herbs in meal preparation. Herb of the Day – Basil!
 3. Allow students to practice knife-cutting on the herbs and use to flavor protein.
- Students will rotate through kitchen stations (food prep, knife cutting, cooking, plating, and garnishing) in twenty-minute intervals.

Discussion.

- What can be done to improve the nutritional value of the recipe?
- What parts of the plant were used?
- What knife cuts and knife is needed for each element of the recipe?
- How do you double the yield of the recipe?
- How do you half the yield of the recipe?

Figure 12: Sample Culinary Lesson

Experiential Learning

Experiential Learning is defined as learning from experience and hands-on activity. When a student applies this learning to his own life, it deepens his

understanding. As a nutrition education concept, nutrition knowledge, food preference, and food acceptance is actively constructed through experience with food, cooking, and farming. In a review of studies on nutrition knowledge, there was no positive relationship found between knowledge of nutrition guides such as *MyPlate* and adherence to the guides. More specifically, it was established that “knowledge of a nutrition guide or a nutrition campaign is ineffective if individuals cannot apply the guidelines to their daily lives” (Haack & Byker, 2014). Incorporating the experiences gained during the Farm to Fork program for continued use outside of the program constructs is an important aspect of reinforcing the strategies learned.

With American children consuming 50% of daily calories at school (Levi et al., 2013), the school setting is the optimal environment to provide a learner-centered nutrition education program to middle school students. It provides students with an opportunity to apply knowledge in situations in which they are comfortable. Many authors have suggested that one of the approaches to diminish the obesity epidemic is to start in the educational system. To support that notion, the authors of *Generation Extra Large* discuss the obesity epidemic and emphatically argue that drastic measures are needed in order for schools to successfully educate and support students changing to healthier eating behaviors (Tartamella, Herscher, & Woolston, 2004). The 2004 Child Nutrition and WIC Reauthorization Act requires every school system to create a Local Wellness Policy that must describe goals for nutrition education and physical activity (Kindermann, 2008). “Recently, the school environment has been chosen as the location for programs aimed at increasing fruit and vegetable consumption in children because

children so much time of their time on school campus” (Hazzard, Moreno, Beall, & Zidenberg-Cherr, 2011, p. 409).

The Farm to Fork nutrition education program is a program structured around direct participation -- experiencing, thinking, discussing, and applying what the adolescents have learned to their daily lives. The organization of the program in this manner may have students assigning a higher task value to the activities needed to complete the program. Task value is “a student’s evaluation of how interesting, how important, or how useful the task is. High task value should lead to more involvement in one’s learning” (Pintrich, Smith, Garcia, & McKeachie, 1991, pg. 11).

An introductory lesson from the Farm to Fork Nutrition Education Program can be seen in Appendix C. As the initial session of the program, it introduces students to nutrition, farm, and culinary basics. Despite its preparatory nature, the lesson still employs engaging methods to create task value among the students as well as provide the information fundamental to further education.

Other Design Considerations

Historically, a nutrition education program begins with industry specific terminology that may not be comprehended by the audience. Even if there is familiarity with the language, participants may not be able to give an accurate definition or apply concepts appropriately. By beginning in this manner, participants are alienated from becoming further engaged in the learning process. This is especially true when there is no attempt made to discern the cognitive and cultural levels of the group. By not establishing a cognitive and cultural common ground with the participants, places the instructor at a disadvantage in being able to provide an interactive learning environment conducive to the participants successfully reaching the desired outcomes. Nutrition guides should assist all demographic populations that represent different backgrounds, food cultures, and food allergies and intolerances (Haack & Byker, 2014). As noted by Anderson (1994) nutrition education programs need to be technologically savvy, culturally relevant, and age appropriate.

Sixth graders were chosen for this design because “There is increasing recognition in policy, research, and clinical practice communities that early and middle childhood provide the physical, cognitive, and social-emotional foundation for lifelong health, learning, and well-being” (Healthy People 2020, 2014).

Furthermore, the Office of Disease Prevention and Health Prevention *Healthy People 2020* initiative instituted several nutrition and weight status objectives specific to the development of children and adolescents:

- Healthier food access for school-age children (6 objectives)
- Reduce obesity rates in children and adolescents (5 objectives)

- Prevent inappropriate weight gain in children and adolescents (4 objectives)
- Increased consumption of nutrient-rich food (3 objectives)
- Reduce consumption of calories, saturated fat, and sodium (5 objectives)

The curriculum for the interventions is a 12- week program that consists of nine lessons. Each class will happen for two hours once a week during the *Film @ 6* Afterschool Program at Southeast Middle School in Salisbury, NC. The classes will consist of 30-minute nutrition lessons and alternate weekly with 2.5 hours of either culinary instruction or farming activities. Although there are only nine lessons, the curriculum is 12 weeks in order to encompass the lead times necessary when planting seeds and awaiting harvest. The final week will also include a dinner party that gives the students occasion to prepare a full meal for stakeholders such as parents, teachers, and master gardeners.

The program design serves as a planning tool and resource for teachers and related service providers. It can be replicated in different settings for varying student populations. The 12-week curriculum incorporates the North Carolina Common Core and Essential Standards for sixth graders and outlines instruction plans, farm and culinary activities, and culinary skills evaluation. Each program lesson provides expected student outcomes, instructor's essential information, preparation instructions, supplies, lesson time, handouts, and guiding questions for reflection by the students. The lessons are manageable by both student and instructor.

While the nutrition lessons can be implemented by any stakeholder, the culinary lessons are best taught by a chef. Not only are chefs experts in culinary arts, with an influx of media visibility, chefs are “an interesting, credible, and visible influence for

sharing cooking advice and a passion for food” (Condrasky, Corr, & Cason, 2007).

Additionally, the excitement of interacting with a chef, is a good opportunity for various community members and stakeholders to collaborate on achieving a common goal.

Additional specialty staff, while not necessary, may include a special resource teacher experienced in experiential educational strategies, a public health nutritionist, a nurse, a master gardener, or a farm manager.

In the second and third trials of the program, support staff was inherent to the nutrition education program as being part of the host program. The second trial was part of a larger day of instruction for middle school students at a local college. Support staff consisted of volunteers, parents, teachers, college students, and professors that were involved in facilitating the larger program. For the third trial, support staff consisted of the afterschool-program site director and teachers from the host middle school.

Although the fundamentals of the program are outlined in the curriculum, schools are able to adapt weekly program activities to suit their individual physical environments, school regulations, and community needs. For example, dense urban areas can create rooftop gardens, build raised bed gardens, or use a hydroponics system.

CHAPTER THREE: PROGRAM DESIGN AND IMPLEMENTATION EFFECTIVENESS ANALYSIS

Because obesity in adolescents has become a major problem in the United States, the problem of practice this Dissertation in Practice will address is the lack of nutritional knowledge held by middle school students. The Dissertation in Practice aims to determine the effect of nutrition education as a means to increase nutritional knowledge and reduce diet-based obesity risks in middle school students in an urban Title I school.

Overview

Background

An epidemic refers to a condition characterized by widespread growth and affects a disproportionately large number of individuals within a population (Merriam-Webster, 2015). Childhood and adolescent obesity has reached epidemic proportions in the United States. Approximately 33% of children in the United States are classified as overweight or obese (CDC, 2014). The growing obesity epidemic is profoundly affecting the nation's health (Dietz, Benker, & Hunter, 2009). Currently, obesity is considered the leading lifestyle-related cause of morbidity, even ahead of smoking, in the United States (CDC, 2014). This is a grave public health concern because overweight and obese children are at an increased risk for a number of health complications that were previously considered

rare in children such as, type 2 diabetes, hypertension, high cholesterol, and respiratory ailments (Lee, Herman, McPheeters, & Gurney, 2006).

Fruits and vegetables provide many necessary nutrients including those that the USDA claims are the most under-consumed (USDA, 2010). Nutritional experts believe that improving fruit and vegetable consumption can effectively promote a healthy diet. Research indicates that children's preferences for healthy foods will increase if they are repeatedly exposed to these foods, and if they experience a variety of flavors in their diets (Forestell & Mannella, 2007; Wardle, Harrara, Cooke, & Gibson, 2003; Liquori, Koch, Contento, & Castle, 1998).

The Farm to Fork Nutrition Education Program designed for middle school youth will use experiential nutrition lessons, farm instruction, and culinary training as a way to personalize nutrition concepts and address nutritional habits that increase risks for obesity. The objectives of the program design are to assist sixth graders increase nutritional knowledge, expand the knowledge of food sources and farming practices, increase the consumption of fruits and vegetables, and improve culinary techniques. The overall goal of the program design is to provide an experiential nutrition education as a means to increase the nutrition knowledge and improve the diet-based decisions that can reduce risk of obesity in middle school students.

Overall Approach

The nutrition education program aims to increase the nutritional knowledge of the participants and to provide knowledge on how to implement healthier food choices in order to decrease risks for obesity. Participants will learn about nutritional needs, the nutritional benefits of various foods, diet-based disease associated with poor nutrition, farming methods, food preparation skills, and food presentation techniques. By learning how to build a high-nutrient meal into their lifestyles, youth will take a more active role in making healthier food choices, decreasing their risk for obesity.

The nutrition lessons include handouts such as puzzles and word searches and activities such as charades and constructing worm bottles. Farming lessons provide information on soil preparation, plant care, and harvesting. Culinary lessons start with basics about safety and sanitation and continue through other culinary proficiencies such as knife cutting, heat transfer, recipe building, meal preparation, and plating techniques. All lessons incorporate a STEM (science, technology, engineering, and math) content standard.

Although nutrition education is essential to any population in order to make appropriate diet-based decisions, sixth graders are the target of the program because lifelong, healthy nutritional habits are developed early in life from participatory learning (Lytle, 1997). During adolescence, students are building a multitude of physical, psychological, and cognitive competencies that have a significant impact on their later adult development. Since children spend a large amount of time in educational environments, schools have been identified as key venues for the implementation of nutrition intervention programs (Fung et al., 2012; Mullen & Shield, 2004). School

personnel can be instrumental in reinforcing and promoting healthy dietary behaviors while at school. School settings can also serve as the connection point between home and community and provide a consistent nutrition education model to be implemented in all segments of the students' lives.

Design Perspective and Program Goals

Nutrition education design that relies on traditional education methods that capitalize on memorization and regurgitation of facts may be tedious and ineffective, whereas interactive and practical nutrition education, involving hands-on learning such as cooking classes or computer-based methods tend to be more effective in promoting a positive change in children (Seaman and Kirk, 1995; McCullough, 2004; Condrasky, Corr, Sharp, Hegler, & Warmin, 2010). Research also indicates that increased repeated exposure and food tasting opportunities are effective methods to increase children's consumption of fruits and vegetables (Liquori, Koch, Contento, & Castle, 1998; Wardle, Herrera, Cooke, & Gibson, 2003). Therefore, the Farm to Fork program is an experiential design that uses multiple interventions in order to achieve program goals.

This program design incorporates three interventions – a nutrition curriculum, farming, and cooking. Each lesson of the interventions emphasizes hands-on learning and student experiences direct synthesis of the information learned. Layering and connecting information using several interventions addresses the multiple factors of obesity, reinforces the nutrition knowledge concepts, provides repeated exposure to content foods, and presents varying instructional delivery methods to address different learning styles. Engaging all senses and involving students in direct experiences is congruent with

theories that support the notion that these activities have a positive impact on children's dietary consumption and other health outcomes (Cunningham-Sabo & Lohse, 2014).

This program design conception seeks to achieve for participants:

- Expanded comprehension of how foods consumed affect body and health
- A higher awareness of the importance of eating fruits and vegetables
- A better ability to identify fruits and vegetables
- Increased growing or purchase and consumption of fruits and vegetables
- Exposure to and consumption of fruits and vegetables never eaten before
- Improved understanding of agriculture
- Make connection between food and science

Target Audience and Program Beneficiaries

The program targets middle school students participating in the *Film @ 6* afterschool program instituted in Rowan County, NC. Financial status, gender, ethnicity, and academic achievement are not factors for participation. This program targeted a very specific segment of the student population for ease of accessibility, but the program is meritorious across a wide population of students in various settings.

Program participants and their family members will be the immediate beneficiaries of the Farm to Fork Nutrition Education Program. Students benefit from the direct goals of the program. Additionally, students receive an expanded application of STEM education. Parents and caregivers obtain an increased awareness of nutritional content and consumption of children. Both students and parents become better-informed consumers. The local community and city also benefit, as the potential improvement in health would lessen the burden on medical resources and the farm produce increases accessibility for local citizens to fresh fruits and vegetables.

Learning, Performance, and Skill Development

Anticipated Changes in Performance and Learning

In order to achieve program objectives, changes should occur in nutrition knowledge, cognitive decisions that mediate improved diet-based decisions, and cooking confidence and self-efficacy in students. Findings support the importance of providing nutrition knowledge as a means to promote healthy dietary behaviors (Mohd Shariff et al., 2008). Farming may help overcome student fears and questions about eating new foods because of the excitement of eating something they produced on the farm (Lineberger & Zajicek, 1998). Learning food preparation skills can result in lower fat intake and higher intakes of fruits and vegetables for adolescents (Condrasky, Corr, Sharp, Hegler, & Warmin, 2010). Research finds that nutrition education interventions not only improve nutritional knowledge but vegetable-related attitudes and self-efficacy in school age children (Wall, Least, Gromis, & Lohse, 2012).

Anticipated Knowledge Acquisition, Skill Development, and Attitude Changes

A 2007 study determined that people make an average of about 227 food and beverage decisions daily (Wasnik & Sobal, 2007). Each of the decisions associated with food choice, food preparation, quantity of food consumption, even when food consumption will occur contribute to the bevy of food decisions people make every day. With so many decisions being made, it is essential that nutrition education be provided so that people can make informed decisions about their personal diet, nutrition, and

subsequently their health. The Farm to Fork Nutrition Education Program focuses on two types of knowledge. Declarative knowledge refers to facts and things, while procedural knowledge refers to the way in which actions are performed (Dickson-Spillmann & Siegrist, 2010). Focusing on both the “what” and “how-to” of knowledge helps ensure students can synthesize the concepts learned with the associated skillsets.

Some anticipated knowledge and skill acquisition and increases include:

- Nutrition knowledge (declarative and procedural)
- Farming methods
- Culinary skills (preparation)
- Plating/garnishing skills
- Reading, science, and math skills
- Teamwork
- Planning abilities (learned through menu planning, planning cooking strategy, planning farm layout and cultivation)

Evidence of Change

Based on condensed trial program implementations, a prediction of success is justifiable when the program is implemented with the complete curriculum. The first trial of the program was conducted with ten adults. The program was a six-week workshop whose curriculum focused on nutrition lessons and culinary training. The adults were successful in accomplishing an increase in nutrition knowledge and culinary skills as evidenced by mastering culinary concepts presented during the program and answering food and nutrition assessments correctly. The participants were so excited about their newly acquired knowledge they regularly endorsed and recommended the program to their peers.

Additionally, forty percent of the workshop participants saw a decline in their blood pressure rates as a result of applying the nutrition and culinary lessons learned throughout the workshop to their home practices. This is evidence that participants will utilize their acquired knowledge in a real-life setting. The participants' lower blood pressure rates are a positive reinforcement and a dynamic example that there is a direct correlation between nutrition and its effect on personal health.

Even though there was success with the first trial, the target population changed because it is more effective to execute interventions with youth and adolescents as prevention of obesity risks than to change the established risk behaviors of adults (Dehghan, Akhtar-Danesh, & Merchant, 2005; Merck Manuals, 2014; Healthy People 2020, 2014). Another impetus to change the target population is the numerous government initiatives calling for schools and communities to create or integrate measures that tackle obesity, nutrition, and physical activity issues into existing programs (Nelson, Corbin, & Nickols-Richardson, 2013; Hellmich, 2010; Healthy People 2020, 2014). The Farm to Fork program is a collaborative tool that can prove to be effective in assisting schools implement the mandated initiatives.

The second trial implementation consisted of a further condensed version of the program. This trial retained the same objectives -- to increase nutritional knowledge, expand the knowledge of food sources and farming practices, increase the consumption of fruits and vegetables, and improve culinary techniques – but was implemented during one, daylong series of workshops for low-income adolescents. One hundred and twenty middle school students, in 14-person groups, received three 35-40 minute sessions on

nutrition education, farming, and culinary techniques. The students were qualified as low income based upon their participation in the National School Lunch Program (NSLP).

Many students that participated in the trial program were excited about the knowledge learned. They were so eager to learn more, that they requested the opportunity to participate in the full-scale program. This demonstrates a positive attitude and a willingness to revise rationales regarding dietary decisions.

As a result of the second program trial, the third trial of the program design occurred during an afterschool program at a middle school in Rowan County, NC. The targeted audience was 30 sixth grade students participating in the *Film @ 6* afterschool program. Six weeks of nutrition lessons and instruction in culinary techniques were used to validate further such concepts as cooking skills, knife cut skills, and nutrition knowledge. One of the sessions focused on the different varieties of apples and the various preparation methods of the fruit. Initial responses included some that stated they did not like apples. After identifying the 15 different varieties of apples, learning how to cut them for meals and garnishing, and then tasting the apples, some students were able to identify apple varieties that appealed to their palate. This serves as an example of how the program design can facilitate an increase in taste preference and consumption of fruit.

Steps, Measurement Tools, Procedures, and Activities

The trial implementations of the program design helped refine program procedures, test validity of the curriculum, and assess the effectiveness of the activities and delivery methods. Measurement tools include a nutrition knowledge questionnaire, based on the CATCH Kids Questionnaire, to be used as a pre/post program participation assessment; a knife-cutting rubric; a practical, which requires students to plan and prepare a meal in accordance with USDA *MyPlate* recommendations; and instructor observation. The activities and procedures have culminated into a curriculum based on the Harvard *6-Week Healthy Eating* program, the UC Davis *Nutrition to Grow On* curriculum, and the results of the experimental programs executed. The *Nutrition to Grow On* and Harvard programs were selected because they are tested and validated. Changes were made to reflect the use of a farm versus a garden, community needs, and the expertise of the researcher as a culinarian and instructor for 30 years. The CATCH Kids questionnaire is preferred because of its use by the National Institute of Health (NIH) WE CAN! (nutrition and physical activity program). The knife-cutting and culinary rubrics are standards used by the American Culinary Federation (ACF). ACF is the lead organization in the United States for offering educational resources, training, and certification for professional chefs.

Achievement Indicators and Tangible Results

Livingstone College in Salisbury, Rowan County, NC was the site of the second trial of the program design. The projected number of participants was 230 middle school children. The actual participants were 120 sixth grade students from four different middle schools – China Grove, Corriher-Lite, North, and Southeast – in Rowan County, NC. The intention of this implementation was to study the effectiveness of the curriculum and its delivery on middle school participants. The test of the middle school version of the program design helped determine any needed revisions to the curriculum or modifications to lesson delivery.

The five-hour program trial consisted of 35 – 40 minute sessions with 14 children per session. The imminent concern was gauging the knife skills of the students. This skill is of such importance because cutting and knife technique is fundamental to culinary proficiency and integral to the nutrition education program. The students received instructions very well and were able to demonstrate understanding by applying knife-cutting skills to the task of making an orange basket.

A second session entailed a nutrition seminar on the United States Department of Agriculture (USDA) *MyPlate* guidelines. While the students did not have the opportunity to see the farm at Livingstone as initially outlined, they did have a session on farming and the process of getting produce from “farm-to-fork.” In this session, students planted cantaloupe seeds in soil inside a bag (a “mobile farm”). Then, the students made smoothie drinks using cantaloupe and other fruit they cut. In the next session, the students learned about total food use and how to create healthy snacks. In this lesson, the students

made a “turkey roll up” using a tortilla shell and a spread made from the fruit they cut in the previous session. The culmination of the nutrition education program was a discussion of the curriculum and careers in the Culinary Arts industry. The students also participated in activities from other departments in the college. The principal of one of the middle schools expressed that the nutrition education program was the most well received piece of information of the day.

The principal invited the Farm to Fork program onto a middle school campus to provide the curriculum as part of the afterschool program, *Film @ 6*. During the six weeks of the program implementation, children did “homework” and returned the homework for review. Additionally, students retained their knowledge of knife cuts in each sequential class. Parents participated as well by completing a food journal about their children’s eating habits. As some parents stated, the nutrition education program was the reason they were buying new produce selections. Table 10 displays a chart of the program goals and the measures needed in order to demonstrate that goals were reached.

Table 10: Program Immediate Outcome Measures

QUESTIONS TO CONSIDER FOR IMMEDIATE OUTCOMES	POSSIBLE INDICATORS/MEASURES	DATA COLLECTION/INFORMATION SOURCES
Does the participant know how nutrition affects: blood pressure, cholesterol levels, and blood glucose levels?	<ul style="list-style-type: none"> - Understands categories of nutrition - Correctly identifies which foods affect health indicator and how 	<ul style="list-style-type: none"> - Nutrition knowledge questionnaire
Are appropriate nutritional adjustments to change BMI exhibited?	<ul style="list-style-type: none"> - Food journal used to log food consumption, modifications, and nutritional goals 	<ul style="list-style-type: none"> - Health and Diet Survey - BMI Chart
Does participant demonstrate ability to read and understand nutrition information on food labels?	<ul style="list-style-type: none"> - Reads label and accurately defines nutritional information 	<ul style="list-style-type: none"> - In class observation - Verbal quiz
Has the participants' nutritional knowledge increased?	<ul style="list-style-type: none"> - Increase in post-program Nutritional Knowledge test score over pre-program score 	<ul style="list-style-type: none"> - Nutrition knowledge questionnaire
Can participant demonstrate how to get the most food product use?	<ul style="list-style-type: none"> - Demonstrates proper cutting techniques 	<ul style="list-style-type: none"> - Visual observation of skills in class
Will participants be able to demonstrate food preparation techniques?	<ul style="list-style-type: none"> - Identifies various cooking methods - Identifies equipment necessary for each cooking method - Produces food samples for each cooking method - Describes the difference between seasoning and flavoring 	<ul style="list-style-type: none"> - Observation of in-class meal preparation

Table 11: Program Intermediate Outcome Measures

QUESTIONS TO CONSIDER FOR INTERMEDIATE OUTCOMES	POSSIBLE INDICATORS/MEASURES	DATA COLLECTION/INFORMATION SOURCES
What regulations relate to the program?	<ul style="list-style-type: none"> - Explain categories and portion sizes in USDA <i>MyPlate</i> recommendations 	<ul style="list-style-type: none"> - USDA <i>MyPlate</i> - American Culinary Federation - ServSafe
How do students use what they learn? Is knowledge only transferred to participants or do they use and apply?	<ul style="list-style-type: none"> - Participants relay how they have used program skills outside of control environment - Participant discussion of skills learned and nutrition knowledge with peers and family 	<ul style="list-style-type: none"> - Verbal participant survey - Food journal log
Can participant demonstrate how to increase meal nutrition values? Can participant plan and create a high nutrient meal?	<ul style="list-style-type: none"> - Correctly matches food to nutrients - Modifies typical “unhealthy” lunch to become “healthy” higher nutrient meal - Select high nutrient recipe to prepare - Properly create grocery list - Create meal using proper food preparation and presentation techniques 	<ul style="list-style-type: none"> - In class observation during meal preparation - Rate your Food Questionnaire
Can participant differentiate SKUs and their meaning for produce?	<ul style="list-style-type: none"> - Properly identify fruit origin based upon SKU 	<ul style="list-style-type: none"> - SKU labels - Verbal Quiz
Will the participant be able to demonstrate how different knife cuts can be used to increase vegetable consumption?	<ul style="list-style-type: none"> - Understands proper knife selection - Demonstrates basic cutting techniques - Properly use knife techniques for various food garnishing methods 	<ul style="list-style-type: none"> - In class observation during knife skills assessment
Can participant explain the benefits of juicing or blending fruits and vegetables?	<ul style="list-style-type: none"> - Describe differing nutrient content in fresh vs. canned/boxed juice 	<ul style="list-style-type: none"> - Juicing

Table 12: Program Long-Term Outcome Measures

QUESTIONS TO CONSIDER FOR LONG-TERM OUTCOMES	POSSIBLE INDICATORS/MEASURES	DATA COLLECTION/INFORMATION SOURCES
Has there been a change in health levels?	<ul style="list-style-type: none"> - Decrease in BMI - Improvement/Reduction in Blood Pressure Rate - Decrease in cholesterol levels - Improvement in Blood Glucose levels 	<ul style="list-style-type: none"> - Health Log - BMI Chart - Information Sheets: Hypertension, Cholesterol, Blood Glucose - Volunteer Nurses
Does participant prepare foods at home more frequently than consuming fast food or food from local restaurants?	<ul style="list-style-type: none"> - Majority of meals (> 70%) prepared at home 	
How do participants rate their food knowledge and preparation skills as compared to skill set before program completion? How was the overall experience for the participants?	<ul style="list-style-type: none"> - Participants express increase in knowledge and skills as a result in program participation - Participants express satisfaction with program 	<ul style="list-style-type: none"> - Participant post-program interview

Table 13: Program Ultimate Outcome Measures

QUESTIONS TO CONSIDER FOR THE ULTIMATE OUTCOME	POSSIBLE INDICATORS/MEASURES	DATA COLLECTION/INFORMATION SOURCES
Is there a need for the program?	<ul style="list-style-type: none"> - Health status of target group - Nutrition and eating habits of target group 	<ul style="list-style-type: none"> - Research articles - Health assessments - Surveys/Questionnaires
Is content relevant to practical problems?	<ul style="list-style-type: none"> - Participants express concerns that can be addressed with program content - Skills are being used as intended 	<ul style="list-style-type: none"> - Participant Interviews - Research articles
What impact does program have on existing knowledge, skills, and attitudes, related to the subject do the participants have?	<ul style="list-style-type: none"> - Increased culinary skills - Participants express confidence in new skills - Participants able to define and explain nutrition knowledge in a better manner 	<ul style="list-style-type: none"> - Participant interviews - Post-program assessment
Can the project be sustained? Has the program had a broader and continuing impact?	<ul style="list-style-type: none"> - Participants favor program continuation - Stakeholders there is continued need for sustaining program - New category of participant request program - Support from external organizations 	<ul style="list-style-type: none"> - Location staff feedback - Participant feedback - Plan development for broader scope

Anticipated Program Impact

The ultimate goal of the Farm to Fork Nutrition Education Program is to provide sixth graders with an experiential nutrition education through nutrition lessons, farming instruction, and culinary workshops to increase nutritional knowledge; to expand

knowledge of food sources and farming practices; to increase the consumption of fruits and vegetables; and to improve culinary confidence and skills, as a means to improve the diet-based decisions that can reduce the risk of obesity in middle school students.

CHAPTER FOUR: IMPLICATIONS AND RECOMMENDATIONS

Because obesity in adolescents has become a major problem in the United States, the problem of practice this Dissertation in Practice will address is the lack of nutritional knowledge held by middle school students. The Dissertation in Practice aims to determine the effect of nutrition education as a means to increase nutritional knowledge and reduce diet-based obesity risks in middle school students in an urban Title I school.

Conclusion and Future Implications

There is much research on nutrition education programs and its immediate impact on participants. Unfortunately, there are no consistent results regarding the effectiveness of these programs or their long-term effects. There will be a need to further research to identify any long-term behavior modifications of nutrition education program participants. Skill transference gained during the interventions may be heightened by pairing adolescent students with parents or caregivers since students may not be decision makers in the home. This method may increase the probability of learned food preferences and preparation methods being applied in the domestic setting of the student. While the farming activities have some level of physical activity associated with it, collaborating with a physical education instructor would add another layer of intervention to the program that addresses the multiple risk factors for obesity.

Obesity is a major risk factor for cardiovascular disease (CVD) and is commonly found in conjunction with other CVD risk factors such as hypertension, type-2 diabetes, and/or hypercholesterolemia. There is little doubt that obesity in the United States has reached epidemic proportions and that each year there are substantial health and social costs associated with obesity-related pathologies. Therefore, development of programs and resources to educate children, parents, schools, governmental and semi-governmental agencies, and the community at large on the causes, effects, solutions, and preventative measures of childhood obesity is of utmost importance. It is crucial to providing future generations with the means to manage their health and longevity of life.

Children and adolescents are considered the priority population for intervention strategies because 70% of obese adolescents become obese adults and it is difficult to reduce excessive weight once established (Dehghan, Akhtar-Danesh, & Merchant, 2005). An implication of starting interventions at this younger age is the reduction in Medicare costs. The Treat and Reduce Obesity Act of 2015 was created “to provide for the coordination of programs to prevent and treat obesity” (S.1509, 2015). The focus is on Medicare recipients because 34% of those 65 and older are obese and more than half of Medicare beneficiaries are treated for 5 or more chronic conditions that are linked to obesity. The spending on these obese Medicare recipients has more than doubled between 1987-2002. There are 15 million Medicare recipients with obesity and each of these recipients has \$1964 more spent on them than other recipients (S.1509, 2015). That is approximately \$29 billion more in costs to the Medicare system that is preventable through early obesity intervention methods.

Early and middle childhood is an ideal time to set a foundation of learning about nutrition, creating a connection with food sources, and acquiring food preparation skills. Research has confirmed youth that participate in farming activities exhibit higher levels of self-esteem in “life skills.” Youth that participate in culinary workshops have increased self-efficacy in their food preparation skills. Both interventions generate an increased preference for fruits and vegetables.

As such, the Farm to Fork Culinary- and Farm-Enhanced Nutrition Education Program was created to integrate farm instruction and culinary activities into a nutrition education curriculum in order to increase nutrition knowledge, improve food preparation skills, and increase fruit, vegetable, and minimally processed food consumption as a means to address the overweight and obesity risks of middle school students. This proposed project has strong multi-disciplinary characteristics since it aims to link major disciplines such as mathematics, science, language arts, environmental studies, nutrition, and health. The ultimate outcome is to see a behavioral change in the middle school students that results in lowered risk of obesity. In the interim, an increase in nutrition knowledge and improved food preparation skills is a solid foundation to achieve the desired long-term goals.

The Farm to Fork program trials indicate the benefits of an ongoing nutrition education program using farming instruction and culinary arts to help redefine eating behavior of participants. With use of just the partial curriculum, Farm to Fork showed improvements among participants. The project supports the success and need for experiential programs for any target audience, but especially as a means to improve the

nutrition knowledge, fruit and vegetable consumption, and dietary decisions of middle school students in order to reduce the risks of obesity.

Children and adolescents are considered the priority population for intervention strategies because 70% of obese adolescents become obese adults and it is difficult to reduce excessive weight once established (Dehghan, Akhtar-Danesh, & Merchant, 2005).

APPENDIX A: IRB APPROVAL LETTER



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1
FWA00000351, IRB00001138**

To: **Vivian Maria Ray**

Date: **May 19, 2015**

Dear Researcher:

On 05/19/2015, the IRB approved the following human participant research until 05/18/2016 inclusive:

Type of Review:	UCF Initial Review Submission Form
Project Title:	Farm to Fork: A Culinary- and Farm-Enhanced Nutrition Education Program
Investigator:	Vivian Maria Ray
IRB Number:	SBE-15-11231
Funding Agency:	
Grant Title:	
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 05/18/2016, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the [Investigator Manual](#).

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Joanne Muratori

Signature applied by Joanne Muratori on 05/19/2015 03:25:44 PM EDT

IRB manager

**APPENDIX B: CHILDREN'S NUTRITION AND ACTIVITY
QUESTIONNAIRE**

CHILDREN'S NUTRITION AND ACTIVITY QUESTIONNAIRE

The following questions (chosen from the CATCH Kids Club After-School Student Questionnaire) ask about what you know about the food you eat and physical activity.

The questions help us learn about what kids your age eat, what kids your age know about nutrition, and what kids your age know about physical activity.

This is NOT a test. Please be as honest as possible.

1. What grade are you in? _____

2. How old are you? _____ years old

3. Are you a boy or a girl? _____ Boy _____ Girl

4. How do you describe yourself?

_____ White

_____ Black or African American

_____ Hispanic or Latino

_____ Asian or Pacific Islander

_____ Other

INSTRUCTIONS: Please CIRCLE your answer.

1. Do you ever read the nutrition labels on food packages/
 - a. Almost always or always
 - b. Sometimes
 - c. Almost never or never

2. How many total servings of fruits and vegetables should you eat each day?
 - a. At least 2
 - b. At least 5
 - c. At least 9
 - d. At least 10
 - e. I don't know

3. The foods that I eat and drink now are healthy.
 - a. Yes, all of the time
 - b. Yes, sometimes
 - c. No

4. Do you ever eat high fiber cereal?
 - a. Almost always or always
 - b. Sometimes
 - c. Almost never or never

5. Do you ever eat whole wheat bread?

- a. Almost always or always
- b. Sometimes
- c. Almost never or never

6. Do you ever drink 100% fruit juice?

- a. Almost always or always
- b. Sometimes
- c. Almost never or never

7. Do you ever eat fruit for lunch?

- a. Almost always or always
- b. Sometimes
- c. Almost never or never

8. Do you ever eat vegetables for dinner?

- a. Almost always or always
- b. Sometimes
- c. Almost never or never

INSTRUCTIONS: Please CIRCLE one of the two foods that you would pick if you had to choose just one.

9. If you were at the movies, which one would you pick as a snack?

- a. Popcorn with butter
- b. Popcorn without butter

10. Which would you pick to drink?

- a. Regular milk
- b. Low fat or skim milk

11. Which food would you eat for a snack?

- a. Candy bar
- b. Fresh fruit

12. Which would you do if you were going to eat a piece of chicken?

- a. Leave on the skin
- b. Take off the skin and not eat the skin

13. Which food would you ask for?

- a. Frozen yogurt
- b. Ice cream

14. Which would you choose to cook if you were going to help make dinner at home?

- a. French fries
- b. Baked potato

15. Which would you do if you were going to eat cooked vegetables?

- a. Eat without butter
- b. Add butter

16. Which would you order if you were going to eat at a fast food restaurant?

- a. A regular hamburger
- b. A grilled chicken sandwich

INSTRUCTIONS: Please CIRCLE ONE of the two foods that you think is better for your health.

- | | | |
|-----|----------------------|-------------------------|
| 1. | a. Whole wheat bread | b. White bread |
| 2. | a. Broiled beef | b. Broiled fish |
| 3. | a. Cereal | b. Eggs and bacon |
| 4. | a. Beef | b. Beans |
| 5. | a. Chicken | b. Regular hamburger |
| 6. | a. Regular milk | b. Low fat or skim milk |
| 7. | a. Frozen yogurt | b. Ice cream |
| 8. | a. Green salad | b. French fries |
| 9. | a. French fries | b. Baked potato |
| 10. | a. 100% fruit juice | b. Fruit punch |

INSTRUCTIONS: The questions in this section ask how likely you are to be physically active. Please answer by circling either NOT LIKELY, LIKELY, or VERY LIKELY for each question.

11. How likely are you to be physically active 3-5 times a week?

- a. Not likely
- b. Likely
- c. Very likely

12. How likely are you to run or bike 3-5 times a week?

- a. Not likely
- b. Likely
- c. Very likely

13. How likely are you to keep up a steady pace without stopping for 15 -20 minutes when you are physically active?

- a. Not likely
- b. Likely
- c. Very likely

Thank you for your help!

**APPENDIX C: FARM TO FORK NUTRITION EDUCATION
PROGRAM INTRODUCTORY LESSON**

Nutrition Kitchen and Farm Basics

OBJECTIVES

- To understand what humans and plants need for survival
- To learn the origin of our food
- To learn about safe food handling techniques
- To understand the causes of food spoilage and food-borne illnesses
- Take tour of farm
- Match farm tool with purpose
- Prepare plot for planting

ESSENTIAL CONSIDERATIONS

- How to choose the appropriate knife
- How does knife selection affect food preparation?
- Basic knife cutting techniques
- Safe use and cleaning of cutting implements

APPLICABLE CONTENT STANDARDS

- English–language arts
- Science

Materials for Lesson	Activity
Nutrition	
Charades Game (one copy/class)	Our Bodies Charades
Favorite Foods Survey	A Closer Look at Food
Culinary	
Food Safety Checklist	Food Safety
Cooking spray or vegetable oil	Sanitation
Cinnamon	
Soap	
Paper Towels	
Knife Parts Worksheet	Knife Skills
Cutting Boards	
Produce	
Plant Parts We Eat chart	
Farm	
Apple, Knife	Land Use Demo
Soil Composition Diagram	
Shovels/Trowels	
Plastic Tarp	
Colored folders	Use to keep handouts
"10 tips" Handout	
Letter to Parents/Guardians	

Nutrition Lesson Activities

(45 minutes)

1. Introduction and icebreaker

Discussion. Our bodies are made up of many different parts that do many things for us every day. Who can name a few things that our bodies do every day? What part of our body is working?

Move (muscles)

Grow (muscles, bones)

Eat (digestive tract)

Drink (digestive tract)

Play (muscles)

Learn and think (brain)

Pump blood (heart)

Heal wounds (cells)

Sleep (whole body)

Breathe (lungs)

Can your students think of any others?

Game of charades. Look more closely at five things our bodies need to perform all the tasks just discussed. (The class should already be divided into five groups.)

- Give each group a slip of paper from the Charades handout indicating one thing that our bodies need.
- Groups should get only about one minute to work on their charade, so they must make it simple.
- After a minute, bring the groups back together. Have each group present its charade to the rest of the class while the other students guess the charades.
- Write the correct answers on the board. Discuss why our bodies need these things and write key words on the board (underlined below).

1. Food. Provides our bodies with energy

2. Air. Provides our bodies with oxygen that is needed by organs such as our brains to function (We breathe in oxygen and breathe out carbon dioxide through the process of respiration.)

3. Water. Helps to keep our body temperature normal and our blood flowing

4. Exercise. Helps to keep our muscles strong, especially our hearts

5. Sleep. Gives our bodies a chance to rest and prepare for another day of activities

2. A close look at food

Discussion. What are your favorite foods? Are you willing to try new foods? Where do they come from? How are your favorite foods prepared?

- Have each student fill out the 'Favorite Foods' survey. Chart the number of times each food is mentioned. That is only a small portion of the total number of foods that are available to us.
- Take a closer look at where some favorite foods come from. Map the production history of the most popular favorite food on the board (e.g., pepperoni pizza). Keep it simple, direct, and to the point. Ask the students where different components come from; for example, what is the crust made of? Where does the dough come from? The objective is to trace each item all the way back to *plants* and *animals*.

Pepperoni pizza example

Crust → dough → flour → plants

Tomato sauce → tomatoes → plants

Cheese → milk → cow (A cow must eat plants to have the energy needed to produce milk.)

Pepperoni → pig (A pig must eat some plant products in order to grow.)

- Tell the students to focus on plants. Plants need food, air, and water just as our bodies do.

Culinary Activity

(90 minutes)

1. Safety and Sanitation

Discussion. Use food safety checklist to discuss importance and reasons for sanitation and food safety methods.

Talk with students about safe food handling practices at their homes.

- Do they thoroughly wash dishes?
- Do they refrigerate food properly?
- Do they look for expiration dates on packages?
- Do they wash their hands with soap and warm water?
- Before we begin, there are some kitchen rules that must be followed:
 - Wash hands to prevent spreading germs. All students *must* wash their hands.
 - Follow directions.
 - Work quietly so everyone can hear the directions.
 - Handle the food as little as possible and do so only with clean hands.
 - Handle knives carefully and be aware of hot objects.

Clean Hands. Use this activity to show students the importance of washing hands with soap and warm water.

- Apply cooking spray or vegetable oil to each student's hands.

- Sprinkle cinnamon on the palms, backs and in between the fingers of each student's hands. The cinnamon represents the germs that get on our hands. Groups should get only about one minute to work on their charade, so they must make it simple.
- Try to get rid of the cinnamon using only cold water. Discuss the results.
- Try to get rid of the cinnamon using soap and cold water. Discuss the results.
- Try to get rid of the cinnamon using soap and warm water. The cinnamon "germs" will rinse right off the students' hands and into the sink.
- Ask students why the cinnamon stayed on their hands until they used soap and warm water. How is this similar to washing germs off our hands? Is it important to use soap and warm water for hand washing?

2. Knife Skills

Discussion. One of the most valuable tools for a chef is a knife. The most important basic skill is knife cutting. Knife cutting is also an essential skill for healthy eating. It gives students the proficiency to manipulate the predominate food groups (fruits and vegetables) they should consume -- the USDA *Choose My Plate* website recommends 3 ½ - 5 cups (about "half your plate") of fruits and vegetables daily – for healthy nutrition.

Knife Knowledge.

- Describe the nine different knife parts and their uses.
- Show students different types of knives and explain uses.
- Demonstrate and have students practice knife handling and cleaning.
- Demonstrate and have students practice cutting board anchoring.

Cut It!!

- Demonstrate knife cutting and how to execute specific cuts.
- Have students practice two specific cuts on different types of fruits and vegetables.
- Let the students taste the cut food. Begin the discussion on plant parts and their function.
 - **Bulb.** An underground bud that sends down roots and consists of a very short stem covered with leafy scales or layers, as in an onion.
 - **Flower.** Reproductive organ of a plant that attracts insects and animals to promote pollination and seed dispersal.
 - **Fruit.** Part of a plant that grows from the flower and contains seeds. The fruit generally protects the seeds of a plant. Edible fruits that are not sweet are sometimes called vegetables (e.g., tomatoes, bell peppers, cucumbers).
 - **Leaf.** Site of food production for the plant through the process of photosynthesis.
 - **Root.** Part of the plant that absorbs water and nutrients from the soil and anchors the plant in the ground.

- **Seed.** Contains the embryonic plant along with all the nutrients required for the plant to start growing.
 - **Stem.** Supports the plant and transports water and other nutrients throughout the plant.
- Give each student the 'Plant Parts We Eat' chart. Encourage students to eat one food from each plant part.

Farm Activity

(45 minutes)

Become a farmer! There are several considerations before you begin this activity.

First, decide what seeds you will plant. Check with local master gardeners, farm advisers, nurseries, or the planting guides for your region.

Consider the climate, time of planting, and the time of harvest. Then decide which crops you would like to harvest at the end of the project to use as ingredients for the dinner party meal.

Last, some seeds need to be started in small containers and then transplanted outdoors when they have grown a couple inches (e.g., broccoli, leafy greens); other plants do better when seeded directly into the ground from which they will be harvested (e.g., carrots, radishes). Read the seed packets to learn more about the planting of the seeds.

Until your crops are ready to harvest, take advantage of your local farmer's markets to obtain the produce you need for your culinary activities.

1. Farm Tour

Discussion. Ask students to describe what farmers do. Describe the different elements needed to operate a farm. Explain and demonstrate the uses of farm tools.

Lay of the Land. Take students to farm and allow them to see farm in action.

2. Soil

Discussion. Talk to students about soil and its role in the plant growth process.

- **What is soil?** Soil is a layer of Earth where plants grow.
- **What is soil made of?** Mineral, air, water, organic matter. Show and discuss Soil Composition Diagram.
- **What color is soil?** Black, dark brown, light brown
- **Why do plants need soil?** Plant roots need something to hold onto, take nutrients, and protect the growing seed.
- **Are there different types of soil?** Yes.
- **How do the kinds of soil differ?** Soil differs in color, texture, how much water they allow, what they do, and what they are used for.
- **Name the different soil types.** Sand, silt, and clay. Take students to their dedicated area of the farm. Give students hand trowels to dig up soil. Let them experiment with the soil (feel the texture, add water, compare to texture of other items).

Not all land is created equal. Use the apple land use demonstration (Source: Michigan Farm Bureau) below to discuss the availability of land that can be used for food production.

- Cut a large apple into four equal parts. Three-fourths of the apple represents the oceans that cover our planet. The remaining quarter piece represents the land area.
- Next, cut the land section in half lengthwise, making two $\frac{1}{8}$ sections. One represents the deserts, swamps, mountains, Arctic, and Antarctic regions. The remaining $\frac{1}{8}$ section of apple symbolizes the land where people can live and may be able to grow food.
- Cut the remaining $\frac{1}{8}$ section into four pieces. Three of those pieces represent land that is too rocky, too wet, or too hot to grow food or that has been developed by people.
- Finally, peel the last small piece of apple – $\frac{1}{32}$ of the world. This tiny peel represents the soil, which we all depend on for food production.

3. Farm Plan

Farm manager and master gardener will discuss with students the plan for starting the planting process on their farm plot. With the gardener, the students will decide which seeds to plant based on the crop they wish to harvest.

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