FRUITS AND VEGETABLES IN AN INNER-CITY HEAD START CENTER

A Thesis in
Integrative Biosciences
by
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Early intervention is one of the most effective methods of creating or changing dietary patterns; yet, evidence on intervening efforts targeted toward low-income and African American preschoolers is limited. These two groups, from the fetus through adulthood, endure a disproportionate risk of developing diet-related diseases and have a low intake of fruits and vegetables. Head Start offers one avenue to assist low-income and African American populations in improving their dietary intake and it may, thereby, help reduce their disproportionate health burden. The purpose of this exploratory, qualitative study is to:

1) explore the concepts, preference, availability, and dietary intake of fruits and vegetables in low-income, African American preschoolers who participate in an inner-city Head Start childcare center;

2) explore the concepts, preference, availability, and dietary intake of fruits and vegetables of the primary care providers (i.e. parents, grandparents, etc.) of the children studied under the first aim; and,

3) determine the level of shared meaning, preference, availability, and dietary intake of fruits and vegetables between the children studied under the first aim and both their primary care providers (studied under the second aim) and their childcare providers.

Design and methods were informed by the Theory for the Ecology of Human Development, the Theory of Meaningful Learning, hypotheses generated by Achterberg, and the Ecological Model of Predictors of Childhood Overweight. The study methodology involved direct observations from January—August, 2002 of over six inner-city Head Start centers. Methods included: qualitative interviews (n=24 children, n=22 primary care providers, and n=2 childcare providers), preference ratings, descriptions of household availability, direct observations of the food served at the primary Head Start study center (n=77 days), mealtime observations, menu to actual food served comparisons, a child-feeding practices survey, and the National Cancer Institute Fruit and Vegetable Screener. Concept maps were used to analyze the interview transcripts. Statistical analyses aided in differentiating study participants and determining the correlation between concepts, preference, availability, and intake of fruits and vegetables within the sample.

Some of the results indicate: the children’s average score for naming the foods was 73-75%. The children’s concepts varied tremendously—from almost none to some and often involved misconceptions such as “vegetables do bad things to the body.” The children who were able to express their concepts of fruits and vegetables primarily discussed where, when, and how they ate fruits and vegetables, where fruits and vegetables came from, what fruits and vegetables
could do for their body, and their preference for fruits and vegetables. Preference ratings were positive with 80% of fruits and vegetables being rated as “yummy.” Fruits were preferred. The availability of fruits and vegetables in a child’s household varied, especially for fresh produce. Only six primary care providers reported having all the selected fruits and vegetables in their homes on a regular basis. The estimated median daily servings of fruits and vegetables were 7.03 and ranged from 13.87 to 1.86. Primary care providers also had a limited and varied understanding of fruits and vegetables with some misconceptions. Preference ratings were positive (82%) and the estimated median daily servings of fruits and vegetables were 8.69 and ranged from 15.97 to 0.85. Shared meaning and preference between children, primary care providers, and childcare providers in this study were minimal. Availability and intake were related among children and also between children and primary care providers. Child-feeding practices by both primary care providers and childcare providers included using food as a reward and portioning the children’s food. These results demonstrate that an inner-city Head Start center’s children and primary care providers both had: a varied understanding of fruits and vegetables with little meaning behind the concepts, a positive preference for fruits and vegetables, limited access to fruits and vegetables, and an intake of fruits and vegetables that varied. Nonetheless, between these children, primary care providers, and childcare providers minimal common meaning occurred.

These findings indicate that nutrition communication, education, and intervening efforts for populations like this low-income, inner-city, African American sample should focus on developing methods and mediums to increase nutrition knowledge on fruits and vegetables in children, primary care providers, and childcare providers. Efforts should design mediums to facilitate similar dialogue and activities around fruits and vegetables in the home and childcare settings between these three groups. Potential topics and aims about fruits and vegetables can include expressing preference; improving household, childcare center, and community availability; along with targeting messages to increase dietary intake. Future research and theory should validate these findings in other samples and then should build off this work in order to learn how to effectively utilize Head Start—its meals, educational curriculum, and interaction with primary care providers—to promote healthy eating in at-risk populations and, in doing so, help reduce the risk of diet-related diseases prevalent in this population.
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A wise person once told me to never forget to count my blessings. Although this opportunity provides a venue for me to formally do so, words cannot truly capture the breadth and depth of my blessings. First and foremost, I acknowledge God. My faith in him has been a constant source of strength and guidance. He has blessed me with tremendous gifts including my family. I am truly indebted to my parents’ investment in my education and unconditional support of my life and dreams. Each of my brothers and sisters has been significant supporters of my educational and life pursuits. I also thank my extended family, especially my godfather Br. Donald Fleischhacker, for their enduring direction and support.

A notepad I have states that one who plants a garden, plants happiness and friendships are like plants, they need to be watered often. Although my research stresses fruits and vegetables as important components of diet-disease prevention, I truly believe the seeds for life-long health are friendships. I, luckily, have been blessed with numerous fruitful friendships. These friendships include my relationship with my advisor, Dean Cheryl Achterberg. She has been a true rose in my life and has provided constant nourishment to my education, teaching, and research growth and development. I am also thankful for my committee members’ (Dr. Leann Birch, Dr. Linda Burton, Dr. Katherine Cason, Dr. Terryl Hartman, and Dr. Carla Miller) additional nourishment. My advisor and committee have enabled me to blossom despite many thorns along the way and, in doing so, each of them has truly fulfilled Henry Adams’ saying that a teacher affects eternity, you never know where her influence will stop.

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I would like to take this opportunity to express my gratitude to some of the other special flowers in my life including Beth Zagotta, Lori Ann Greidanus, and Kati Veety. I give tremendous thanks to my favorite TBD for despite not wanting me to be at this other Big Ten
University for consistently reminding me why I was. My coaches (Dave Grim, Marc Burns, and Gordon Thompson) and teammates (LHN, LUXC, AIHI, and Oak St. Beach) have been extraordinarily influential in my academic as well as life journey. A special thanks goes to my friends at Head Start and in that community. Each and every single one of you went out of your way to welcome me into your family. I am continually humbled by all of your kindness and will always treasure my special time with you.

Carpe Diem has become my life’s motto and I am reminded on a daily basis that fulfilling my daily goal would be impossible without the numerous blessings God grants me on a daily basis. This list is a simple and short acknowledgement of my gratitude to each and every single person that not only enables me to seize the day but, more importantly, inspires me by seizing the opportunities available to them to try to make this world a better place.
DEDICATION

To the memory of my favorite birds:

CHAPTER I:

INTRODUCTION
A. Background

Childcare has become a fact of life for many American families, especially the poor (1-2). The majority of low-income United States preschool children (over 800,000/year) receive childcare through Head Start—a government funded program that provides childcare, school readiness, and nutrition education for low-income young children (3). The impact of Head Start’s nutrition efforts, however, lacks consistent and constructive evaluation, especially in inner-city centers.

Early intervention is one of the most effective methods of creating or changing dietary patterns (4). Yet, evidence on dietary or nutrition intervention efforts targeted toward low-income and African American young children is limited. These two groups, from the fetus through adulthood, endure a disproportionate risk of developing diet-related diseases (5). Reducing these health disparities are one of Healthy People 2010’s main objectives (6). The National Cancer Institute, among others, acknowledges that low-income and African American population’s consumption of fruits and vegetables must be improved (7). Head Start offers one avenue to assist low-income and African American populations in improving their dietary intake and it may, thereby, help reduce their disproportionate health burden.

B. Statement of the Problem

Head Start aims to promote child wellness, in part, by providing nutrition services that both supplement and complement those of the home and community. Complementing these entities is vital to fostering a healthy child. It also helps in fostering a healthy partnership between the childcare center, primary care providers (parents, grandparents, etc.), foodservice workers, unit specialists (nutrition, mental health, disabilities, etc.), and the community. This partnership is thought to be a key ingredient to Head Start’s success and its lack is felt to be a key reason why it is not as effective as it aims to be in serving its children, parents, and the community (8-10). Evidence in non-Head Start childcare centers illustrates the negative repercussions that occur when parents and care providers work at cross-purposes in feeding children (11-12). Despite this evidence, limited research, resources, and strategies geared toward inner-city Head Start centers exist that help bridge food and nutrition services and messages between the childcare center and household.

Designing an intervention for low-income and African American young children can be especially problematic due to the lack of research on these populations. According to the Theory
for the Ecology of Human Development (13), the Theory of Meaningful Learning (14), and the
Ecological Model of Predictors of Childhood Overweight (15), effective dietary interventions
must incorporate the targeted audience’s context. This includes the audience’s concepts,
preference, availability, and intake of fruits and vegetables along with an understanding of
intermediary variables such as economics, childcare, and welfare reform. Concepts, according to
Novak and Gowin (14), are a perceived regularity in events or objects designated by some label.

C. Research Questions

The purpose of this exploratory, qualitative study is to:

1) Explore the concepts, preference, availability, and dietary intake of fruits and vegetables in
low-income, African American, young children who participate in an inner-city Head Start
childcare center;
2) Explore the concepts, preference, availability, and dietary intake of fruits and vegetables
of the primary care providers of the children studied under the first aim; and,
3) Determine the level of shared meaning, preference, availability, and dietary intake of fruits
and vegetables between the children studied under the first aim and both their primary care
providers (studied under the second aim) and their childcare providers.

D. Vee Diagram

A vee diagram is a “V-shape” schema that provides a brief and visual illustration of a study’s
philosophies, theories, principles, concepts, events, facts, results, claims, and research question
(14). A vee demonstrates how the conceptual or thinking components are separate, but connect to
and work with the methodological or “doing” components of a research inquiry. It is typically
read down the left side and up the right side. This study’s vee diagram (Figure 1.1) was informed
by Achterberg (16) and is displayed on the following pages in order to summarize the “thinking”
and “doing” involved in this study.

E. Significance of the Study

This study will generate theory-based hypotheses and strategies that may help in designing
culturally and economically sensitive nutrition interventions for the target population. The
findings may help Head Start more effectively develop, implement, and evaluate their nutrition
services.
**Central Question:** What concepts, preference, availability, and intake of fruits and vegetables do inner-city Head Start preschoolers have?

**Conceptual**

<table>
<thead>
<tr>
<th>World View</th>
<th>Methodological</th>
</tr>
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| The quality of life can be improved, i.e. life is open-ended. | **Value Claims**
1) Nutrition communication, education, and intervention efforts should be developed in a culturally and economically sensitive manner. These efforts should strive to increase nutrition knowledge about fruits and vegetables in children, primary care providers, and childcare providers. Efforts should design mediums to facilitate similar dialogue and activities around fruits and vegetables in the home and childcare settings between these three groups. Potential topics and aims can include expressing preference; improving household, childcare center, and community availability; along with targeting messages to increase dietary intake.
2) Since fruits and vegetables play a critical role in diet-disease prevention, barriers to fruit and vegetable consumption in Head Start needs to be addressed.
3) Nutrition professionals should work to ensure that Head Start continues to develop, implement, and evaluate food and nutrition services. Providing data on these services and working with Head Start’s other services is essential.
4) Theoretical frameworks should drive the data and research generated by nutritionists. Efforts should be made to further validate and synthesize theoretical frameworks and ensure they are used to drive all research and intervening endeavors.
5) and 6) See Figure 1.1, Continued. |

<table>
<thead>
<tr>
<th>Philosophies</th>
<th>Principles</th>
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<tr>
<td>Humans are free agents. Knowledge evolves. Culture and community influence the research process (230, 231, 233).</td>
<td>See Figure 1.1, Continued.</td>
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<tr>
<th>Theories</th>
<th>Knowledge Claims, Transformations, Records</th>
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<td>A synthesis of principles from the following: Theory of the Ecology of Human Development (13), Theory of Meaningful Learning (14, 221), Ecological Model of Predictors of Childhood Overweight (15), and hypotheses generated by Achterberg (16).</td>
<td>See Figure 1.1, Continued and Figure 1.1, Continued Part Two.</td>
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<tr>
<th>Concepts</th>
<th>Event</th>
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<tr>
<td>Meaningful Learning, Shared Meaning, Cognitive Structures, Concepts, Social Interactions, Household, Childcare, Head Start, Preference, Availability, Intake, Misconceptions, Development, Interpersonal Relations, Context, Feeding Practices, Fruits, and Vegetables.</td>
<td>A series of individual interviews with children (n=24) who participate in an inner-city Head Start focused on their concepts, preference, availability, and intake of fruits and vegetables. These interviews were complemented by similar interviews with the children’s primary care providers (n=22) and childcare providers (n=2).</td>
</tr>
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</table>
Figure 1.1: Vee Diagram on the Study, Continued.

Conceptual

**Principles**
1) The construction of knowledge improves when each of the elements involved in the construction of knowledge is made explicit.
2) Human beings act toward things on the basis of the meaning they have for those things (14).
3) Cognitive structure can be studied via individual interviews and concept mapping (14).
4) Meaningful learning about fruits and vegetables occurs during the early years.
5) No one level or factor operates in isolation.

Methodological

**Value Claims**
5) Research policies and ethical considerations should be constantly re-evaluated and revised in order to ensure that all parties involved are practicing ethical scientific conduct.
6) As an exploratory, qualitative study, the value of this work can only be measured in the success of future applications.

**Knowledge Claims**
1) Children and their primary care providers and childcare providers have basic and varied concepts of fruits and vegetables. These concepts include where, when, and how they ate fruits and vegetables, where fruits and vegetables come from, what fruits and vegetables do for the body, and their preference for fruits and vegetables. Misconceptions were expressed. Some children expressed minimal concepts of fruits and vegetables.
2) Shared meaning and preference among the sample was minimal. Availability and intake were related.
3) See Figure 1.1, Continued Part Two.

**Transformations**
Concept maps for fruits and vegetables individually and collectively; qualitative comparisons of interviews and maps; and preference and availability ratings, rankings, and descriptions. Descriptive frequencies of the food served and the menu provided. Quantitative coding of intake and child-feeding practices surveys. Statistical analyses including T-tests and Spearman correlations.

**Records**
Series of interviews, tapes, handwritten notes, observational notes, Head Start menus, and study instruments.
<table>
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<th>Methodological</th>
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<tbody>
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<td><strong>Knowledge Claims</strong></td>
<td></td>
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<tr>
<td>3) Availability of fruits and vegetables in this center were limited at snack time and primarily canned, rarely fresh. Household availability varied, especially for fresh produce.</td>
<td></td>
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<tr>
<td>4) Fruit and vegetable intake was varied in the sample, but the majority of the sample served at least one vegetable for dinner daily.</td>
<td></td>
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<tr>
<td>5) Preference for fruits and vegetables in the children, primary care providers, and childcare providers was positive; but, did not necessarily positively relate to concepts.</td>
<td></td>
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<tr>
<td>6) The theories used for this study provided a framework by which key elements could be tested and interpreted, but further work is needed to strengthen their applicability.</td>
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F. Dissertation Content and Format

This dissertation includes a review of the literature on the role of fruits and vegetables in chronic diseases, the dietary intake of fruits and vegetables in low-income and African American populations, the National 5-A-Day for Better Health Program, and early childhood nutrition education efforts, especially in Head Start childcare centers (Chapter II). The theories and models that informed this research are described in Chapter III. The study methodology is described in Chapter IV. Then, the results are presented in Chapter V. The results are presented by aim. A discussion on each individual aim is provided subsequent to that aim’s results. This chapter concludes with overall study hypotheses and recommendations for future research. Chapter VI provides concluding thoughts on the theoretical framework and research findings. The conclusion supplies specific suggestions for future studies and interventions. The Reference section lists all of the references that are cited throughout this dissertation in a style required by the *Journal of the American Medical Association*. The appendices include all of the study’s informed consent forms, data collection tools, and additional data.
CHAPTER II:

LITERATURE REVIEW
CHAPTER II: LITERATURE REVIEW

A. Introduction

To justify why this study focuses on fruits and vegetables, a review of the pertinent research on their role in chronic diseases will start this chapter. To further understand the role of fruits and vegetables in chronic diseases and why this study focuses on low-income, African American children, this review will discuss the dietary intake of fruits and vegetables in this population. The National 5-A-Day for Better Health Program targets amongst others low-income, African American children. Reviewing this program provides insight into developing, implementing, and evaluating fruit and vegetable-based interventions; nevertheless, 5-A-Day interventions do not include preschoolers. This review will utilize research, particularly on nutrition education efforts in preschool-aged children, to illustrate why this period is critical in increasing the consumption of fruits and vegetables in tomorrow’s adults. A review of nutrition efforts in childcare settings, specifically Head Start centers, will conclude this review and help justify why this setting is a fruitful venue to explore.

B. The Role of Fruits and Vegetables in Chronic Diseases

Fruits and vegetables play a critical role in the etiology and treatment of several fatal and chronic diseases. They are recognized as key players in reducing health disparities (17-19). Based on strong epidemiological evidence (20-21), the United States government, along with several health initiatives, encourages the consumption of five or more servings of fruits and vegetables a day (6, 19, 22). Benzie (23) noted that an increase in even one serving of fruits or vegetables a day has been estimated to decrease cancer risk by 14%. Fruits and vegetables may exert a protective effect through several active compounds such as antioxidants. Studies (24-27) have investigated one or more of these active components in order to elucidate the exact mechanism by which fruits and vegetables exert their protective effect. Antioxidants are especially interesting because they have been demonstrated to play a critical role in decreasing oxidative stress, which is a significant etiological factor in a host of diseases. These investigations predominantly focus on alpha-tocopherol and ascorbic acid. Carotenoids and other antioxidants, however, are important for disease prevention (28). Regardless of which antioxidant has been studied, these investigations have produced mixed results (29-30). These conflicting results may be due to the lack of data on the specificity and bioavailability of particular antioxidants in the body. More studies are needed to understand the role of a certain antioxidant in a certain disease pathology (31-34). Another limiting factor is that some
antioxidants are widespread in fruits and vegetables while certain antioxidants such as dithiolthiones are more prominent in certain vegetables such as broccoli (19). Current means of even measuring antioxidants in fruits and vegetables need improvement as they simply provide the levels of antioxidants in fruits and vegetables and do not elucidate if these antioxidants have beneficial effects after consumption (35-36).

The nutrient properties of fruits and vegetables that factor into their role in diseases include being: low fat, nutrient dense, high fiber, and low sodium. Each of these nutritional properties has been shown to have beneficial effects on diet-disease outcomes (20). To elucidate the role of fruits and vegetables in chronic diseases, researchers need to develop methods of evaluating individual characteristics such as antioxidants and fat content while accounting collectively for its other nutrient properties. The exact type of fruits and vegetables, i.e., broccoli versus orange, also need to be considered. Joshipura et al. (37-38), for example, reported that cruciferous vegetables and citrus fruit were particularly influential in lowering ischemic stroke and cardiovascular risk in the Nurses’ Health Study and Health Professionals’ Follow-up Study. These investigators went on to stress the importance of examining where an individual is getting her or his servings of fruits and vegetables.

The form of fruit and vegetable, i.e. fresh, canned, or frozen, along with its method of storage and preparation is important. Many studies on the disease-protective properties of fruits and vegetables are conducted on unprocessed foods. Consumers often eat processed forms of fruits and vegetables. Evidence suggests that raw fruits and vegetables are associated most consistently with lower risk of disease (35). Hunter and Fletcher (39) reported that a substantial proportion of the total ascorbic acid of a vegetable (e.g., peas and spinach) may be lost during storage post-harvest. Ascorbic acid is frequently used to assess antioxidant status in fruits and vegetables and may or may not reflect other antioxidants in the food item. Further losses may occur when the vegetable undergoes commercial processing by canning or jarring. In both processes, vegetables are usually heated to a high water temperature. The steamy temperatures potentially cause thermal decomposition of antioxidants and leaching of water-soluble antioxidants into the water. Hunter and Fletcher (34) reported relatively smaller losses from blanching and freezing. This study suggested that, for peas, the amount of ascorbic acid went from highest to lowest in the following order: fresh varieties> frozen> canned> jarred. A similar trend was found for spinach, except leaf varieties had higher ascorbic acid than chopped leaves. For both vegetables, these differences were significant. Hulme (40) acknowledges that freezing may have negligible effects on ascorbic acid in fruits and similar studies show similar effects with other nutrients in other
fruits and vegetables. Yet, Hulme (40) stresses more work is needed to truly understand the effect of freezing and subsequent storage on fruits and vegetables.

Martin-Belloso et al. (41) investigated the proximate composition as well as the mineral and vitamin contents of canned white asparagus, whole peeled tomatoes, mushrooms, and lentils. They reported that the composition did not vary significantly with processing time and location except for sodium, calcium, and vitamin C. Hall and Edwards (42) compared the composition of processed and fresh vegetables as consumed and reported: 1) increasing maturity in vegetables resulted in reductions of vitamin C; 2) storage of vegetables resulted in reductions in vitamin C and protein content; 3) cooking in tap water caused leaching of potassium and vitamin C, but the uptake of calcium and sodium; and 4) the processed products resulted in losses similar to those noted due to cooking. The amount of cooking liquid and mode of heating affected the extent of these vitamin and mineral losses. Cooking’s effect on folate content, in canned vegetables in particular, was investigated. This investigation reported that the preparation and processing of a particular food negatively affects the nutrient content of the food. This effect is elevated as the amount of water used in cooking increases (43). Cooking did not affect carotene in carrots, broccoli, and spinach; nevertheless, dehydration, regardless of drying method, was found to significantly affect carotene content (44).

Shin and Eun (45) focused on processing’s effect on fiber content. This study reported that normal boiling, applied to fresh vegetables, usually lowered total dietary fiber content. In baked potatoes, however, the high cooking temperature and prolonged cooking time marked over a five-fold increase of total dietary fiber content. Ross et al. (46) also reported that fruits and vegetables appear to differ in fiber content. Type, variety, and processing method influenced fiber content. In most cases, Ross et al. (46) reported higher levels of dietary fiber in fresh varieties. Ros and Rincon’s (47) studies with peas emphasize that the size of some of the vegetable’s components, such as soluble solids and trace elements, determines to an extent the losses. This means that nutrients, which are larger, such as protein, are more susceptible to processing. Another investigation (48) focused on the changes in nutrient content in three vegetables (carrots, broccoli, and corn) processed and stored under controlled conditions. Refrigeration resulted in about a 10% loss of ascorbic acid in all three vegetables. Steam blanching affected the vegetables differently and resulted in a 30% loss in broccoli, 50% loss in carrots, and 10% loss in corn. Freezing did not significantly affect the three vegetables’ ascorbic acid content. Canning reduced ascorbic acid about 40% in carrots and corn; yet, no change in this reduced content after one-year storage occurred. Beta-carotene concentration was not significantly different in fresh or frozen broccoli and carrots during storage. Blanching decreased beta-carotene content by 15% for both
the broccoli and carrots. Niacin in corn maintained stable concentrations during blanching and had little change during storage. Microwave cooking had no significant affect on ascorbic acid, beta-carotene, or niacin contents in fresh, frozen, or canned varieties. Storage losses were noted in other studies, though (49-50). Frying has been found to have a negative impact on various nutrient parameters in vegetables (51). In the case of tomatoes, van het Hof et al. (52) demonstrated that mechanical homogenization and heating actually increases the bioavailability of carotenoid. They speculate that tomatoes’ cellular matrix determines the bioavailability of carotenoids. If the matrix is disrupted as a result of mechanical homogenization and/or heat treatment, then the bioavailability of carotenoids is enhanced. A Dutch study (53) acknowledged that a study conducted in rats fed exclusively canned foods for over five generations experienced no difference in health risks compared to the control group. Nevertheless, they noted considerable decreases in protein quality and significant reductions in the nutrient content of vitamin A, thiamin, niacin, and pantothenic acid during both the sterilization and storage of six canned meals over the course of one to five year examinations. Processing or storage did not affect some nutrients including vitamin E, riboflavin, and vitamin B₁₂.

In sum, processing affects produce; nevertheless, several investigators (54-55) stress that processing effects are different for different produce. Thus, methods of processing need to be specific for specific produce and care needs to be given to generalizations. Methods of analyzing the quality of the specific canned item must be specific to the particular canned item. Moreover, Hemiksen et al. (56) speculated that a long list of environmental and genetic factors affect the nutritional content of canned produce such as cultivar, stage of maturation, season, weather, amount of daylight, irrigation, geographic location, soil, fertilization, biocides, and genetic lines. These factors can exert their effect at or after processing. Their effect can depend on the materials being used in the cans, the canning media, the pH of the can contents, the type of processing, the storage time, and the storage temperature. Time of holding, handling, transportation, distribution, storage, humidity, and chemical agents have additional effects (57). Gurerra-Vargas et al. (58) add that sodium chloride, acetic acid, and pasteurization temperature affect the nutrient retention of canned vegetables. Sinar and Mason (59) specifically studied sodium’s effect. They noted that sodium content of canned vegetables differs. These differences can be affected by a manufacturer’s processing methods, seasonal and geographical fluctuations in sodium content in the soil, sodium content of fertilizer added to the soil, laboratory techniques, and sodium content of water used in processing. Significant differences in sodium contents of canned vegetable varieties were found. The effect of rinsing, which reduced the sodium content, affected a vegetable’s final sodium level. Others (60-61) have demonstrated the high sodium
content of canned vegetables. Additions to canned fruits and vegetables, such as sucrose and fructose, do affect the quality attributes of canned fruits and vegetables. These additions alter osmotic stability, sweetness, flavor, color, freezing point, tartness, acidity, pH, and sugar content (62-63). The canning materials add lead, tin, and cadmium to the canned item, but the addition is not consistent (64-65). Additions of nitrogen to canned vegetables have been shown to have positive quality effects (66). Taken together, the type, form, and processing of fruits and vegetables influence its nutritional properties and must be taken into account when investigating their role in chronic diseases. White (67) commented that in order for the benefits of fruits and vegetables to come to fruition, more work must be done. Improving fruit and vegetable quality, especially for canned varieties, must be a component of this work. More research is needed on understanding how policies, farming, and economic status affect the type of fruits and vegetables consumed by an individual and an individual’s overall variety of fruit and vegetable consumption. Further research is also needed on the influence of produce quality on dietary consumption and health outcomes (68-69).

Studies (39) have implicated that the variety of fruits and vegetables an individual consumes plays a critical role in health. Epidemiological evidence supports consuming at least five servings of fruits and vegetables a day. Several epidemiologists, however, believe that sufficient evidence exists to support a refinement to this message. This refinement includes emphasizing the importance of consuming a wide variety of fruits and vegetables. All fruits and vegetables are good sources of antioxidants, vitamins, and minerals; yet, some fruits and vegetables may provide a stronger dietary and health benefit. Several studies and recommendations (70) have presented a color code approach to encourage diet diversity of fruits and vegetables consumed based on the idea that phytochemicals (chemical substances in plants, some of which carry out important bodily functions) are colorful. Michels and Wolk (71) demonstrated in a prospective study with 59,038 women, that women who followed a healthy diet (which was defined as a consumption of a high variety of fruits and vegetables, whole grain breads, cereals, fish, and low fat dairy products) had a significantly lower mortality than women who consumed fewer of these foods. Other studies (72-73) suggest that a narrow range of food choices, especially for fruits and vegetables, has the potential to lead to dietary inadequacies, which can contribute to ill health and mortality. Krebs-Smith and Kantor (74) and others (19-21, 29, 75) contend that the complexities of the health benefits of fruits and vegetables provide a solid rationale for consuming a variety of them.

Eating a variety of fruits and vegetables in childhood may be particularly important to increasing one’s dietary variety and quality as an adult (76-79). Skinner et al. (76) found that
vegetable variety in school-aged children was predicted by their respective mother’s vegetable preference. Fruit variety in these children was predicted by their respective mother’s breast feeding duration and either early fruit variety or fruit exposure. This study also illustrates the importance of parent’s dietary variety, or lack thereof, on their children’s dietary intake. Sargent et al. (80) demonstrated, in a study with fourth and seventh graders, that dietary quality and variety tend to decrease as a child transitions into adolescence. Variety of fruits and vegetables consumed seems to be an important indicator of overall dietary variety and a marker for dietary and health risk. Studies, such as Drewnowski et al. (81), have developed instruments to assess dietary variety. Cox et al. (82) even developed an instrument for toddlers. Further work, however, is needed in assessing dietary variety along with determining its influence on health outcomes.

Research is continuing to dismantle fruit and vegetable components in order to elucidate their disease protective properties (83); yet, increasingly more research is being conducted to investigate the consumption of fruits and vegetables holistically. The United States Dietary Guidelines (84) and 5-A-Day (19) promote fruits and vegetables as a whole versus emphasizing their individual active components. Further studies are needed. Specifically, “large randomized trials or intervention studies providing fruits and vegetables to defined populations for a period of time and assessing health-related outcomes (19).” Conducting this type of study is difficult because chronic diseases have multi-faceted etiology and prolonged onset. More small clinical trials in diverse populations investigating the role of fruits and vegetables on particular risk factors and biomarkers may be more time and cost-effective (85-86). In order to evaluate these studies, it will be critical to recognize that although fruit and vegetable consumption relates to health, health behaviors tend to occur in clusters. In other words, fruit and vegetable consumption is lowest among individuals who report a sedentary lifestyle, heavy smoking, and/or heavy drinking (39, 87-88). Interaction or clustering health behaviors hinders the appropriate elucidation and allocation of the extent to which an individual risk factor, such as fruit and vegetable consumption, contribute to a specific disease. Developing means of separating the impact of fruits and vegetables, while evaluating the influence of other factors on health, will be critical to evaluating the role of fruits and vegetables in health. These efforts will also aid in developing interventions targeted on increasing individuals’ consumption of fruits and vegetables. In the meantime, fruits and vegetables play a critical role in several chronic diseases and are a well-received dietary message as they promote eating versus limiting one’s dietary consumption (i.e. eat less fat).
C. The Dietary Intake of Fruits and Vegetables in Low-Income and African American Populations

Now that the role of fruits and vegetables in health outcomes has been reviewed, the focus of this chapter will shift to a more thorough review of fruit and vegetable consumption, particularly in low-income and African American populations. Baseline data from the 5-A-Day studies (89) (which will be discussed further later) indicate that national fruit and vegetable consumption is low (3.6 servings/day), not meeting the 5-A-Day recommendation, and significant differences occurred by: age (<30 years=3.7 servings versus 30 to 49 years=3.4), education (college graduate=3.9 serving versus high school graduate=3.4), race (African American=3.7 serving, Hispanic=3.0, white=3.6), marital status (married=3.6 versus single=3.5), and food-shopping responsibilities (little=3.2 versus most=3.8). Results from the Second National Health and Nutrition Examination Survey (1976-1980) (90) reported that an estimated 45% of the population had no servings of fruit or juice; 22% had no servings of a vegetable; 29% had the two or more servings of fruit recommended by the United States government; and nine percent met the United States government’s recommendation for both fruit and vegetable. Consumption was lower among African Americans than Caucasians. The choice of vegetables lacked variety.

These studies present conflicting findings on African American fruit and vegetable intakes in relation to other ethnic groups. This is not uncommon as many studies comparing diets among various socio-demographic groups are limited by one or more of the following problems: 1) lack of statistical testing, 2) insufficient sample size for subgroup analyses, 3) failure to control for age, and 4) failure to take into account energy intake in the analysis when large energy intake differences exist (91). In spite of these study limitations, low-income and African American populations are found to consistently consume low intakes of fruits and vegetables (89, 92-94). In some studies (90, 95), African Americans consume the least when compared to other ethnic groups. When evaluating fruit and vegetable intakes, economic status should be differentiated from ethnicity. Popkin et al. (96) demonstrated that low-income African Americans consume the least amount of fruits and vegetables (2.1 servings per day) in the United States compared to other socio-economic status and racial groups. The highest intake (3.6 servings per day) was reported by high-income African Americans. Trichopoulon et al. (97) demonstrated that as economic status increases, so does the availability of fresh fruits and vegetables and healthier food items in the household. Studies (39, 98) report that lower economic status is associated with lower intakes of fruits and vegetables, especially fresh along with lower levels of plasma antioxidants.
Reviewing the intake of fruits and vegetables in children exclusively, intakes, in general, are low for children. Intakes tend to be even lower in low-income and African American populations (99-100). Based on the Continuing Survey of Food Intake, 1989-1991 (99), the mean daily intakes for Caucasian children (n=2,248) for vegetables were 2.5 servings and for fruits were 1.3 servings. African American children (n=550) reported 2.9 servings of vegetables a day and 1.1 servings of fruits per day. The proportions of children meeting the vegetable recommendations over three consecutive days were 34.4% for Caucasian children and 44.5% for African American children. For fruit, 26.6% of Caucasian children met the recommendation while 21.9% of African American children met it. Neumark-Sztainer et al. (100) also demonstrated that the percentages of youths consuming the recommended amounts of fruits and vegetables were not being met. Large socio-demographic disparities were noted in obesity and eating patterns, such as fruit and vegetable consumption, particularly across race/ethnicity and socioeconomic status. Children in the Bogalusa Heart Study (101) consumed low intakes of fruits and vegetables, but consumption did not differ across ethnic groups. African American children reported higher fiber intakes per 1,000 kcal than Caucasian children. Ballew et al. (102) added, based on their findings from the Continuing Survey of Food Intake, 1994-1996, that children who consumed diets high in fat, regardless of ethnicity or economic status, had lower intakes of fruit, but higher intakes of vegetables. These findings suggest that high fat diets are not protective of diet inadequacy and affect fruit and vegetable intakes differently. Taken together, fruit and vegetable intake is low regardless of economic status and ethnicity; yet, economic status and ethnicity factor into accurately measuring intake. Studies on fruit and vegetable intake exclusively are limited, particularly, in low-income and African American populations.

D. The National 5-A-Day for Better Health Program

To benefit from fruits and vegetables, people must eat them. To understand how to persuade people, particularly low-income and African American children, to eat fruits and vegetables, Baranowski et al. (103-104) has conducted several psychosocial studies. These studies demonstrated that preference is important, but it is not the only factor in a child’s consumption of fruits and vegetables. Some of the other factors that Baranowski’s group (105-108), amongst others (109-112), has determined to influence fruit and vegetable consumption include: geographical location, season, socio-economic status, culture, age, storage space, and cooking skills. To help people overcome some of these barriers, especially low-income and ethnic minorities, the National 5-A-Day for Better Health Program was developed and implemented (18-22). This program encourages Americans to eat five or more servings of fruits and vegetables a
day. Program supporters include amongst others: the National Cancer Institute, the American Cancer Society, and the United States Department of Agriculture. This review will now focus on describing the 5-A-Day interventions that were targeted toward adults, particularly low-income, African Americans.

1. Maryland: WIC 5-A-Day Promotion Program

In Maryland, the Special Supplemental Nutrition Program for Women, Infant, and Children (WIC) centers were utilized to implement a multi-dimensional program in pregnant, postpartum, and breastfeeding women (113-114). This particular target was selected because it works with one of the 5-A-Day highlighted disadvantaged groups. WIC, a federally funded program, provides support for over seven million low-income participants. Besides being financially challenged and typically reporting poor diets, these women may be receptive to dietary change out of concern for their children. WIC has a baseline intervention of nutrition education and supplemental foods. It requires their participants to visit the office for re-certification every six months and pick up food vouchers twice a month. Short nutrition education programs usually take place at WIC centers. These factors supported the selection of WIC as a viable study site for the Maryland 5-A-Day program.

Based on pilot research along with formative research, Havas et al. (113-119) implemented a multi-faceted program among women served by sixteen WIC locations in Baltimore City and six Maryland counties. Over half of the study sample was African American. The program’s goal was to increase the consumption of fruits and vegetables by at least one-half serving more than their control participants. In order to accomplish their goal, they implemented a two-phase intervention design. In Phase 1, eight sites were randomized into intervention status and eight were randomized into control status. Subsequently, women who were enrolled in the respective location’s WIC program (or have children enrolled), were at least 18 years of age, and planned to remain enrolled at that particular site for at least six months were recruited. Phase 2 began four months after the completion of Phase 1 and it recruited the same type of women. It entailed the reverse status of the originally randomized intervention and control sites. In either phase, the intervention status sites participated in the following activities: 1) attended nutrition sessions, 2) received printed materials and visual reminders, and 3) received direct mail. The nutrition sessions occurred at recruitment and three approximately 45 minute sessions took place at check pick-up. Each of the sessions featured a food demonstration and focused on: 1) self-assessment, the values of eating fruits and vegetables, and personal goal setting,
2) identifying and overcoming perceived barriers, and 3) maintenance strategies. Based on research illustrating peer educators as effective mediums facilitating behavior change in low-income audiences, hired and trained peer educators conducted the program’s implementation. *Get Clued into Fruits and Vegetables Guidebook*, amongst others, complemented the nutrition education sessions. During the six-month intervention period, peer educators sent letters, amongst other materials, that were tailored to a women’s pregnancy status, Stage of Change, attendance at the sessions, and individual goals for eating more fruits and vegetables. All activities were designed to provide education, skill development, environmental support, visibility, and incentives to facilitate increased fruit and vegetable consumption by engaging the participants and enabling them to progress through the Stages of Change.

All participants completed pre-and post-intervention (two months following last session) self-administered surveys, which queried the participants about fruit and vegetable intake, along with other factors, that may affect intake such as demographics, smoking, knowledge, attitudes, self-efficacy, social support, Stage of Change, and perceived barriers to increasing consumption. Process evaluation was utilized. Potential external and competing programs, peer staff characteristics, and any form of participant exposure were documented. Participants were asked about all intervening activities. Attendance at the sessions was taken and verified. At the conclusion of the pilot and Phase 1, focus groups were held with the participants.

Based on post-inventions surveys (113, 118-119), mean daily consumption had increased by 0.56+/-0.11 servings in intervention participants and 0.13+/-0.07 servings in control participants (p=0.002). Intervention participants experienced greater comparative change in Stages of Change, knowledge, attitudes, and self-efficacy. The number of nutrition sessions attended, baseline Stage of Change, race, and education correlated strongly with the participant’s change in consumption. One year post-study, intervention and control participants had a 0.27 increase in their mean fruit and vegetable consumption. Results illustrated differences in the distribution of the Stages, the amount of movement across Stages, and in the effectiveness of the intervention across groups that varied according to which of the measures were used.

Even though this program illustrates success in increasing an at-risk group’s fruit and vegetable consumption, it fails to illustrate how their theoretical model facilitated this process. A half a serving increase in the treatment group is noteworthy and components of this intervention such as using the WIC nutrition education sessions to encourage fruit and vegetable consumption are worth further use. Havas et al. (113-119) did mention using the Transtheoretical Model, however, they did not adequately utilize the theory to target their intervening materials and evaluate their outcomes. Simply stating “letters were tailored towards an individual’s Stage of
“Change” or even showing positive movement along the Stages among intervention participants does not suffice. Given that their program is fragmented in the literature, it is difficult to piece together what questionnaire they utilized to even stage their participants. It is also a challenge to understand how they concluded their nutrition education efforts, which focused on eating more fruits and vegetables rather than encouraging “5-A-Day,” lead to increases in knowledge, attitudes, and self-efficacy that facilitated an upward progression in the Stages. Even though their findings seem generalizable to other WIC centers and provide insight into low-income, African American mothers, failures in their communication of their intervention (such as, are three 45 minute sessions really necessary) hinder what we can learn from this study. In other words, Havas et al. (113-119) did not expand much on the strengths and weaknesses of their intervention, especially their nutrition education curriculum and sessions.

Relying on self-administered surveys for dietary intake raises the concern that social desirability or improved ability to record intake influenced the increase in the intervention groups’ fruit and vegetable consumption. Furthermore, despite their problem with having poorly attended sessions, they spent more time providing demographic characteristics on those who did and did not attend their meetings then adequately evaluating potential mediating variables that may increase future attendance and likewise create positive behavior change. In sum, the Maryland WIC 5-A-Day Promotion Program illustrates how WIC can be utilized as a medium to target at-risk populations for dietary interventions. This study, unfortunately, captured how inconsistent intervening messages and activities along with inappropriate measures, such as a combined fruit and vegetable measure, hinder the usefulness of advancing the literature and theory development. Correcting these shortcomings is vital to improving this particular study and strengthening the contribution of further interventions.


The Black Churches United for Better Health developed a 5-A-Day program geared toward rural African American adults who attend church (7, 22). The multi-component intervention was based on an ecological model of change and worked with 50 churches over a four-year period. The actual intervention took place over 20 months. Close to half of the churches were randomized into an intervention group while the other half served as a control group. The first step of this intervention was to assess baseline intake of fruits and vegetables and parameters associated with intake. Using a telephone survey, 3, 737 adult members of 50 black churches from ten rural counties in North Carolina were interviewed. The survey measured demographic characteristics, knowledge and beliefs regarding cancer and nutrition, and food-
frequency data related specifically to fruit and vegetable consumption. Food-frequency analyses determined mean intake to be $3.7 \pm 2.4$ daily servings of fruits and vegetables and the percentage of the participants who reported eating five or more daily servings of fruits and vegetables was 23%. Age and gender had significant correlations with fruit and vegetable intake with older females consuming the most fruits and vegetables and young males consuming the least. In another baseline study (120), 3,737 participants were asked if they recognized the 5-A-Day message. Although 40.7% reported to have recognized this message, only 7.4% were able to correctly identify the recommended daily number of servings of fruits and vegetables. Reported family history of cancer was related to a higher tendency to believe that eating more fruits and vegetables could prevent disease. Based on these findings, Demark-Wahnefried et al. (120) stress the importance of culturally sensitive and Stage appropriate messages.

Process evaluations (121) were based on participant surveys, church reports, and qualitative interviews. From the intervention churches, 1,198 members responded to a two-year follow-up survey. Twenty-three churches provided reports and twenty-two churches provided interviews. The most frequently reported activity was serving more fruits and vegetables at church functions. This activity had the highest perceived impact. Personalized tailored bulletins, pastor sermons, and printed materials were reported to have had high impact. Groups who reported the highest impact were women, older individuals, and members of small churches. Intervention exposure was associated with an increased fruit and vegetable intake. The study reported that a major limitation was relying on church volunteers to collect the process evaluation data. Outcome evaluations (122) were based on a total of 2,519 participants (77.3% response rate) baseline and two-year follow-up interviews. At baseline, both control and intervention groups consumed similar intakes of fruits and vegetables. At follow-up, the intervention group consumed 0.85 (SE=0.12) servings more than the control group ($p<0.0001$). The groups who reported the highest increases in intake were older than sixty-six (1 serving), those with education beyond high school (0.92 servings), those widowed or divorced (0.96 servings), and those attending church frequently (1.3 servings). Participants aged 18 to 37 years and those who were single reported the smallest change in intake. Other findings from this project (123-124) were the potential utility of using produce ratios (ratios of produce sales to total grocery sales) to track fruit and vegetable consumption in a rural community. Study investigators (123-124) also discussed some considerations to keep in mind when designing, implementing, and evaluating collaborating community-oriented research. Results on the Stages of Change (125) that were based on surveys with 79.1% of the participants (3,737) were combined with results from other 5-A-Day sites. No consistent pattern in Stage distribution for African Americans compared to other ethnic groups.
was found. This particular program did show a significant relationship between program awareness and higher Stage category. These findings support the use of the Stages of Change approach to understanding fruit and vegetable consumption among rural African Americans. Campbell et al. (126) note that data collected on psychosocial information indicate that intervention strategies should focus on: overcoming barriers and increasing self-efficacy, knowledge of recommendations, and social support for eating 5-A-Day. Theoretical applications of the Social Cognitive Theory, Health Belief Model, and social support, Campbell et al. (126) suggest, should be incorporated into multi-level interventions (i.e., Stages of Change target the individual while the social support theories and models target the environmental elements). Altogether, the Black Churches United for Better Health project demonstrated that a 5-A-Day intervention interwoven into church services could improve the fruit and vegetable intake of rural African American adults.

The 5-A-Day findings discussed thus far are important and supply pertinent information on fruit and vegetable interventions as well as interventions targeted toward low-income, African Americans; however, they do not provide any insight on interventions geared toward adolescents and children. This review will now focus on the 5-A-Day interventions conducted in younger age brackets.

3. Alabama: High-5-Alabama

The High-5 Alabama project (22, 127) developed and evaluated a multi-component program to increase fruit and vegetable consumption by fourth-grade students and their families. The program targeted theoretical constructs within the Social Cognitive Theory. Schools (n=20) were randomized into either an intervention or control group; 16% of the sample was African-American. Program components were: classroom curriculum, a parent intervention, and an environmental intervention. The classroom component involved a 15 session curriculum with the assistance of project staff. Parents were invited to taste tests and food fairs. Newsletters, tip sheets, and educational sessions were sent to the parents. To increase fruit and vegetable availability and awareness, foodservice workers were trained and the cafeteria offerings were modified. Process evaluations (128) using observations, self-report checklists, surveys, and other measures demonstrated a high degree of program implementation. Mean daily consumption of fruits and vegetables was based on 24-hour diet recalls using the Nutrient Data System with 2-dimensional food models to confirm portion sizes. Final project results (129) revealed that the intervention group consumed a higher mean daily consumption of fruits and vegetables (3.96) compared to the control schools (2.28) at follow-up one year later and at follow-up two years
later (3.20 versus 2.21). The intervention group reported increases in macro-and micro-nutrient intakes. Similarly, parents in the intervention group at follow-up one year later reported higher mean daily consumption of fruits and vegetables (4.23) compared to the control parents (3.94). The intervention parents, unfortunately, did not report significantly higher intakes than the control group at follow-up two years later. Details on which fruits and vegetables either control or treatment group were consuming were not provided.

4. Georgia: Gimme 5 Fruits and Vegetables for Fun and Health

Gimme 5 Fruits and Vegetables for Fun and Health (22, 130) targeted children and 15.3% of their sample were African American. This program was based on the Social Cognitive Theory and strived to: 1) increase home availability of fruits and vegetables, 2) increase preference for fruits and vegetables, 3) enhance children’s ability to prepare fruit and vegetable dishes, and 4) increase consumption using behavior modification. The curriculum activities included games and songs and were implemented in eight Georgia schools with fourth and fifth graders. Eight schools served as the control. The project sent home newsletters and videotapes to encourage role-modeling. Grocery store activities were used. Fidelity of implementation, reach, use of intervention materials, and environmental mediators: teacher training, curriculum delivery, participation in family activities, attendance at evening point-of-purchase grocery store activities, and availability and accessibility of fruit, juice, and vegetables at home were assessed during process evaluations. These assessments demonstrated that about half of the curriculum activities were being implemented. The activities related to behavior change were the lowest type to be implemented. Parents (87%) reported participating in the program homework activities with their fourth graders while parents of fifth graders reported less participation in homework (66%). The videotapes were reportedly watched by 75% of the parents in both grades. Only ten percent of the parents attended the grocery store activities. The outcome results (131) utilized seven-day food records and psychosocial measures. Results demonstrated that the intervention group had increased their consumption of fruit, juice, and vegetable combined, fruit, juice, and vegetable consumed at weekday lunch, eating fruit, juice, and vegetable self-efficacy, social norms, asking behaviors, and knowledge. The findings highlight the influential role a theory-based school nutrition education program can have. In spite of these results, the actual changes were small and the persistence of these changes is unknown.
5. Minnesota: 5-A-Day POWER PLUS Program

The Minnesota 5-A-Day POWER PLUS Program is the final 5-A-Day child focused intervention (22, 132). In this study, 20 elementary schools in St. Paul participated in a randomized school-based trial that aimed to increase fruit and vegetable consumption using a multi-component approach. The intervention was based on the Social Cognitive Theory. They targeted multi-ethnic schools and 19.1% of the sample was African American. The children were in fourth grade in the spring of 1995 and the fifth grade in fall 1995. The intervention included classroom behavioral curricula, parental involvement, school foodservice changes, and industry support and participation. Lunchroom observations and 24-hour food recall measured fruit and vegetable consumption. Process evaluations demonstrated that programs were implemented as intended. High levels of participation were noted except in parental activities. Outcomes (133) demonstrated increases in: lunchtime fruit consumption, combined fruit and vegetable consumption, lunchtime vegetable consumption among girls, daily fruit consumption, and the proportion of total daily calories attributable to fruits and vegetables. The investigators noted that methods to increase parental involvement and improve lunchtime vegetable consumption in boys are needed.

Study investigators analyzed (134) varying ways to calculate daily fruit and vegetable consumption and noted that differences in calculations occur based on methodology used. The United States Department of Agriculture databases used to calculate servings of fruits and vegetables for the Continuing Survey of Food Intakes of Individuals (CSFII) allows for complete disaggregation of foods with multiple ingredients. This method allows for the fruits and vegetables in mixed dishes to be counted. In the version 2 series of the Nutrient Data System (NDS) most, but not all, foods are disaggregated and then counted. The University of Minnesota Cancer Prevention Research Unit (CRPU) used a narrow definition of what constitutes a fruit or vegetable and does not include foods such as French fries, fried potatoes, onion rings, pickles, and sauerkraut. This method, which was used in the POWER PLUS program, resulted in the lowest estimate of total servings of fruits and vegetables. Elderidge, et al. (134) go on to urge researchers to evaluate various methods of counting fruits and vegetables and determine which method is best for their needs and audience. Clearly stating the method along with the rationale for using it is important.
6. Other 5-A-Day Findings Along with Other Insights from School-based and Community-oriented Research on Fruits and Vegetables

All of the child-focused 5-A-Day studies have helped to identify specific means of how to increase children’s consumption of fruits and vegetables. These include: increasing accessibility and availability, parental and peer modeling, nutrition education, and motivation. 5-A-Day interventions have also emphasized the importance of conducting formative research along with process and outcome evaluations. French and Stables (135) add in their review of the environmental interventions (including the aforementioned 5-A-Day child-based interventions) to promote the consumption of vegetables and fruits among youth in school settings that the changes in the environment such as increasing fruit and vegetable availability have potential in affecting fruit and vegetable consumption in youth. They stress that while multiple strategies and multi-component interventions may increase fruit and vegetable consumption in youth, it is vital to separately evaluate each strategy and component to more effectively elucidate what exactly facilitates or hinders fruit and vegetable consumption in children.

The role of school lunches in children’s fruit and vegetable intakes as these interventions note is very influential. Many times the school lunch program has a positive affect on students’ fruit and vegetable intake. For example, in 1986, the United States Department of Agriculture (136) implemented a pilot program to expose children at school lunch to an increased variety of fruits, particularly fresh. Frozen blueberries, cherries, and raisins were tried. Ryan et al. (137) described the consumption and waste of fresh and canned fruits and vegetables in a school lunch program in 29 schools versus 37 controlled schools. Controlled schools did not receive fresh produce. Researchers monitored one school lunch per school. The average number of students per school taking fruits and vegetables during lunch was 194 and 187 respectively for the experimental and controlled schools. The students’ actual fruit and vegetable consumption was calculated by subtracting the weight on the plate waste from the beginning weight for each fruit and vegetable served to an entire school. The experimental group took an average of 2.7 ounces of combined fruit and vegetable per child while the controlled group took 3.14 ounces. Children in the experimental group consumed a statistically significant greater percentage of fruits and vegetables (73%) than the control group (61%). Both groups ended up consuming more fruits and vegetables. A higher percent consumption of individual fresh fruits (64% to 88%); canned fruits (69% to 76%); and fresh vegetables (74% to 87%) were found. Canned vegetable percent individual consumption was lower (44% to 64%).

A United States Department of Agriculture report (138) on the availability of fresh produce in nutrition assistance programs reported that in 2001 almost seven billion dollars of the
Food and Nutrition Service program funds supported consumption of fruits and vegetables by children and low-income families. In order to accomplish the delivery of a greater variety of fresh produce, the Food and Nutrition Service has partnered with the Department of Defense. The United States Department of Agriculture does support the consumption of fruits and vegetables in all forms—fresh, frozen, canned, dried, and juices; but continues to explore ways to offer a greater variety of commodities, particularly fresh produce in nutrition assistance programs. The United States Department of Agriculture aims to promote nutrition education to increase the acceptance of these offerings. On the other hand, Kubik et al.’s (139) cross-sectional study of 16 schools reported that a la carte availability was inversely associated with fruit and fruit/vegetable consumption and positively associated with total and saturated fat intake. A negative correlation between snack vending machines and fruit consumption was reported. Fried potatoes at school lunches did have a positive effect on students’ vegetable and fruit/vegetable intake. Samuel (140) commented on how certain school lunch programs hinder dietary variety and the selection of more locally based food items such as fruits and vegetables. Hence, school lunch can be a critical component to school-based fruit and vegetable interventions, but can have a varying impact on children’s fruit and vegetable intake.

Various barriers to fruit and vegetable consumption have been explicitly and implicitly stated thus far. Two particular barriers are availability and price. In a recent study, Morland et al. (141) demonstrated that low-income neighborhoods had limited access to a variety of healthy foods including fresh fruits and vegetables. Assessing availability of fruits and vegetables does raise the methodological issues raised earlier such as: Does type of fruit and vegetable matter? In a study by Morris et al. (142), while supermarkets were found to offer a wide range of fresh foods, small and medium stores did not stock any fresh vegetables. The availability of fresh fruits was even more limited. One out of three small/medium stores did not stock any fresh fruits. Understanding the role of availability of fruits and vegetables is increasingly important if consuming them continues to be a focal point of national initiatives to reduce health disparities.

Even if fruits and vegetables are available in a community, the price of fruits and vegetables can be a barrier, particularly in populations surviving on limited means. Cappo and Love (143) demonstrated that socioeconomic factors influence fruit and vegetable intake, especially fresh fruit and vegetable intake. Based on their findings, they suggest changing food distribution outlets along with investigating fruit and vegetable varieties consumed by households. Brooker et al. (144) demonstrated that there is a significant increase in the price of fresh produce, especially when the produce reaches the grocery store. Krehl and Cowgill (145) reported that in general canned foods were the most economical when cost was calculated on the
basis of edible portion of processed and fresh foods. Shankar and Klassen (146) assessed food purchasing behaviors among 20 low-income African American women using focus groups in addition to 230 low-income African American women using structured-questionnaire interviews. They (146) reported that women wanted to increase fruit and vegetable consumption by their family, but cost was a barrier. Other barriers included: cost, poor cooking skills, lack of social support, and childhood eating patterns. The United States Select committee (147) on hunger recognized shopping and living constraints for low-income communities, particularly, for produce. This committee tried to develop methods ensuring that low-income families were able to consume fresh fruits and vegetables on a consistent and affordable basis. Reducing the price for fresh fruits and vegetables in a community-based study in two communities was found to increase the community’s purchasing of these items (148). Therefore, the availability and price of fruits and vegetables should be assessed when evaluating fruit and vegetable consumption and should be considered when designing fruit and vegetable targeted interventions. Even though the 5-A-Day studies and others (149) have been moderately successful at increasing children’s consumption of fruits and vegetables, we are not certain at this point what factors influence preschoolers’ consumption of fruits and vegetables.

When combining the quantitative and qualitative results of each of the 5-A-Day interventions, Thompson et al. (150) and Trudeau et al. (151) believe that one single national message or campaign to increase fruit and vegetable intake may not be effective and, in particular, reach the populations in most need of change. They suggest investing more time into understanding the food consumption habits of the target population to develop messages that more effectively facilitate behavior change. Trudeau et al. (151) used a cross-sectional, randomized sample from the Washington State Cancer Risk Behavior Survey (1995-1996) to assess the utility of a single fruit and vegetable message. Through telephone interviews completed with 1, 450 adults, health status, health-related behaviors, and psychosocial factors were more strongly associated with fruit intakes than vegetable intakes. Adults in the Maintenance Stage consumed 0.99 more daily servings of fruits and 0.68 more daily servings of vegetables than participants in the Preaction Stage. Intrinsic motivations for eating a healthful diet were highly correlated to intakes of both fruits and vegetables. These associations were stronger for fruit. Extrinsic motivations were not associated with intakes of either fruits or vegetables. Based on these findings, Trudeau et al. (151) conclude that dietary interventions based on a general 5-A-Day message may be more effective in increasing intakes of fruits than vegetables. Interventions targeted on vegetables seem needed. Intrinsic motives for eating a healthful diet should be a component of future interventions.
E. Economic and Cultural Facets

In each of the sections reviewed thus far, economics and culture have been mentioned to have a major influence on health status, dietary intake, along with awareness and acceptance of fruit and vegetable interventions. Studies reviewed (39, 104-108, 125) consistently emphasized the importance of developing economically and culturally sensitive research methodologies and interventions. Several national initiatives (6, 22), along with numerous multi-ethnic nutrition education programs and interventions (152-155), have been implemented. These efforts are vital in reducing health disparities; however, evidence (156) suggests that they will be more effective if they explicitly target and design their interventions to be culturally or ethnically specific. In hopes of developing an economically and culturally sensitive research study, this review will briefly highlight some pertinent points on low-income, African American populations. To begin, welfare reform has had a tremendous impact on low-income, African American families. Otherwise known as the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, the government intended to use this policy as a means to: “end the dependence of needy parents on government benefits by promoting job preparedness, work, and marriage” (157). This legislation (158), which replaced the entitlement program called the Aid to Families with Children (AFCD), places a five-year lifetime limitation on cash assistance. It requires that participants have a job within two years. States could choose to make these time limitations even shorter. Increasingly, this federal legislation along with several changes in state policies before and after passage creates incentives and requirements for families receiving benefits to move into work and eventually off welfare. As a result, employment by single mothers, a group that in the past has been the least likely group to work and most likely to be on welfare, is on the rise. In fact, between 1993-1999, the number of single mothers working increased by 25% (157). This trend is forcing childcare to become a fact of life for many American families, especially the poor.

Over 80% of working-age welfare recipients reside in the metropolitan area and over half of African American babies are born to unmarried mothers (159-160). An analysis by the National Survey of American Families, which adjusted for family size, found that two parent homes have a 2½ times greater median income than a single parent household (161). In addition, 39.3% of single mothers in poverty are African American. Even though poverty rates have fallen from 12.7% in 1998 to 11.8% in 1999, poverty rates amongst children remain high (162). African American children, according to the United States Bureau of the Census, make up the largest ethnic group living in poverty (36.7%) (163). Poor children are substantially more likely than other children to suffer negative outcomes including emotional and behavioral. Most of them
endure difficulties in school and score extremely low on academic achievement tests. Diet inadequacy is a typical finding (157, 164). According to the United States Department of Agriculture (165), low-income children in the United States are deficient in a number of essential nutrients. Based on these alarming statistics, it is imperative to investigate how growing up in a poverty-ridden home and in a childcare facility is affecting inner-city, low-income, African American, preschool children. It is equally important to both their near and long-term health to understand how and where these children develop their food preferences and nutrition knowledge.

Although the evidence of welfare reform’s impact on children is sparse, most researchers conclude that for young children, the results are either neutral or slightly positive in areas such as school behavior and academic performance. Some of these effects can be attributed to a strong economy (157). Research conducted by the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care (166) is currently trying to determine the relationship between the childcare experience of children and their development over time. Their study concentrates on how different aspects of care—such as quantity and quality—relate to various aspects of a child’s development. Despite the invaluable information this study will provide, it will not generate any information on the child’s food preference, nutrition knowledge, dietary intake, or nutritional status. This deficiency in nutrition research, especially on low-income and African American groups, can only perpetuate these groups’ disproportionate diet-related disease risk.

F. Preschool Nutrition Education Efforts with an Emphasis on the Food and Nutrition Services in Head Start Childcare Centers

Economics and culture are important aspects of health status, dietary intake, and successful nutrition inventions. Age is a critical factor in each of these three. Age is a particularly critical factor in nutrition interventions aimed at reducing health disparities because evidence demonstrates that one of the most effective methods of creating or changing dietary patterns is to intervene early (4). Early intervention is critical because the establishment of food behaviors occurs very early in life and lays the foundation for lifelong food preferences and eating patterns (167). To illustrate, Serdula (168) reported that 26-41% of obese preschoolers become obese adults. These studies thereby demonstrate that the preschool period is a particularly important time in the development of food behaviors. Parents as well as childcare providers have the opportunity to influence the development of nutrition knowledge, attitudes, and behaviors in a variety of ways (169-170). Over the years, a cornucopia of methods have been utilized to study
the development of eating habits in children: ecological approaches, studies of the food preferences of children, the effectiveness of specific educational programs for preschool children, using games to assess nutrition concepts of preschool children, along with examining the social context of the presentation of food to children (171-176). Neophobia (177-178) and mealtime interactions (176, 179-180) have received attention. More recent studies have examined the influence of family-style eating, i.e. children serve themselves (181), and portion sizes (182) and have found that even children are susceptible to overeating when served larger portions. In retrospect, these studies have established preschool children as reliable sources of their food preferences and nutrition knowledge. These studies validate that interviews with a young child can facilitate the investigation of current issues such as welfare reform, working single mothers, and childcare. Studies on young children demonstrate their vulnerability to both short-term and long-term health issues.

This study is modeled specifically after Achterberg’s (16) methodology and theoretical framework. Her study utilized semi-structured interviews with nine preschool-aged children and their parents. The study aimed to explore as well as generate hypotheses and theory as to where young children obtained their meanings about food and nutrition. Achterberg (16) aimed to determine whether or not the children’s meanings were shared with their parents. A qualitative analysis of the data based on concept maps, the results of various task performances, and observational notes illustrated that young children held similar knowledge about food and nutrition as their parents. Additionally, Achterberg (16) hypothesized that shared meaning is negotiated between individuals and it is not established between a child and his or her parents unless there is a defined need, interest or super-ordinate goal to which parents and children can direct their attention, have an opportunity for social interaction on the subject and conduct a meaningful discussion about the topic. In the absence of this discussion or exchange, children create their own meanings for that particular topic. Similarly, children potentially can create their own meanings for particular topics when receiving mixed messages, i.e., from their parents and childcare providers. Misconceptions are difficult to change and become increasingly hard to correct as the meanings grow in complexity. Thus, educating children is vital because it intervenes before complex meanings have the opportunity to develop (14). In the same manner, children cannot be successfully educated unless we know what concepts they currently hold and truly understand the context in which they are learning.

In another study with young children and their parents, Anliker et al. (183) evaluated the early nutrition-related knowledge and attitudes of preschool children and the types of messages that their parents gave to them about nutrition. The sample entailed 104 children, aged three and half
to three and three quarters-years old, and their mothers. The children demonstrated significant levels of nutrition knowledge in the areas of food groups, food transformations, food origins, and energy balance. Some demonstrated the ability to judge relative food values. Derived from open-ended questions asked to the mothers, parental messages about food and nutrition were categorized into the following groups: passive and non-verbal, example, discouragement or encouragement, general nutrition, specific nutrition, physical, bribes and rewards, and authoritarian messages. Both the quantity and specificity of nutrition-related messages given by parents and about foods were significantly and positively correlated to the children’s nutrition knowledge scores. Although Achterberg (16) and Anliker (183) among others (184-194) contribute to the understanding of how parents influence preschool children, none assess the current impact of Head Start on inner-city, African American preschoolers. Several investigations have focused on parents’ eating habits (184-186), eating attitudes (187-189), weight status (190-191), and child-feeding practices (192-194) and have demonstrated each to have a strong relationship on children. These effects can be noted on the children’s eating habits, eating attitudes, weight status, and ability to self-regulate. Altogether, parents exert an effect on children and understanding what these effects are and how to promote or discourage positive or negative effects is fundamental to facilitating healthy eating habits in children.

In regards to working mothers, Barnet and Baruch (195) found that employed mothers spent less time interacting with their children than did non-employed mothers. Gillespie and Achterberg (196) found that a mother’s working status was related to their attitudes regarding the importance of nutrition and how much they discussed food and nutrition topics with their families. Kirk and Gillespie (197) added that some working mothers experience guilt in regards to their choices for family meals. Campbell and Sanjur’s (198) nutrition-oriented ecological analysis of single employed mothers and preschool children demonstrated certain occupations as well as childcare and home variables influence a child’s diet quality. Relative income and type of childcare (licensed vs. unlicensed) were the most important predictors of diet diversity. These studies provide insight into the relationship between a working mother and her children. They do not, however, thoroughly evaluate the influence of the childcare provider on a child’s food preferences or nutrition knowledge. None of these studies adequately address how and where children of working single mothers are learning about nutrition.

Together these studies demonstrate the vitality of early childhood nutrition; yet, we have a limited understanding of the factors or strategies that facilitate or hinder the development of healthy diets in at-risk preschoolers. Designing an intervention for low-income and African American young children can be especially problematic due to the lack of research on these
populations. According to the Theory for the Ecology of Human Development (13), the Ecological Model of Predictors of Childhood Overweight (15), or the Theory of Meaningful Learning (14), effective dietary interventions must incorporate the targeted audience’s context. This includes the audience’s concepts, preference, availability, and intake of fruits and vegetables along with an understanding of economics and childcare.

As a consequence of welfare reform, more low-income single mothers rely on childcare. They are not alone. Today, over eight million children under the age of five receive childcare. This care occurs in a variety of settings: care by fathers, other relatives, in-home caregivers, childcare providers, and center-based care. A child may be receiving care either individually from a formally trained nanny or collectively with a group of children in a center-based program (1). Children aged three to five years typically attend childcare centers or family day care homes (2). The majority of low-income preschool children participate in Head Start. This federally funded program specifically provides a child development curriculum for low-income preschool children (199). Today, Head Start is responsible for over 800,000 children a year; over 35.1% of these children (the largest proportion) are African American. Besides providing childcare for low-income young children, Head Start receives funds, primarily through the United States Department of Agriculture Child and Adult Care Food Program (CACFP), to help improve its children’s nutrition status and nutrition knowledge (200).

Head Start aims to promote child wellness, in part, by providing nutrition services that supplement as well as complement those of the home and community. It has set standards for five nutrition-related areas: 1) the identification of each child’s nutritional needs; 2) the design and implementation of nutritional services programs; 3) meal services in center-based programs; 4) family assistance with nutrition; and 5) food safety and nutrition. Head Start is to use the Food Guide Pyramid as a guide and serve a variety of healthy foods including a rich selection of fruits and vegetables (201-202). Although Head Start aims to serve its children a broad variety within each of the food groups, it stresses the importance of doing so in a manner that is appropriate to cultural, religious, ethnic, and personal food preferences. Head Start established that children cared for by the centers for more than six hours a day need to receive at least 1/3 of their daily nutrient needs from the center’s nutrition services. Guidelines specifying how this can be accomplished through various food group offerings per meal were established (200). They suggest that each center aim to moderate the fat, sugar, and salt served to their children. Family-style eating and nutrition education efforts are required (201). Though these guidelines reflect the suggestions made by organizations such as the American Dietetic Association (203) and the American Academy of Pediatrics (204), the quantity and quality of care as well as nutrition
services a child receives in the different Head Start venues varies from program to program and site to site. The impact of nutrition education programs lacks consistent and constructive evaluation, especially, in inner-city centers.

Several studies have analyzed the meals and nutrition education programs offered at childcare facilities. Briley et al. (205), Briley et al. (11), and Bruening et al. (206) have assessed the menu planning resources and skills of childcare center’s foodservice staff and childcare providers. Briley et al. (207) evaluated three ethnically diverse centers in Texas and came to three conclusions: “1) childcare menus need to be improved; 2) training for childcare staff needs to be sensitive to the missions and cultures of different kinds of childcare centers; and 3) because of the lack of staff knowledge has only an indirect influence on the menus, changes in program requirements and strategies for assisting and monitoring food programs in childcare may also be needed.”

In regards to Head Start, McKey et al. (8) evaluated the program’s impact on children, families, and communities. Their study illustrated how the program improved the nutritional status of the participants. Another study conducted by Cook et al. (208) revealed that Head Start children began the school year with lower intakes of key nutrients than non-Head Start children, but the group differences disappeared by spring. These results may indicate that the children participating in Head Start consume more nutritious foods in the center than in their own homes. A more recent study (12) conducted in Head Start centers in upstate New York noted both deficiencies and excesses in the nutrient content of their meals. Moreover, this study demonstrated that Head Start children had inadequate energy intake, but excessive intakes of total fat, saturated fat, and cholesterol. Nonetheless, no published evidence exists on meals in inner-city Head Start centers. These studies (8, 208, 12) demonstrate the impact of Head Start on a preschool child’s food intake and nutritional status. But, they only focus on the childcare providers’ menu planning, center’s menus, and the children’s nutritional status. None of these studies (8, 207, 12) examine the actual influence that food provision by childcare providers or centers have on a child’s nutrition knowledge or food preferences.

The American Dietetic Association (203) established guidelines for a child’s daily nutrition intake at childcare facilities, but inherently assumed that parents plan to complement the center and reinforce the healthful food modeled in the center. Yet, the actual exchange of information between a parent and childcare provider regarding a child’s food intake is limited. Discussions between the parent and childcare provider on nutrition education are even less. In the absence of these discussions, Head Start cannot complement the household’s food provision and nutrition messages. Briley et al. (11) discussed how the absence of food and nutrition conversations
between childcare providers and parents may actually encourage parents allowing their child to consume convenience foods such as chips and cookies or making a quick stop at the local fast-food venue on the way home. This scenario thereby may teach the child that, during family time, she has the freedom of choice regarding her dietary intake. The child’s preference, consequently, for fast, fatty, and salty food may soon surpass her desire to eat any vegetables or cereal. This scenario could lead to health problems and increase diet-disease risk in low-income and African American populations.

The identification of the concepts primary care providers and childcare providers are instilling in their young children may help to correct this problematic scenario. This knowledge can enable the design of a nutrition intervention that can correct the misunderstandings children may be struggling with. The identification of these concepts can ensure that the efforts primary care providers and childcare providers put toward teaching children healthy eating habits does not work at cross-purposes and, as a result, transpire into poor eating habits in children. Although the research presented thus far indicates a mother has the strongest influence on a child’s food behaviors, assessments of other contemporary contexts children eat and learn about food and nutrition are needed. Nicklas et al. (209), amongst others (210-211), argued specifically for further analyses in childcare centers as the “childcare settings are important social environments within which food-related behaviors among young children are developed.” Childcare providers can influence children’s eating practices by controlling availability and accessibility of foods, meal structure, food modeling, food socialization practices, and food-related parenting style. Childcare centers can take advantage of the fact that fruit, juice, and vegetable preference play a critical role in predicting a preschooler’s fruit, juice, and vegetable consumption and that his preference is influenced by availability, variety, and repeated exposure. Several experiments have been conducted in childcare settings and have illustrated that the venue can facilitate positive behavior change such as getting a child to eat a previous disliked vegetable (212). Childcare-based experiments have demonstrated how practices of restrictive access (213-214) and use of contingencies (215-216) can have negative influences on children’s eating. Teacher modeling in the preschool setting has been systematic investigated and shown to be effective (217). Various teaching strategies (218) and trainings (219) have been evaluated. Thus, childcare centers not only influence children’s eating in both positive and negative ways but, more pertinently, can be methodologically evaluated and serve as an intervening environment. Nonetheless, limited research (220-222) has been conducted in inner-city Head Start childcare centers. Strategies that help to build a partnership between the various contexts in which children
grow and develop, particularly between the home and childcare center, will facilitate more meaningful nutrition knowledge in young children (13, 14).

**G. Summation and Significance of the Proposed Study**

Fruits and vegetables play a role in chronic diseases; yet, understanding their exact role demands further study on how type, form, and processing influences its nutritional properties and disease-associated parameters. Evidence supports that the variety of fruits and vegetables consumed also merits attention. Future fruit and vegetable studies will require more in-depth analyses of how factors such as socio-economic status, ethnicity, geography, and age impact an individual’s both fruit and vegetable intake as well as health status. Differentiating the impact of each of these factors will be essential to understanding their individual as well as collective effect. More effective interventions can be designed based on these differentiating analyses. Programs such as 5-A-Day have laid the foundation for designing, implementing, and evaluating fruit and vegetable interventions targeted toward low-income and African American populations. These interventions have helped identify constructs such as concepts, preference, availability, and intake as specific means of how to understand fruits and vegetables in children. 5-A-Day programs, however, have not provided sufficient evidence on how any of these constructs operate in preschool-aged children. The preschool period is particularly influential in creating or changing dietary patterns. Parents and childcare providers can impact—positively and negatively—a preschooler’s nutrition knowledge, food preferences, food availability, and dietary intake. Food-related research in childcare centers, particularly in Head Start centers, is needed as these centers increasingly factor into low-income preschoolers’ development.

Taken together, the reviewed evidence and noted deficiencies in research demonstrate that exploring how concepts, preference, availability, and intake of fruits and vegetables operate in an inner-city, African American, preschool population can be an important contribution to future nutrition interventions. The addition of a qualitative understanding of how primary care providers (i.e., parents, grandparents) and childcare providers influence these children can also be instrumental. An exploratory, qualitative design may further theoretical development in this under-studied sample and aid in building a trusting collaboration through which future studies and interventions in the targeted population can take place.
CHAPTER III:

THEORETICAL FRAMEWORK
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A. Introduction

This chapter complements the literature review and helps establish the theoretical framework for this inquiry. Based on the literature review, I focused on describing how these individual groups: child, primary care provider (i.e., parents, grandparents), and childcare provider along with these constructs: concepts, preference, availability, and dietary intake operate in understanding fruits and vegetables in an inner-city Head Start childcare center. Constructs are terms, ideas, principles, or concepts that are used to build larger models or theories. Constructs show relationships between concepts. Although they are not directly derived from observations of events or objects or have direct referents, constructs are ideas that do support reliable theory (16). I will use two types of constructs in this chapter. One will be referred to as theoretical constructs. This type of construct specifies terms, ideas, principles, or concepts I used from the selected theoretical resources to inform this study’s model. The other type is study constructs. These are specific constructs (concepts, preference, availability, and dietary intake) I used to build this study’s model. I used Figure 3.1 as a starting template through which I then constructed this study’s final theoretical framework, which will be presented at the end of this chapter. Using this template, I then relied on four theoretical resources to further understand how these individual groups and study constructs operate and relate: 1) Bronfenbrenner’s (13) Theory for the Ecology of Human Development; 2) Novak and Gowin (14) and Ausubel’s (222) Theory of Meaningful Learning; 3) Achterberg’s (16) hypotheses; and 4) Davison and Birch’s (15) Ecological Model of Predictors of Childhood Overweight. This chapter lays out my logic in using each of these resources by briefly defining some of the theoretical constructs of these resources I selected to inform this study’s model. I used a modified version of Figure 3.1 to provide an illustration of how I envisioned a theoretical resource’s selected theoretical constructs to inform this study’s final theoretical model.
B. Bronfenbrenner’s (13) Theory for the Ecology of Human Development

As illustrated in Figure 3.2, a set of theoretical constructs from Bronfenbrenner’s Theory for the Ecology of Human Development (13) informed my conceptualization of how concepts, preference, availability, and intake operate at the level of the child, primary care provider, and childcare provider. Although Bronfenbrenner (13) does not explicitly discuss how concepts, preference, availability, and intake of fruits and vegetables operate in any of these individuals, the selected theoretical constructs listed within the individual level circles give credence to the use of the selected study constructs. The listed theoretical constructs would suggest that the study constructs relate to each other. To expand, I will define each of the terms and incorporate examples of how concepts, preference, availability, and intake of fruits and vegetables inter-relationships can be deduced. The Theory for the Ecology of Human Development (13) is defined by the scientific investigation of the “progressive, mutual accommodation between an active, growing human being and the changing properties of the immediate setting in which the developing person lives, as the process is affected by relations between these settings and larger contexts in which the settings are embedded (13).” Within this definition are key terms as well as some of this study’s selected theoretical constructs.

To start, settings are characterized as: “places where people can readily engage in face to face interaction (13).” For a child in this study, the home is an example of an immediate setting. At this setting or another (such as the childcare center), a child can engage in activities. Activities, according to Bronfenbrenner (13), are forms of behavior; yet, not all behaviors are forms of molar activities because some behaviors are short-lived and do not make any impact on
Figure 3.2: An Illustration of Bronfenbrenner’s (13) Theory for the Ecology of Human Development’s Influence on the Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center.

*Study constructs (concepts, preference, availability, and intake) that are bolded and in all capital letters were explicitly stated by this theoretical resource.
development. One’s dietary intake can be considered a form of activity. Other activities a child or primary care provider or childcare provider participates in that relate to fruits and vegetables may be expressed in their concepts of fruits and vegetables. For example, through a child’s concepts of peas, one may grasp an understanding of how a child sneakily feeds his cat his peas because he does not have a preference for them even through they are available and served at his home at least once a week. This concept of not liking peas and how this individual deals with that can also be viewed as part of this child’s experience. Further expression of how this child’s mother would get mad if he were caught feeding the cat and not eating his peas helps to illustrate how this child perceives a particular environmental element—his mom.

A child and his mom as well as a childcare provider and a child in her care are examples of dynamic entities. Each entity interacts with one another and responds to the other in a dynamic manner. For example, when a childcare provider expresses to a child that she does not like bananas, a child can dynamically follow the childcare provider’s lead and not eat the banana provided to her at snack. This example illustrates how a childcare provider can serve as a positive or negative role model for a child. Roles are discussed in the Theory for the Ecology of Human Development (13) and are defined as a “set of activities and relations expected of a person occupying a particular position in society and of others in relation to that person.”

Buying, serving, and eating fruits and vegetables in the household are all roles that primary care providers may or may not have that impact how fruits and vegetables operate for them and their child. Understanding which of these roles a primary care provider participates in are examples of determining his or her level of engagement in activities such as grocery shopping, meal preparation, and feeding his or her child. Settings, activities, experiences, perceptions, interactions, roles, and engagements evolve. People, no matter what age, develop. Development is a fundamental construct in understanding dietary activities in individuals. Bronfenbrenner (13) defines development as: “the person’s evolving conceptions of the ecological environment and his or her relation to it (13).” Taken together, the Theory for the Ecology of Human Development...
Development (13) provides several theoretical constructs that help to understand the importance of concepts, preference, availability, and intake of fruits and vegetables in a child, primary care provider, and childcare provider. The theory also illustrates that environmental elements such as availability and intake of fruits and vegetables relate as does a mom’s intake of fruits and vegetables affects a child’s intake of fruits and vegetables.

Moving outside the immediate settings and working on further understanding the relations that transpire between a child and his primary care provider and childcare provider, I will define a mesosystem. A mesosystem defines interrelations among two or more settings in which the developing person actively participates. In this study, the mesosystem consists of the household and the Head Start childcare center. Operating in this system is dyads or a two-person relationship. This study used a dyad that is often considered one of the strongest for young children. This dyad is the relationship between a primary care provider and a child. Participating in this dyad can help this child form other interpersonal relationships such as with a childcare provider. These relationships involve mutual accommodation. Social interactions and interconnections are theoretical constructs of the Theory for the Ecology of Human Development (13) that further explains how environmental elements and how one relates and responds to them influence an individual. In other words, a child’s relationship with his mother is two-directional. This means that a mother’s actions such as eating her vegetables or not influence her child’s concepts, preference, availability, and intake of vegetables. Likewise, a child’s dislike for vegetables may influence his grandfather’s purchasing of these items. This dynamic bi-directional relationship is a process of mutual accommodation and has an inherent reciprocity.

Other considerations provided by the Theory for the Ecology of Human Development (13) is the importance of realizing that no one level or factor operates in isolation. In other words, the operations of a child’s concepts, preference, availability, and intake of fruits and vegetables is affected by other levels or factors such as his mother’s concepts, preference, availability, or intake of fruits and vegetables or a grocery store’s offerings of fruits and vegetables. Supporting links within the mesosystem and external to this system can help or hinder an individual or relationship. In other words, a food bank or grandmother who serves weekly Sunday dinners that include collard greens can provide support to a struggling low-income single mother. Larger contexts such as culture are imbedded into the ecological environment a child, primary care provider, and childcare provider develop and operate in and must be taken into consideration in order to correctly interrupt and understand an individual or specific dyad. An example of culture in the targeted population is the Sunday meal. This meal not only regularly takes place and consists of collard greens but also plays a critical role in African American families in connecting
the entire family. But, this meal, although culturally relevant, did not take place in all of the children in this study.

The selected Bronfenbrenner (13) theoretical constructs that informed my conceptualization of the child, primary care provider, and childcare provider individual level as well as the between level interactions demonstrates that the relationship between the individuals provides a substantial amount of insight into what is occurring at the individual level. Yet, an inherent weakness to this theory is it does not provide sufficient insight into how to systematically study what is occurring at the individual level independent of the interacting systems. Thus, in order to gain a better understanding of the individual factors in this study I needed to supplement this theory to design this study’s theoretical model.
C. Novak and Gowin (14) and Ausubel, et al.’s (223) Theory of Meaningful Learning

Similar to Bronfenbrenner’s theory (13), the Theory of Meaningful Learning (14, 223) (Figure 3.3) focuses on individual conceptualization. The difference between the two theories is that the Theory for the Ecology of Human Development (13) focuses on external or environmental influences that affect conceptualization while the Theory of Meaningful Learning (14, 223) focuses on the intra-psychic influences. Ausubel (223) stressed in his work on meaningful learning that: “the most important single factor influencing learning is what the learner already knows.” He went on to explain that a teacher should ascertain what a learner already knows and teach from there. According to the Theory of Meaningful Learning (14, 223), an educated individual “learns to interpret and manage her relationship with the environment through the meanings that she attaches to that relationship” (16). Thus, meaning or meaningful learning along with understanding an individual’s unique meanings and learning is the obvious key idea of the Theory of Meaningful Learning (14, 223).

Meaning, as defined by Ausubel, et al. (223), is the abstract prepositional relation that one concept has with other actions, objects, or concepts in the cognitive structure. Meaningful learning is the end product of the process by which new information is acquired into existing relevant concepts and propositions in a substantive manner. This acquisition can result in adjustments to the existing cognitive structure (structure of knowledge) and of the newly learned material. Meaningful learning demands a pre-existing cognitive context and by its nature facilitates long-term memory or acquisition of the new material.

Using how one learns as a foundation, Ausubel, et al. (223) as well as Novak and Gowin (14) developed strategies by which these learning processes can be utilized in education. Novak and Gowin (14), specifically, used concepts from philosophy and instructional theory to expand the Theory of Meaningful Learning (14, 223) and make it more relevant to classroom instruction. These strategies emphasize an individual’s unique meaning and concepts. Concepts are emphasized, as Novak and Gowin (14) believe they are what individuals think with. Novak and Gowin (14) explain that the meaning of any given concept is derived from the interrelationships that concept has with other concepts. One reason, therefore, that early childhood education is important is that it provides a rich base of concepts from which all future learning can proceed. If that base is impoverished, then future learning will be impoverished as well. Thus, a preschool child with few concepts of fruits and vegetables may have a weak foundation for understanding the more complex, but important concepts of fruits and vegetables later in life such as how antioxidants in fruits and vegetables help prevent chronic diseases.
Figure 3.3: An Illustration of Novak and Gowin (14) and Ausubel et al.’s (223) Theory of Meaningful Learning’s Influence on the Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center.

*Study constructs (concepts, preference, availability, and intake) that are bolded and in all capital letters were explicitly stated by these theoretical resources.
Utilizing concepts is useful in early educational programs because concepts are acquired early in life. Young children unlike older children discover concepts. They do not receive instruction on concepts. Somewhere between the ages of two and three, children learn to construct meaning of new concepts. Limited knowledge of young children’s transition from concept discovery to concept construction is available (223). This study focuses on three year-olds and older and thus should fall into concept construction. Not all children, especially developmentally delayed children, follow the typical developmental trajectories. Based on the concept maps from the children in this study, I believe some of the children in this study were in the concept discovery stage.

Misconceptions are another theoretical construct used in the Theory of Meaningful Learning (14, 223). Novak and Gowin (14) defined it as an: “unaccepted (but not necessarily ‘wrong’) interpretation of a concept illustrated in the statement in which the concept is embedded.” “Fruit is poison” is a misconception in that fruit is not a poison. But, if a child is told by his parents not to eat the seeds of an apple because they will make him choke, the child might logically identify that eating a certain part of a fruit is “poison.” Misconceptions are difficult to change (14). Identifying and understanding young children’s misconceptions are important to this study. It enables me to identify potentially harmful knowledge in the children as well as potential sources of this misleading information. This misleading information may be the result of a misconception from either a primary care provider or a childcare provider. It may also be a result of a child’s misunderstanding of a nutrition message from either their primary care provider or their childcare provider. Or, alternatively, it may be a product of the child’s own creative efforts of trying to create understanding in an otherwise confusing environment.

In the Theory of Meaningful Learning (14, 223), knowledge is hierarchical. It is stored in such a manner that new concepts fall under the meanings of pre-existing concepts (14). Based on this, education strategies must create higher order concepts that can be used to guide lower order concepts. A goal of this research was to identify if children were using any specific hierarchy or order in discussing their concepts of fruits and vegetables.

The Theory of Meaningful Learning (14, 223) provides a framework and specific methodology by which I can identify each child’s concepts, misconceptions, and order of processing knowledge. The theory supplies a framework by which future nutrition educators can utilize this data to develop, implement, and evaluate their own future nutrition education efforts. In sum, the theory provides a way for me to develop meaningful questions to ask the children, observe meaningful classroom and mealtime observations that may influence the children’s
concepts about fruits and vegetables as well as interpret meaning from the children’s responses and my observations of the children’s actions.
D. Achterberg’s (16) Study of the Meaning of Food and Nutrition in Families with Young Children: A Study in Social Cognition

Achterberg (16), as previously discussed in Chapter II, effectively illustrates some of the key elements used in this study’s methodology and theoretical framework. She provided a means of synthesizing the Theory for the Ecology of Human Development (13) and the Theory of Meaningful Learning (14, 223) as a means to understanding a preschooler’s social cognition of food and nutrition and how his or her parents influence this understanding. And, thus, constructs previously discussed in the Theory for the Ecology of Human Development (13) and the Theory of Meaningful Learning (14, 223) are found in her work and will not be redefined here. As illustrated in Figure 3.4, hypotheses generated by her study informed this examination of Head Start children’s concepts and preference of fruits and vegetables. Specifically, she hypothesized that shared meaning is negotiated between individuals and it is not established between a child and her/his parents unless there is a defined need, interest or super-ordinate goal to which parents and children can direct their attention, have an opportunity for social interaction on the subject, and conduct a meaningful discussion about the topic. In the absence of this discussion or exchange, children created their own meanings for that particular topic. Similarly, children created their own meanings for particular topics when receiving mixed messages, e.g., from their parents and their childcare providers. As previously discussed, Novak and Gowin (14) stress that misconceptions are difficult to change and become increasingly hard to correct as the meanings grow in complexity. Thus, Achterberg (16) illustrates the importance of examining a child’s current concepts of fruits and vegetables. She suggested that observations and explorations of a child’s interaction in her or his home and childcare center are essential. Achterberg’s (16) other hypotheses emphasize the importance of early nutrition education and provide specific methods of developing, implementing, and evaluating not only studies on young children but also nutrition education materials generated toward children and their parents.
Figure 3.4: An Illustration of Achterberg’s (16) Influence on the Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center.

*Study constructs (concepts, preference, availability, and intake) that are bolded and in all capital letters were explicitly stated by this theoretical resource.

CONCEPTS
- Meaning, Learning
- Meaningful Learning
- Misconceptions
- Current Cognitive Structure
- Knowledge is Hierarchical
- Concepts
- Methods: Interviews, Concept Mapping

PREFERENCE

CONCEPTS
- Meaning, Learning
- Meaningful Learning
- Misconceptions
- Current Cognitive Structure
- Knowledge is Hierarchical
- Concepts
- Methods: Interviews, Concept Mapping

Intake

Shared Meaning, Preference
Acquisition of Concepts
Sources of Information
Social Interaction
Interpersonal Relationships
Methods: Meaningful Classroom & Mealtime Observations

CONCEPTS
- Meaning, Learning
- Meaningful Learning
- Misconceptions
- Current Cognitive Structure
- Knowledge is Hierarchical
- Concepts
- Methods: Interviews, Concept Mapping

Intake

CONCEPTS
- Meaning, Learning
- Meaningful Learning
- Misconceptions
- Current Cognitive Structure
- Knowledge is Hierarchical
- Concepts
- Methods: Interviews, Concept Mapping

Intake

CONCEPTS
- Meaning, Learning
- Meaningful Learning
- Misconceptions
- Current Cognitive Structure
- Knowledge is Hierarchical
- Concepts
- Methods: Interviews, Concept Mapping

Intake

CONCEPTS
- Meaning, Learning
- Meaningful Learning
- Misconceptions
- Current Cognitive Structure
- Knowledge is Hierarchical
- Concepts
- Methods: Interviews, Concept Mapping

Intake

Childcare Provider (Child’s Environment)

Primary Care Provider (Child’s Environment)

Child
E. Davison and Birch’s (15) Ecological Model of Predictors of Childhood Overweight

Although Achterberg’s (16) findings and hypotheses guided the research questions, this study’s sample is different. Some of these differences include socio-economic, ethnic, and geographic factors. These factors play a role in a child’s nutrition-related parameters (224-226). Limited research indicates the influence of economic and geographic factors in a child’s fruits and vegetables availability (227-229). Therefore, to control for these influences, I focused this exploratory study exclusively on a low-income, African American, inner-city Head Start childcare center preschool population.

Davison and Birch’s (15) Ecological Model of Predictors of Childhood Overweight (15) (Figure 3.5) provide a theoretical understanding of how economics, ethnicity, and geography factor into understanding food and nutrition in children. This understanding provided a nutrition-specific and more comprehensive understanding of constructs I was using in this study (Figure 3.6). They also believe gender and age have an impact. Other theoretical constructs of this Bronfrenbrenner-informed (bi-directional, no one level operates in isolation) model that informed this study was the idea of immediate contexts. The home and school are immediate contexts for a child. This model emphasizes that parenting styles and family characteristics have an influence on a child’s nutrition knowledge, food preferences, food availability, and dietary intake. These characteristics include the parent’s dietary intake and activity patterns, nutrition knowledge, child-feeding practices, along with peer and sibling interactions. The school environment plays its own role in a child’s weight status. A school can exert its influence through its provision of food at breakfast and lunch as well as its allocation of time for physical activity. At the larger social contextual level (community and society in general), parents’ work-related demands impact a child’s weight status. The availability and accessibility of healthy food and recreational facilities is another influential factor.
Figure 3.5: Davison and Birch’s (15) Ecological Model of Predictors of Childhood Overweight.
Figure 3.6: An Illustration of Davison and Birch’s (15) Ecological Model of Predictors of Childhood Overweight’s Influence on the Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center.

*Study constructs (concepts, preference, availability, and intake) that are bolded and in all capital letters were explicitly stated by this theoretical resource.
Figure 3.6: An Illustration of Davison and Birch’s (15) Ecological Model of Predictors of Childhood Overweight’s Influence on the Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center, Continued.

Outer Level Influences: Socio-economic Status, Parent’s Work-Related Demands, Ethnicity, Peer and Sibling Interactions, Larger Social Contexts, and No One Level or Factor Operates in Isolation

F. Summation, Synthesis, and Explanation of the Study Model

Taken together, the Theory for the Ecology of Human Development (13), the Theory of Meaningful Learning (14, 223), Achterberg’s (16) findings and hypotheses, and The Ecological Model of Predictors of Childhood Overweight (15) provide a theoretical framework for this study. The Theory for the Ecology of Human Development (13) supplies an ecological perspective on how I can evaluate the influence of the home, childcare center, and other contextual factors on inner-city Head Start children’s development of concepts and preferences on fruits and vegetables. The Theory of Meaningful Learning (14, 223) illustrates the importance of the individual. It stresses that all nutrition education efforts must start at the level of knowledge a child already has. The Theory of Meaningful Learning (14, 223) also supplies a methodology of describing an individual child’s unique conceptual framework of fruits and vegetables. Achterberg’s (16) work demonstrates how to integrate the Theory for the Ecology of Human Development (13) and the Theory of Meaningful Learning (14, 223). She generated hypotheses that are informative to developing, implementing, and evaluating this study. Davison and Birch’s model (15) gives this study a childhood nutrition-specific ecological model. It illustrates how contextual factors such as economics, ethnicity, and geography influence the children I am working with. All of these theories, hypotheses, and models complement each other and facilitate a theoretical framework by which I can generate some understanding of low-income, African American, inner-city, Head Start children’s concepts, preference, availability, and dietary intake of fruits and vegetables.

Even though each of these four unique theoretical resources informed this research study and complement each other in many critical ways, integrating each of them in a specific model that can guide this research inquiry was complicated. The difficulty of theory integration is each theoretical resource is robust and one study cannot test one resource’s hypotheses let alone four. Theory integration is challenging to effectively communicate. A study using multiple theories has to be very careful and clear in communicating to the field which theories provided, informed, or guided which theoretical constructs. Nonetheless, successful theory building thrives on a
multi-faceted theoretical foundation as no one theory can explain dietary behavior. Theory building demands a systematic set of hypotheses and/or models to drive the inquiry. The theoretical model (Figure 3.7) I constructed to guide this research inquiry combines findings discussed repeatedly in the literature review (Chapter II) and selected theoretical constructs discussed throughout this chapter. Some of these theoretical constructs such as “bidirectional influence” were expressed in each theory in some shape or form while other theoretical resources such as the Theory of Meaningful Learning (14, 223) and Achterberg (16) provide specific guidance through the theoretical construct of meaningful learning to understanding one of this studies’ particular constructs—concepts.

This model is not an attempt to capture all levels, variables, or contexts of influence on fruits and vegetables in an inner-city Head Start childcare center. Rather, this model is a small, but systematic attempt to inquire how constructs such as concepts, preference, availability, and dietary intake of fruits and vegetables interact in a low-income, African American, Head Start preschooler. This model also tries to inquire how a child’s primary care provider and childcare provider’s concepts, preference, availability, and intake of fruits and vegetables interact and relates to the child’s concepts, preference, availability, and intake of fruits and vegetables. The model’s ordering of the study constructs—concepts, preference, availability, and dietary intake—is not meant to be hierarchical or chronological. No one study construct is pre-supposed to have more weight in understanding fruits and vegetables in this population than another. The primary care providers are hypothesized to be more influential on their child’s study constructs because they share more genetic and contextual influences such as household fruit and vegetable availability. Even though the literature review and the overview of the theoretical resources provides a foundation for this study model, the model—its components and connections—are in and of themselves hypotheses to which this study aims to explore.
Figure 3.7: The Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center Prior to Data Collection.
See Figure 4.1 for the methodology used to measure each study construct (concept, preference, availability, and intake) and explore the construct and entity (childcare provider, primary care provider, and child) connections.
CHAPTER IV:

METHODS
CHAPTER IV: METHODS

A. Introduction

This chapter outlines the methodology used for the overall project. This outline includes a description of the study design, study participants, and the methods used to collect and analyze the data needed to assess each of the three project aims:

1) To explore the concepts, preference, availability, and dietary intake of fruits and vegetables in low-income, African American preschoolers who participate in an inner-city Head Start childcare center;

2) To explore the concepts, preference, availability, and dietary intake of fruits and vegetables in primary care providers (parents, grandparents, etc.) of the children studied under the first aim; and,

3) To determine the level of shared meaning, preference, availability, and dietary intake of fruits and vegetables between the children studied under the first aim and both their primary care providers (studied under the second aim) and their childcare providers.

Essentially, the data were collected through qualitative interviews of low-income, African American, Head Start preschoolers along with subsequent interviews of their primary care providers and childcare providers. Food picture cards and food preference ratings were components of the interviews. The appendices further describe the interview questions (Appendix H (child), I (primary care provider), I (childcare provider)) as well as foods used in the picture cards and preference ratings (Appendix G). Primary care providers and childcare providers completed additional questionnaires as part of their interviews. These questionnaires provided information on demographics (Appendix J (primary care provider), K (childcare provider)), feeding practices (Appendix M), selected fruit and vegetable availability, and fruit and vegetable intake (Appendix L). Direct observations of the Head Start classrooms and mealtime environment including foods served and the menu provided by the center to the childcare providers and primary care providers were used. The data were then analyzed using concept maps (see H.2.), descriptive frequencies, and statistical analyses including Spearman correlations and T-tests (see I.7.). The Vee diagram in Chapter I visually displays the driving elements of this study. Figure 4.1 represents how the methodology utilized helped test this study’s theoretical model.
Figure 4.1: The Methodology Used to Test the Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center.
The study’s key constructs are **bolded** and underneath each construct are the specific measures used to investigate that particular construct. All arrow connections were analyzed via Spearman correlations. The larger influence of the primary care provider on the child in comparison to the childcare provider was assessed by the strength of the correlations between individual study constructs.

**Concepts**
- Ability to name fruits and vegetables
- Answers to interview questions

**Availability**
- Household descriptions

**Preference**
- Yummy/yucky
- Ratings

**Intake**
- National Cancer Institute Fruit and Vegetable Screener

(Darker Indicates Larger Influence)
B. Study Philosophy

Poverty has prevailed for centuries and its causes have been established as multi-factorial. The United States government has played a role in addressing poverty for decades. Poverty has been studied extensively, is not clear-cut, and is often controversial (230). The role of this thesis was not to define the etiology of poverty nor will it solve poverty. This thesis did not aim to evaluate the government’s role in poverty.

My aim with this research was to embrace the humbling opportunity I had to listen and learn from members of an inner-city Head Start childcare center. I aimed to explore the role of fruits and vegetables in their lives in hopes that this exploration may serve as a foundation for future nutrition interventions targeted toward this population to increase this population’s consumption of fruits and vegetables. This research may also serve to inform government officials on how they may more effectively use their programs such as Head Start and Food Stamps to help low-income, African Americans consume more fruits and vegetables.

The members of this study sample were the heart of the study. They were the driving pulse of this work. I was honored to have the opportunity to work with them. In order to gain the trust of this study sample—collectively (at the Head Start administration level) and individually (at the child and primary care provider level), successfully work with them, and try my best to maintain their confidentiality, I tried to ascribe to the multi-cultural paradigm (231-232). This paradigm is an expanded version of the prevalent mono-cultural, Euro-centric paradigm and aims to improve the validity, generalizability, applicability, and acceptability of current health research. To accomplish this, Rogler (232) restructured the predominant research process. This restructuring entailed revision in all seven steps of the research process: 1) articulation of the research question, 2) theory development, 3) design and methods, 4) measurement and translation, 5) implementation, 6) interpretation, and 7) dissemination. These revisions were proposed to increase the cultural sensitivity of research and, in doing so, more effectively serve multi-cultural populations. Some revisions include: involving members of the study group to be an integral player in the research process, a reassessment of theoretical constructs that were predominantly derived in Western societies with a majority of Caucasian participants, an increased emphasis on purposeful sampling versus traditional random sampling, adequately measuring the validity and reliability of translated measurement instruments, changes to typical data collection methods such as paper and pencil formats to more semi-structured interviews, controlling for economic versus cultural factors, and a heavier reliance on participatory research strategies. These revisions, among others, establish the fundamental premises of the multi-cultural paradigm. Moreover, this paradigm strives to: “identify, incorporate and support the strengths, integrity and protective
health-promoting behaviors that are inherent in every cultural group (232).” Hence, the multi-
cultural paradigm provides a framework that enables the development, implementation, and
evaluation of more effective ethnic-specific interventions. Table 4.1 provides examples of how I
tried to ascribe to this paradigm.

Table 4.1: Examples of How this Study Tried to Follow the Multi-Cultural Paradigm (231-
232).
The numbered statements are the seven steps of the research process that the paradigm suggests
need to be revised. Below the numbered statements are examples of how this study tried to revise
this step in light of the Multi-Cultural Paradigm.

1) Articulation of the Research Question
-Used an exploratory, qualitative study where the research question was not pre-supposed with
hypotheses. The research direction also emerged from the study participants.
-Implemented a preliminary study in the research community to ask if the research study—topic
and method—were of interest to the community.

2) Theory Development
-Relied on four different theoretical resources as a means of trying to understand how contextual
factors such as ethnicity, socio-economic status, and geography factor into the study sample.
-Designed a study that integrated multiple and interacting players: children, primary care
providers, and childcare providers.

3) Design and Methods
-Designed a community-based study where I went and worked within the community. This
allowed study participants the opportunity to get to know me better before participating in the
study. Working at the center also provided a convenient meeting point for all study participants.
-Utilized methodology such as open-ended questions that facilitated a more relaxed and person-
centered environment for the study participants.

4) Measurement and Translation
-Relied on a preliminary study to test the study methodology and instruments within the
community and refined the study protocol based on these findings.
-Refined study protocol and instruments to include culturally appropriate foods and community-
based questions.

5) Implementation
-Worked slowly within the community to first build trust before even asking them to participate
in this study.
-Allowed flexibility in interview times so that the experience was convenient and enjoyable for
all involved.

6) Interpretation
-Analyzed results in context and tried to understand findings in light of other contextual variables
such as fruit and vegetable availability in neighborhood grocery stores.
-Relied on colleagues to help in differentiating objective versus subjective observations and
interpretations.

7) Dissemination
-Shared both positive and negative findings with the Head Start administration that were of
interest and were areas in which feasible steps could be implemented.
-Designed nutrition education activities for the children and primary care providers that were
based on their interviews. Then, designed a childcare provider and foodservice staff in-service
based on ideas generated from the study’s interviews and my conservations with the childcare
providers and foodservice staff.
I also found guidance from McCuen (233) who stressed that the federal, state, or local government cannot improve the health of low-income and ethnic minority populations alone. McCuen emphasizes the fundamental role of organizations and individuals at all three governmental levels (federal, state, and local) including health researchers. The National Institute for Environmental Health Sciences (234) supports community-based research efforts and I aimed to follow (as illustrated in Table 4.2) what they described as the ideal community-based research project:

‘begins with the goals and questions of the community; is participatory at every level; is multi-disciplinary and requires respect for the knowledge of all partners; includes as community partners community-based groups who are accountable representatives of the community; develops codes of ethics defined by communities and their partners; develops principles of collaboration that ensure accountability of all partners; is culturally sensitive and uses a diversity of communication tools and appropriate language; involves sharing of power, including the sharing of significant levels of resources with the communities; attempts to build a common language among partners; develops and employs new standards for evaluation; addresses the more complex and difficult-to-study questions that are often overlooked; and develops a more collaborative and broader definition of problems with preliminary descriptive studies.’

Table 4.2: Examples of How this Study Tried to Follow the National Institute for Environmental Health Sciences’ Recommendations for Community-based Research Projects (234).
The bolded statements are the Institute’s recommendations. Below each statement are examples of how this study tried to ascribe to this recommendation.

<table>
<thead>
<tr>
<th>Begins with the Goals and Questions of the Community</th>
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<tbody>
<tr>
<td>-Used an exploratory, qualitative study.</td>
</tr>
<tr>
<td>-Relied on a preliminary study within the community.</td>
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</table>

<table>
<thead>
<tr>
<th>Is Participatory at Every Level</th>
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<tbody>
<tr>
<td>-Interviewed children, primary care providers, and childcare providers.</td>
</tr>
<tr>
<td>-Asked for Informed consent from each study participant along with obtaining Letters of Agreement from the managing Head Start administration.</td>
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<table>
<thead>
<tr>
<th>Is Multi-Disciplinary and Requires Respect for the Knowledge of All Partners</th>
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<tbody>
<tr>
<td>-Assembled a multi-disciplinary research committee.</td>
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<tr>
<td>-Attended other Head Start comprehensive services’ activities and other neighborhood organizations’ functions.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Includes as Community Partners Community-based Groups who are Accountable Representatives of the Community</th>
</tr>
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<tbody>
<tr>
<td>-Based study at a Head Start childcare center that was housed within a well-attended church.</td>
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<tr>
<th>Develops Codes of Ethics Defined by Communities and their Partners</th>
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<tbody>
<tr>
<td>-Followed university regulations for conducting research with human subjects.</td>
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<tr>
<td>-Obtained Letters of Agreement from the Head Start administration.</td>
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<tr>
<td>-Obtained Informed consent from all study participants.</td>
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<table>
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<tr>
<th>Develops Principles of Collaboration that Ensure Accountability of all Partners</th>
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</thead>
<tbody>
<tr>
<td>-Obtained Letters of Agreement from the Head Start administration and obtained Informed consent from all study participants.</td>
</tr>
</tbody>
</table>
Table 4.2: Examples of How this Study Tried to Follow the National Institute for Environmental Health Sciences’ Recommendations for Community-based Research Projects (234), Continued.

The **bolded** statements are the Institute’s recommendations. Below each statement are examples of how this study tried to ascribe to this recommendation.

<table>
<thead>
<tr>
<th><strong>Is Culturally Sensitive and Uses a Diversity of Communication Tools and Appropriate Language</strong></th>
</tr>
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<tbody>
<tr>
<td>- Researched cultural foods and communication mediums prior to study.</td>
</tr>
<tr>
<td>- Observed community before implementing preliminary study to better understand cultural influences.</td>
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<tr>
<td>- Used preliminary study.</td>
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<tr>
<td>- Open-ended questions.</td>
</tr>
<tr>
<td>- Asked participants to inform me if anything I did made them uncomfortable.</td>
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<table>
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<tr>
<th><strong>Involves Sharing of Power</strong></th>
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<tbody>
<tr>
<td>- Obtained Letters of Agreement from Head Start administration and Informed consent from each study participant.</td>
</tr>
<tr>
<td>-Depended on study participants for study.</td>
</tr>
<tr>
<td>- Funded nutrition activities during summer program and staff in-service.</td>
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<tr>
<td>- Provided about forty hours a week of volunteer time to the center.</td>
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<tr>
<th><strong>Attempts to Build Common Language Among Partners</strong></th>
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<tr>
<td>- Used qualitative interviews, which enabled me to understand what the participants called foods and how they understood key study elements such as fruit and vegetable availability.</td>
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<tr>
<th><strong>Develops and Employs New Standards of Evaluation</strong></th>
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<tr>
<td>- Did not use this study sample to compare to other study samples.</td>
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<tr>
<td>- Let the sample speak for themselves.</td>
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<tr>
<th><strong>Addresses the More Complex and Difficult-to-Study Questions that are Often Overlooked</strong></th>
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<tr>
<td>- Used an exploratory, qualitative design that enabled the participants to provide insight into areas that relate to the study topic that they believed were important.</td>
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<tr>
<td>- Initiated the first study in this topic of this nature at this Head Start center.</td>
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<tr>
<th><strong>Develops a More Collaborative and Broader Definition of Problems with Preliminary Descriptive Studies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Used an exploratory, qualitative study.</td>
</tr>
<tr>
<td>- Generated a series of hypotheses and recommendations that depended on a more comprehensive understanding of the community and the role fruits and vegetables play in it.</td>
</tr>
</tbody>
</table>

These suggestions stress the importance of designing and implementing culturally competent interventions; nonetheless, they define cultural competence to emphasize the importance of recognizing the entire environment an individual grows up in. These suggestions establish the vitality of the health researcher in aiding in empowering the individual in conjunction with her or his community to take initiative in recognizing the obstacles to good health in the community and taking feasible steps to improve them. Patience and stability of contact amongst the community and with the researchers are the foundation to long-term success at building a healthier community.

The National Institute for Environmental Health Sciences (234) acknowledges that the role of the researcher in community-based studies is still evolving. I concur and for this study aimed to...
conduct this research as objectively as possible while acknowledging that some of my observations were subjective. My committee members, colleagues, research assistants, and Head Start staff served to evaluate and differentiate my observations. Bronfrenbrenner (13) recognizes that scientific inquiry demands more than an objective analysis of an environment. These analyses are important to understanding how one’s findings fit into the larger context. I concur and at the same time agree that in order to advance research and theoretical development, data must be presented in a manner that is systematically and scientifically reliable and valid.

An additional element of this study philosophy was a lesson from Thomas Kuhn (235): “Creators of new paradigms are generally ‘very young or very new’ to their field of interest and that, ‘being, little committed by prior practice to the traditional rules of normal science, [they] are particularly likely to see that those rules no longer define a playable game and to conceive another set that can replace them.’” Kuhn provided insight into how new paradigms evolve while emphasizing the role of a new scientist to the field. This study tried to follow non-traditional paradigms. Adhering to these paradigms was constrained by my role as a graduate student. Consequently, I am confined to only confidently determine that I accomplished my proposed role as a graduate student completing on my thesis project of working with an inner-city Head Start childcare center to lay the foundation for future nutrition work by: 1) helping to build trust within the community so that this study as well as future projects can occur; 2) providing baseline data including insight from the community to inform future projects within this community; and 3) sharing economically and culturally sensitive, community-based recommendations for future projects to the participating community as well as to this study’s funding source.

C. Overview of Specific Methods Used for Specific Research Aim

1) To explore the concepts, preference, availability, and dietary intake of fruits and vegetables in low-income, African American preschoolers who participate in an inner-city Head Start childcare center.

- Concept maps were constructed for each child for the questions regarding fruits and vegetables and enabled the identification of patterns of thought.
- Food preference for fruits and vegetables were assessed utilizing a modified version of Birch (236). The foods that were tested are listed in the Food section in Appendix G.
- Fruit and vegetable availability was determined by taking direct observations of the all foods served to the children at the Head Start center from January—August, 2002. The child’s primary care provider also described how often he or she had the selected fruits and vegetables in his or her household.
• Dietary intake of fruits and vegetables for each child was determined by having each child’s respective primary care provider complete the National Cancer Institute (NCI) Fruit and Vegetable screener (237) based on her or his respective child’s intake.

• Statistical analyses aided in defining the relationship between the children’s concepts, preference, availability, and dietary intake of fruits and vegetables and helped cluster children based on high, medium, and low correlations between these parameters.

2) To explore the concepts, preference, availability, and dietary intake of fruits and vegetables in the primary care providers of the children studied under the first aim.

• Concept maps were constructed for each primary care provider for the same questions regarding fruits and vegetables used for the children’s interviews.

• Food preference for fruits and vegetables were assessed utilizing a modified version of Birch (236). The foods that were tested are listed in the Food section in Appendix G.

• Fruit and vegetable availability were determined using information the primary care provider supplied on how often he or she had the selected fruits and vegetables in his or her household.

• Dietary intake of fruits and vegetables were determined by having the primary care provider complete the National Cancer Institute Fruit and Vegetable screener (237) for her or his own intake.

• Statistical analyses aided in defining the relationship between the primary care providers’ concepts, preference, availability, and dietary intake of fruits and vegetables and helped cluster the primary care providers based on high, medium, and low correlations between these parameters.

3) To determine the level of shared meaning, preference, availability, and dietary intake between the children studied under the first aim and both their primary care providers (studied under the second aim) and their childcare providers.

• Concept maps were constructed for each childcare provider for the same questions regarding fruits and vegetables used for the children’s interviews. Maps were than constructed that included the concepts generated by a child along with their respective primary care provider and childcare provider. Shared concepts were highlighted.

• Food preference for fruits and vegetables were assessed utilizing a modified version of Birch (236) for the childcare providers. The foods that were tested are listed in the Appendix G. The preferences stated by an individual child were then compared to her or his respective primary care provider and childcare provider.
• Fruit and vegetable availability were determined using information the childcare provider supplied on how often he or she had the selected fruits and vegetables in his or her household. Since the availability of fruits and vegetables of an individual child was provided by her or his respective primary care provider’s description of how often selected fruits and vegetables were in her or his household, values were the same. Comparisons to the child’s childcare provider’s availability descriptions as well as Head Start foodservice provisions were made.

• Dietary intake of fruits and vegetables were determined by having the childcare provider complete the National Cancer Institute Fruit and Vegetable screener (237) for her or his own intake. A child’s screener score was compared to both her or his respective primary care provider and childcare provider’s scores.

D. Preliminary Studies

Pilot work was conducted from February—March, 2002. During this period, I practiced interviewing preschool-aged children in one of the six classrooms at the Head Start primary study center (to be described further later). I also worked with each child’s primary care providers to obtain information on the child’s demographics and fruit and vegetable availability. In addition, I practiced interviewing the primary care providers and childcare providers. This pilot period allowed for testing the effectiveness of the protocol for data collection. Informed consent was obtained from the child’s primary care provider. A total of eleven children, ten primary care providers, and one childcare provider were interviewed. Table 4.3 illustrates the children’s age, gender, ethnicity, and economic status. Table 4.4 describes the primary care providers’ age, gender, ethnicity, economic status, marital status, and family. The childcare provider interviewed from the pilot classroom was: thirty-one years old, female, married, middle-class, and African American. Based on these interviews, revisions to the original study protocol were made. The key revision was the children were not asked to group the food picture cards in the primary data collection. Grouping was found to be a difficult task for the children. Most of the children grouped by color or shape not by food type. Food grouping was similarly noted as a difficult task for children in another study with Head Start children (173). The importance of a child’s ability to name a fruit and vegetable was noted. Later analyses of the data used for the primary study collection demonstrated that the preliminary studies were conducted in a very similar population.
Table 4.3: Demographic Characteristics of the Pilot Children.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number (n=total number)</th>
</tr>
</thead>
<tbody>
<tr>
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Table 4.4: Demographic Characteristics of the Pilot Primary Care Providers.

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<td>Four or More Children</td>
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Dr. Achterberg, the study advisor, carried out a similar study in 1986 with nine preschool children and their parents (16). She provided training and oversight. Additional training on interviewing children and collecting food preference data was obtained from various qualified professionals including Dr. Birch. These preliminary interviews helped to ensure that the interviewing format was age, culture, and ability-appropriate. It tested the validity and reliability of some of the study instruments.
E. Design and Sample Recruitment

The design was an exploratory, qualitative study. I selected a Head Start center that was in an inner-city and that had several centers and classrooms that served a predominantly low-income, African American population. The Head Start center that served as the primary study center was the managing site for over six Head Start centers. The number of children at each of these centers ranged from 40 to 120. The primary study center cared for 120 children with 20 children in each of the six classrooms. Two childcare providers were in each classroom at all centers, one was considered the head childcare provider while the other was considered the assistant. From these six classrooms (five when the pilot classroom was excluded), I randomly selected two classrooms so that I could focus on understanding the role of a childcare provider on a preschooler’s understanding of fruits and vegetables. From these two classrooms, approximately twenty-four similar children (twelve in each classroom) were recruited to participate in a long-term qualitative study that involved individual multiple interviews. The long-term nature of this study is based on the idea of using multiple qualitative interviews over a course of time paired with over a month of direct classroom observations. I initially observed and interviewed the children in the first classroom from April to May, 2002. Then, I slowly transitioned into the second classroom. I observed and interviewed the children in this classroom from May until mid-June. The primary care providers of the children in both classrooms were interviewed once their respective child had completed her or his set of interviews. The two childcare providers were interviewed once the children from both classrooms were interviewed. “Similarity” is regarded as an important factor because this exploratory inquiry aims to evaluate only the “self” and “microsystems” levels of Bronfenbrenner’s ecologic systems model (13). In this study, similarity focused on recruiting children that were of the same economic status, ethnicity, and that participated in the same Head Start childcare center. Qualitative methods were the basis of the data collection because they enabled me to: 1) match the philosophical underpinnings used to frame this inquiry, 2) produce more reliable measurements of cognitive performance than multiple choice or other more “quantitative” approaches are known to produce, and 3) utilize techniques that could be adapted to preschool-aged children (14).

Data saturation was met by interviewing twenty-four Head Start children. In other words, within this sample, the children were expressing similar concepts and no new concepts were emerging from the other children (via classroom conversation and playtime interaction) in the classrooms and centers that were not utilized in this study. The number of interviews or children was not pre-determined, though. Children were recruited and interviewed until the data were saturated. Twenty-four interviews kept with the purposes of this study. Moreover, I wanted to
generate a series of hypotheses that could be used to drive further research with either larger or different kinds of population samples. Individual interviews were vital as they facilitated the collection of valid information about the individual meanings that each child assigned to various concepts about fruits and vegetables. The childcare facility served as the research site out of consideration for the study participants. Observation of interactions within the actual Head Start setting provided further insights into the data collected.

Twenty–two of the studied children’s primary care providers completed their participation in aim two. Data saturation was met. Both of the childcare providers of the two studied classrooms completed their interviews. The sample size for the childcare providers was necessarily small, as the number of classrooms observed was limited. The childcare providers’ responses, however, were similar to the primary care providers studied and thus two interviewees were sufficient for the goals of this study.

F. Sample

The children were the primary study sample. The children interviewed for this study were selected by age, gender, and economic status out of two classrooms at the center. I tried to sample purposely to obtain a good balance of three, four, and five-year old boys and girls. I utilized the economic status as reported to the center for program qualification to ensure I was only sampling children who were reported as being 130% below the federal poverty guidelines. Table 4.5 describes the sample further. The primary care providers, the secondary study sample, were recruited based on their children’s criteria. Table 4.6 illustrates some of the demographic features of the primary care providers. Only two of the interviewed children’s primary care providers were unable to meet due to their work schedule. The majority of the primary care providers were born in the city the study took place (77%) and completed high school or a high school equivalences (91%). The living situation varied among the sample. Some lived in houses, apartments, relatives’ homes, or government housing. Some moved frequently, but tended to stay within the same area. The childcare providers, another component of the secondary study sample, were selected based a random selection of two out of the six possible Head Start center classrooms and they were the lead childcare provider in these classrooms. The two childcare providers’ demographics were as follows: one was African American while the other was Caucasian; one was in her upper thirties and the other was older than 50-years-old; both were female; and both were married.
Table 4.5: Demographic Characteristics of the Children in Primary Data Collection.

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Table 4.6: Demographic Characteristics of the Primary Care Providers in Primary Data Collection.

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<td>Four or More Children</td>
<td>9</td>
</tr>
</tbody>
</table>

G. Interviewer

I conducted all of the interviews. Before, during, and after the interviews, I worked at the childcare center. During this time, I become familiar with the children and center. I worked on establishing a trusting relationship with the children, the childcare providers, and the primary care providers. During the course of the study, I spent over eight months working with the center. This environment helped to foster the transfer of honest and personal in-depth nutrition-related
information. It is important to note that these interactions were cross-cultural. In order to limit any potential misunderstandings and encourage the most effective relationship, I utilized the most recent cross-cultural interviewing skills along with my extensive experience with multi-ethnic populations (238-241). My deep involvement in the interviewing process facilitated more effective evaluation of the data and a more in-depth observational view of the participants. This “hands-on” data collection approach helped to provide a very real and invaluable resource of young children’s nutrition knowledge along with their interactions with their respective peers, primary care providers, and childcare providers. Additionally, Dr. Burton, who has decades of research experience along with numerous publications in African American family relationships and dynamics, provided insight, expertise, and training.

H. Procedures

1. Methods of Data Collection

   a. Interviews

   Each child participated in a minimum of two semi-structured interviews about concepts related to fruits and vegetables at the childcare facility. Figure 4.2 illustrates the study flow chart. The questions asked during the interviews are provided in Appendix H and a list of the foods used in the study is provided in Appendix G. Naming the food picture cards was one of the first tasks in the children’s interviews. The names a child gave the fruit and vegetable cards were used throughout the interviews until after the child was asked to name the actual foods during the food preference testing. The order of the questions—i.e., fruit questions first then vegetable questions—were switched equally among the children by age and gender so as not to bias one section over the other. If children had difficulty understanding any of the questions, probes such as, “Do you eat these foods at home?” were used.

   Each child’s primary care provider was interviewed using the questions listed in Appendix I. Similar to the procedures used for the children’s interviews, the names for foods provided by the primary care providers were used throughout the interview. The ordering of questions were switched with every other primary care provider interview to avoid bias. Primary care providers provided information on the: 1) child’s demographics (Appendix J), 2) the availability of selected fruits and vegetables in their household, 3) intakes of fruits and vegetables by her or himself as well as her or his respective child (Appendix L), and 4) her or his child-feeding practices (Appendix M). The primary care provider interviews were conducted following the completion of the series of interviews with her or his respective child. This helped to ensure that the primary care providers were not coaching their children to answer in any particular manner.
All the interviews of the primary care providers took place at the center, except for one, which took place at my apartment. The interviews of the childcare providers used the questions listed in Appendix J, were conducted in a similar fashion as the children and primary care providers, and took place after all the children in the childcare providers’ respective classroom were completed. Childcare providers completed a demographic questionnaire (Appendix K), the National Cancer Institute Fruit and Vegetable Screener (Appendix L), and the child-feeding questionnaire (Appendix M). In preparation for further analysis, all interviews were taped and then were professionally transcribed. To ensure the safety of all data, the tapes were copied and locked in a different location (Penn State Nutrition Center). As required by the Institutional Review Board, the tapes and transcripts will be saved for five years and then will be properly destroyed. Coding of study materials was conducted in a manner to ensure confidentially.

I documented all fieldwork and observations in a notebook. Most of these notes were taken away from the center so as to not bias the study. I documented all of my recollections of the event while they were still fresh in my mind. Physical setting, personal characteristics, dress, nuances, and apparent health status of the study participants during the interview and any problems, mistakes, or confusions I encountered during the course of the interview or interaction with the participants were noted. Additionally, analysis and interpretations of the data were recorded in another separate notebook and transposed in a Microsoft Word (2000) document. This notebook and Word document helped to communicate the data, sometimes via the Internet, to colleagues for input. These notes served as a bridge between the interviews and the subsequent development, analysis, and interpretation of the concept maps.

**Figure 4.2: Study Flow Chart.**

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Obtain Institutional Review Board approval for study design and all study protocols. Letters of Agreement were obtained from the study center. Informed consent was obtained from the lead childcare providers in the three chosen rooms for their individual participation in the study. Then, informed consent was obtained from the primary care provider (PCP) for their respective child’s as well as their own participation in the study. Then, an assent statement was read to the child in the presence of the PCP. The child was asked the assent statement before each interview.

Child interview: learning card identification and then fruit and vegetable food card identification.
```
Figure 4.2: Study Flow Chart, Continued.

Child interview: fruit and vegetable questions. The order (fruit first, vegetable second or vice versa) was rotated equally by age and gender.

Once the child completed all of his or her interviews, his or her PCP was interviewed. PCP Interview: (order varied depending on PCP time availability)
1) Fruit and vegetable preference ratings
2) Demographics
3) National Cancer Institute Fruit and Vegetable Screener
4) Child-feeding practices survey
5) Fruit and vegetable identification (cards and real foods)
6) Fruit and vegetable availability
7) Fruit and vegetable questions (order switched every other interview)
8) Additional grocery shopping, mealtime, and nutrition education questions
9) Discussion of child’s interview results
10) Received compensation.

The childcare providers were interviewed once all of the children in their classroom were interviewed. The childcare provider interview (order varied depending on the childcare provider time availability):
1) Fruit and vegetable preference ratings
2) Demographics
3) National Cancer Institute Fruit and Vegetable Screener
4) Child-feeding practices survey
5) Fruit and vegetable identification (cards and real foods)
6) Fruit and vegetable availability
7) Fruit and vegetable questions (order switched every other interview)
8) Additional grocery shopping, mealtime, and nutrition education questions
9) Discussion of the children in their classroom interview results
10) Received compensation.
b. Content

The focus question, “What concepts, preference, availability, and dietary intake of fruits and vegetables do low-income, African American preschool children in an inner-city Head Start childcare center have?” is broad. Therefore, the interviews addressed a broad range of material including food preferences ratings along with the eating of fruits and vegetables and fruits and vegetables’ relationship to the body.

Food preferences from the children as well as the primary care providers and childcare providers were determined using methods developed and based on Birch (236). The foods used are listed in the Food section in Appendix G and were either a fruit or vegetable. I selected these particular foods based on prior research and the population. In particular, I selected foods that Birch (236), Achterberg (16) and Hearn et al. (229) amongst others have tested. Food pictures were used in order to classify and discuss fruits and vegetables. Moreover, in Achterberg’s (16) study, it was found that the children, aged three to five years old, could typically evaluate about five food pictures at a time. Generally, the children could discuss about twenty or more different food pictures at each session. Utilizing these numbers and in order to collect the data I was most interested in, I selected twelve specific food pictures. In Appendix G, I have listed the food pictures I brought to the interview and explained the basic methodology behind their use. It is important to note that I tried to cover as many food pictures as possible and was prepared if the child’s unique feedback and ability level did not meet up with the proposed number of food pictures. Again, based off prior experience, I was confident that about twelve different cards could be covered at each session.
Food classification schemes enable researchers to understand the manner in which the general population categorizes or groups food. They have been extensively used and will serve as a means of comparison. For example, the United States Department of Agriculture utilizes the Food Guide Pyramid (202) to communicate a method of meeting one’s daily dietary needs through food. Based on the pilot findings, I limited food classification to having the children identify which cards were fruits and which were vegetables. I also tested the eating and meals domain, i.e., when are fruits and vegetables eaten and what are they served with. I expected this information to provide insight into the social context of fruits and vegetables use and to provide the meaning that might be created (and shared) for an individual food or foods in general within the childcare setting. “Nutritional science” questions were used to test the children’s knowledge of fruits and vegetables. Evidence illustrated in the Literature Review (Chapter II) indicates young children have been introduced to these concepts and these topics are of particular interest to nutritionists; however, the extent and impact the introduction of these concepts has had on young children is limited.

Achterberg’s (16) study with middle-class Caucasians used the majority of the questions and procedures used in this study. She concluded that the questions and procedures for her particular study’s purposes were valid and reliable. Kumanyika (242) illustrated that the picture-sort approach to assessing food and nutrition intake and knowledge is a valid instrument. The preliminary study aided in assessing the validity and reliability of these methods in a low-income and African American population.

c. Collection of Information and Study Instruments

The semi-structured interviews with the children as well as with the primary care providers and childcare providers were conducted at the Head Start center in a room that allowed close contact between the study participant and I in addition to a work-able position for the tape recorder. One child’s primary care providers were interviewed at my apartment since they could not meet during the week during the center’s operating hours.

The interviews with the primary care providers enabled me to collect background information to aid in the interpretation of their respective child’s data and to share with them the data I had collected from their respective child. The primary care providers were asked to describe how often they buy, eat, etc. the selected fruits and vegetables. This information provided me with an idea of both the child as well as the primary care provider’s availability of the selected fruits and vegetables. The primary care providers were asked to complete the National Institute of Health’s Eating at American’s Table Study National Cancer Institute’s (NCI)
Fruit and Vegetable Screener (237, 243) based on their child’s eating habits to aid in assessing fruit and vegetable dietary intake. The primary care providers also completed this survey based on their own eating habits so I could assess their own fruit and vegetable intake. This questionnaire has been found to be valid and reliable in a sample of 1,286 adults aged 20 to 70 years living throughout the United States by random digit telephone dialing techniques. The sample was predominantly white (90%) and educated (79% had received more than a high school education). Despite this study (243), limited information regarding its use in low-income, ethnic samples has been reported. It has not been validated in low-literate samples or for purposes of assessing children’s intake via their primary care providers. Even though this instrument had not been validated in the population this study was focused on, it was used because of its fruit and vegetable focus. The instrument’s brief, paper-format also fit into the study’s interview structure and other study procedures. The NCI Fruit and Vegetable Screener can be found in Appendix L.

The primary care providers were asked to complete a survey on their child feeding practices (Appendix M). This instrument has been validated in a three different samples (244). These samples were predominately Caucasian and involved parents of children generally five to eleven years in age. The third sample had a large Hispanic population. The childcare providers completed a similar interview format and questionnaires as the primary care providers. The time range varied between child to child (less than ten minutes to forty-five minutes), primary care provider to primary care provider (a little over an hour to three hours), and from interview to interview (the same child could meet about twenty minutes one session and then less than ten minutes during another session). If at any time during the interview, the child, in particular, expressed the slightest disinterest, I ended the interview. The interviews for the child typically ranged from ten minutes to forty-five minutes. The adults’ interviews generally lasted about an hour and fifteen minutes in total. As a standard, if the child consistently displayed disinterest and was not completely involved in the interview process, I would have ended the participant’s involvement in the study. Consequently, this child’s primary care provider would not have been interviewed.

Each and every interview ended, as Novak and Gowin (14) noted, on a positive note. This left the participant feeling good about the experience. I congratulated the children and let them hear themselves talk on the tape recorder.

*At this point, I thanked the participants for their invaluable participation. I provided some basic and pertinent nutrition education to the children, primary care providers, and childcare staff at the conclusion of the entire study.
d. Fruit and Vegetable Availability via Food Supplied by the Head Start Center

The fruits and vegetables supplied by the Head Start center offered contextual data on what types of fruits and vegetables the children were exposed to them at the childcare center. These descriptive data do not aim to assess the childcare center’s meals’ nutritional adequacy nor the children’s individual intake. These data are also not directly factored into the study’s theoretical model as the school’s offerings were considered a constant by which all investigated children had the equal opportunity to be exposed to these particular fruits and vegetables.

Records were made of the food children were actually served for breakfast, lunch, and snack by an inner-city Head Start throughout the school day (8:45 a.m. -2:30 p.m.) from January 4th through June 20th, 2002. Days were omitted when: a particular meal or snack was not observed (n=10), the center had an early dismissal (n=10), or the observed classroom had a party (n=6). Party days were omitted because Head Start did not serve the foods offered at the parties nor did all teachers and children participate in these events. Furthermore, the school store, which was run by a parent volunteer, opened every Wednesday and Friday and sold items such as pop, chips, and candy. These foods were not analyzed due to uneven access, distribution, and consumption; however, they competed with the children’s consumption of Head Start-supplied food. In sum, the results reported reflect those foods served to all children at the center on any given day.

Descriptive frequencies of the meals and snacks provided by the Head Start were computed. In Appendix O a complete listing of all foods served along with a more vivid justification of how foods were classified is contained. The results focus on the major categories, i.e. fresh fruit versus individual fruits such as apples, for brevity. Beans such as kidney or black-eye were considered a vegetable because they were served with another food from the protein group and there was only one other vegetable or fruit accompanying that particular meal. This decision was consistent with the center’s interpretation of the United States Department of Agriculture Child and Adult Care Food Program’s (CACFP) regulations (200). Potatoes were also coded as a vegetable based on the Food Guide Pyramid (202). For particular analyses, vegetables in meals such as stews and soups were generously considered a vegetable even though the portion in a particular item may not have merited a full serving size.

e. Menu Offered by the Center versus the Food Actually Served

To provide further information on the foods served at the center and food information provided to childcare providers and primary care providers by the Head Start center, all monthly menus (n=6) developed by the Head Start nutritionist who managed over six sites were collected
and compared to the observational records of the foods the children were actually served for breakfast (n=96), lunch (n=95), and snack (n=78) throughout the school day (8:45 a.m. -2:30 p.m.) from January 4th through June 20th, 2002 at one of the sites. The menu was compared only to the observational records from the one classroom at only the primary study site in which I was present for any given meal. Days were omitted from the analysis if: 1) a particular meal or snack was listed on the menu, but were not observed; 2) despite the menus specifying a snack, days on which the children were dismissed early and thus were not given a snack (early dismissals were listed in the school calendar, which preceded the menu in all six of the center’s newsletters); 3) days in which meals were described as a “Chef’s Surprise” and listed no food items; and 4) observed meals that did not have a menu listing to be compared to.

Additional observational notes were taken on the foods served for parties, used as rewards or bribes by the childcare providers, provided for extended care (ranging from 7:30 a.m. to 5:30 p.m.), consumed as morning snacks by the children that were provided by the home, but eaten at the center and finally, food items sold at the school store. These foods were not factored into the comparisons. Additional qualitative notes, observations, and interviews complemented these records.

I. Data Analysis

1. Naming

The names the children, primary care providers, and childcare providers gave both the food picture cards and real food were recorded and then analyzed on whether or not their responses were correct. The names considered correct for all selected fruits and vegetables are listed in Appendix G. Greens or spinach was an acceptable response. General responses such as “fruit” were noted, but were not graded as correct. The combined score for naming each of the twelve food items was averaged and used for the analyses. The average between the card score and real food score was calculated and served as the naming score. For analyses focused solely on fruits or vegetables, the average score for naming just the fruits or just the vegetables (with the exception of French fries) were used.

2. Cognitive or Concept Maps: Creating, Scoring, Comparing, and Checking

a. Participant Identifiers

Before I discuss cognitive or concept maps, I will present how I used participant identifiers to confidentially code the maps. The participant codes went as follows:
Letters for childcare providers: MCCP (first class childcare provider) or YCCP (second class childcare provider)

Following the children’s identifiers is their age. Sometimes I wrote out the age or otherwise noted age in parentheses following the identifier such as YGP(5). Moreover, this participant was in the second class (Y), was a girl (G), and was five-years-old. After the identifier are the values for all the study constructs for that particular participant. Parentheses after each particular score indicate the fruits or vegetables the participant did not name correctly, did not like, or did not have in her or his house often. I used avg as an abbreviation for average. F denotes fruit while V means vegetables. When referring to the naming, preference, and availability scores for vegetables that did not include French fries, I used vf. NCI referred to the National Cancer Institute Fruits and Vegetables Screener values or the dietary intake scores. I also used the abbreviation woff when referring to the NCI scores that did not include French fries and woffj when referring to the NCI scores that did not include French fries and juice. The f behind an NCI score indicated the fruit only score while v behind the NCI score indicated the vegetables only score. The vegetable only score did not include French fries. Subsequent to these values was either a fv or vf and this indicates the order of how the questions (i.e. fruit questions first (fv) or vegetable questions first (vf)) were asked of that particular participant. Although the identifier is used in most instances, the rest of the information was used when relevant.

b. Creating the Concept Maps

A cognitive structure is an individual’s internal, abstract organization of thoughts, feelings, and experience. I represented the individual’s cognitive structures I generated from the raw data by utilizing a two-dimensional schematic device called a concept or cognitive map. A concept map represents relationships between concepts held by an individual (14). This method is based on the Theory of Meaningful Learning, which was developed by Ausubel et al. (223) and Novak and Gowin (14).

These maps can serve three purposes:

1) They identify what concepts a person has or uses to think about a certain topic.
2) They arrange concepts from the most general to the most specific.
3) They show the connections made between concepts in the individual’s mind (16).
In order to construct a concept map, the most inclusive concept is first identified and placed at the top of the map. For the study’s purposes, fruits and vegetables each served as the most inclusive concept. Concepts maps for both fruits and vegetables for each child, primary care provider, and childcare provider were constructed by illustrating the individual participant’s response to some specific questions (see Figure 4.3) asked during the interview. The maps do not show any hierarchy (from general to specific). They simple capture each participant’s responses to selected questions.

**Figure 4.3: Illustration of the Schema Used to Construct the Study Participants’ Concept Maps for Fruits** (For the Vegetables Concept Maps, the Central Concept was Vegetables Instead of Fruit).

- c. Scoring the Concept Maps

  Once the concept maps were constructed for the study participant, each map was analyzed for the number of concepts, adapting from Novak and Gowin (14). A concept was arbitrarily defined as any concept under the most inclusive concept that the participant expressed in response and in relation to the selected interview questions. I gave one point to each concept a study participant expressed. This is shown on the maps as (1). In order to focus this exploration on describing the participants’ current concepts, concepts were not scored based on quality. In order to display all of each participant’s concepts in this map schema, some concepts were displayed by the general theme of a participant’s thoughts and a score higher than one indicates further concepts were said, but are not shown on the map. If a participant expressed I don’t know or I forgot for a question response, this was not counted as a concept. A response of yes or no was only scored if it was a logical response to the question such as: “Do you eat fruits with other
food?” Concepts not related to fruits and vegetables such as the children talking about the church that was located next to the location of many of the interviews were not scored. Concepts that were repeated throughout the interview were scored only if they provided breadth and depth to a concept. I used parentheses to denote a particular food card a participant was referring to when talking or to refer in general terms to a specific restaurant, place, or person a participant was talking about. If something was not explicitly stated such as “eat fruit by itself,” I used parentheses on this concept. For the question regarding which cards are fruits and then which cards are vegetables, I referred to the responses under “include.” I listed the fruits and vegetables the participants indicated were included in either the fruit or vegetable group by their proper name (not the name the participants used to refer to them as). For this question, I considered French fries as a vegetable. NA or NR means no answer or no response and these were not scored.

Before I calculated a concept score, I noted any misconceptions (defined by Novak and Gowin (14) as an: “unaccepted (but not necessarily ‘wrong’) interpretation of a concept illustrated in the statement in which the concept is embedded”) the participant expressed with an (M). Misconceptions were not included in the concept scores, but were tallied in their own right as total misconceptions, fruit misconceptions, and vegetable misconceptions.

Once the maps were scored and the misconceptions were identified and calculated separately, I scored each participant’s fruit and vegetable maps individually and collectively. Figures 4.4 and 4.5 demonstrate varying levels of concept maps found in this study. Figure 4.4 represents a map generated from a three-year-old girl (PGI) from the preliminary studies. This child is in the stage of concept discovery, which is marked by awareness of a concept such as fruit, but not much meaning is attached to this concept. Figure 4.5 represents a four-year-old boy (PBH) who is, although minimally, constructing concepts or attaching meaning to a concept such as fruit.

More extensive analyses were not made because the maps did not allow for more extensive calculations. In order to ensure the most accurate construction of each of the maps, I only constructed a couple of maps per day. All the concepts maps for fruits were first constructed and then vegetables. All of the children’s maps were completed together, then the primary care providers, and finally the childcare providers.
Figure 4.4: An Example of a Three-Year-Old Girl (PGI) from the Preliminary Studies who is in the Concept Discovery Stage. NR-No Response.

Fruit Concept Score: 6; Fruit Misconceptions: 0.

Figure 4.5: An Example of a Four-Year-Old Boy (PBH) from the Preliminary Studies who is in the Stage of Concept Construction.

Fruit Concept Score: 20; Fruit Misconceptions: 9.
d. Comparing the Concept Maps

Maps were compared by age, gender, and other demographic characteristics such as single mothers versus two-parent households. I also constructed separate fruit and vegetable maps that contained responses from an individual child along with his primary care provider and his childcare provider. This particular map aided in identifying shared meaning or similar concepts within a household or classroom. Shared concepts are identified by bolded text. For the analyses on shared meaning, I did not focus on similarity in responses such as they eat at home, eat at certain meals, or eat with certain foods. Visually, to fit all the child, primary care provider, and childcare provider concepts onto a map to illustrate shared meaning in the results I reported only questions that gave particular insight into the shared meaning. I also used the combined child, primary care provider, and childcare provider map to provide insight into where a misconception the child had expressed may have came from. Figure 4.6 illustrates how shared meaning or lack of shared meaning can be identified between a child and their primary care provider using concept maps. Figure 4.7 captures a five-year-old girl’s (PGK) misconception of fruit and how her mother may have influenced this misconception.

The next analysis I conducted on the maps was to analyze and group together the common concepts reported by the children for fruits and vegetables as well as by the primary care providers and childcare providers. Each of the study participant’s multiple responses to a question were included in these common maps. These maps do not capture the fact that not all children were able to provide their own concepts. These common responses were than qualitatively compared between the children, primary care provider, and childcare provider. These responses were also compared to messages regarding diet, with particular emphasize on fruits and vegetables, from the United States government and other health organizations (22, 84, 202).
Figure 4.6: An Example Comparison from the Preliminary Studies Between a Four-Year-Old Boy (PBC) and his Father’s (PBCp) Concept Maps that Contains Shared Meaning.

PBC-don’t know
PBCp-sweet, acidic vegetable, sweet vegetable

PCP also discussed the importance of taking care of your teeth.

Figure 4.7: An Example Comparison from the Preliminary Studies Between a Four-Year-Old Girl (PGK) and her Mother’s (PGKp) Concept Maps that Contains a Misconception Potentially as Result of the Primary Care Provider’s Meaning.

Are fruits healthy?: PGK-not healthy, because they make us small and a little bit big.
PGKp: Discusses with child that fruits and vegetables make her big and strong while she also talks with her older daughters about how eating fruit helps give them a flat stomach.
e. Checking the Concept Maps

Inter-rater reliability was conducted by comparing two independent assessments of the individual interviews. For the assessments of the children’s transcripts, Linda Kronheim independently reviewed each child’s transcript. Linda has a Bachelors of Sciences in Nutrition Science from The Pennsylvania State University and is continuing on as a Masters Candidate in Nutritional Sciences. Her research focuses on food security. She recorded her interpretation of the child’s responses to all of the interview questions (except for the learning card section and breakfast, lunch, and dinner questions). I first compared Linda’s findings to my own and generated a score by question and then combined all the questions for an overall score. I also used Linda’s interpretations to create a set of individual child maps as well as common maps for fruits and vegetables. I compared her maps to mine and noted differences quantitatively and qualitatively. Linda also reviewed the final inter-rater reliability findings and all final child maps.

For the assessments of the transcripts from the primary care providers and childcare providers, Tracy Fleischhacker independently reviewed each transcript from the primary care providers and the childcare providers. Tracy is a pre-law undergraduate in the College of Agricultural, Food, and Environmental Sciences at the University of Minnesota. Her major is Applied Economics and she has experience in food marketing, food production, and food distribution. As prescribed by The Pennsylvania State University’s Institutional Review Board, she received her ethical training (eleven on-line quizzes) in Human Research at the University of Minnesota. She recorded her interpretation of the participants’ responses to all of the interview questions. Tracy and I went through each interview and compared responses and generated a map based on both of our findings. We both counted the concepts independently for this map. I also compared Tracy’s findings to my own and generated a score by question and then combined all the questions for an overall score. I used Tracy’s interpretations to create a second version of the common maps for fruits and vegetables for the primary care providers. I compared her maps to mine and noted differences quantitatively and qualitatively. Tracy also reviewed the final inter-rater reliability findings and all final maps. Agreement on the various categories of interviews was determined to be: children (89%), primary care providers (83%), and childcare providers (96%).

f. Focusing on Particular Aspects of the Concept Maps

In analyzing the children’s concepts, there was some noteworthy division in the type of responses the children were generating. To analyze these differences, I focused on five questions: 1) where do fruits come from; 2) where do vegetables come from; 3) what do fruits do for the
body; 4) what do vegetables do for the body; and 5) what does healthy mean? I divided the children into two groups based on their responses to these questions. The divisions for the where do fruits/vegetables come from question were based on whether or not a child stated fruits/vegetables came from a tree, bush, ground, etc. or somewhere else not-related to where fruits/vegetables are grown such as the house, car, etc. The division for what do fruits/vegetables do for the body was based on whether or not the child articulated a response that related to the body or not. The children were divided on what does healthy mean based on whether or not they discussed the body or other related concepts of health or not. T-tests were run by age and then overall to compare the two groups on the study’s key constructs (naming, concepts, preference, availability, and intake). Analyses were also run for fruit parameters specifically on fruit questions, vegetable parameters on the vegetable questions, and fruit and vegetable for the health question.

3. Fruit and Vegetable Preference Analysis

The preference of a particular fruit and vegetable stated by the child, primary care provider, and childcare provider as yummy, yucky, and okay was tallied using the Birch methodology (236). Each study participant was asked to rank the fruits and vegetables from their most favorite (given a score of one) to least favorite (given a score of twelve). These rankings were then evaluated and tallied to assess the children’s, primary care providers’, and childcare providers’ overall ratings of fruits and vegetables and then ranking of the particular fruits and vegetables were assessed. The fruits and vegetables with the highest rankings had lower total scores due to a summation of lower individual scores, i.e. always given one since it was the participant’s favorite. An individual child’s preference was compared to their respective primary care provider and childcare provider.

4. Fruit and Vegetable Availability Analysis

The records on the foods served at the Head Start center along with the Head Start menus, which are provided in a seasonal cyclic calendar format to the primary care providers and childcare providers in a monthly newsletter were assessed for availability of the fruits and vegetables. Primary care providers’ descriptions of their availability for selected fruits and vegetables were generously coded to fit in the following categories: high (eat everyday or more than twice a week), medium (eat sometimes or once a week or bimonthly), or low (eat rarely, once a month or never). Numerical values were given to these categories as follows: high=3, medium=2, and low=1. To rank order the availability of fruits and vegetables in the household
each fruit and vegetable numerical value from each of the primary care providers were averaged. The higher the average, the more often that fruit or vegetable was in the study participants’ household on average. In order to assess the environment of the childcare center community, the primary grocery-shopping stores were evaluated routinely for the availability in quantity and quality of fruits and vegetables. The stores were generally assessed during the period in which Food Stamps are provided to the community—beginning of the month as well as at the end of the month from January to July.

5. **Fruit and Vegetable Dietary Intake Analysis**

The NCI Fruit and Vegetable Screener (237, 243) was entered in Microsoft Excel (2000) and then analyzed by a modified version of the NCI’s Internet-available SAS program. Values were computed with and without factoring in French fries and juice. Separate values were computed based on only fruit intakes and vegetables intakes. The scores generated were considered estimated median daily servings of fruits and vegetables.

6. **Child-Feeding Questionnaire**

The Child-Feeding Questionnaire (CFQ) was entered into Microsoft Excel (2000) and was compared to the confirmatory sample (244). Primary care providers were categorized as high or low on the various CFQ sub-scales based on the confirmatory sample. Specifically, using these confirmatory means, I categorized each of the primary care providers as high or low on each of the instruments seven categories: 1) perceived feeding responsibility; 2) perceived parent overweight; 3) perceived child overweight; 4) concerns about child overweight; 5) pressure to eat; 6) restriction; and 7) monitoring. These categorizations were analyzed in conjunction to the other study findings. In particular, statistical analyses using Spearman correlations were conducted between the child-feeding means and the primary care providers’ study constructs as well as between the child-feeding means and the children’s study constructs. Relationships with an $r$ value above 0.30 were reported.

7. **Statistical Analyses**

Various analyses were conducted using SPSS (245) and SAS (246) programs for exploratory purposes. Given the small sample size, definitive statements are hard to make based on statistics. Primarily, statistics were used to: calculate the NCI scores; cluster groups based on high, medium, and low scores; determine the correlation between the primary study constructs; and to evaluate the correlation between the children, primary care providers, and childcare
providers’ constructs. Analyses with the childcare providers were even more constrained due to the small sample size (n=2). Specifically, T-tests were used to determine group differences; Spearman correlations were used to generate correlations between concepts, preferences, availability, and dietary intake of fruits and vegetables; Spearman correlations were also used to assess the level of sharing between and within children, primary care providers, and childcare providers. Numerous analyses were done on the data as a whole, by age, by gender, and by clustering the children into three groups based on their scores, i.e. a high scoring group, medium scoring groups, and a low scoring group.

The high and low scorers of each group were combined to form an overall high and low group. To be included in either of these groups, a participant needed to score a high or low score on at least two of the study’s constructs. If a participant scored high on two constructs and low on the other two constructs or vice versa, then that participant was not used in the analyses. Models that showed the most interesting, significant, or contrasting correlations were focused on. In particular, I focused on correlations that had an r value above 0.30. Similar procedures were conducted on the primary care providers’ data. The cut-offs for the groups were made at the most logical frequency break as determined through SPSS and are listed with each group. Children in the two different classes were compared to assess a potential influence of the childcare provider. Other analyses such as Chi-square and pathway analysis were tried, but constrained by the small sample size. Higher values for the NCI screener were preferred. Significance was determined at p<0.05. For analyses conducted exclusively on fruits, study constructs were scaled to fruit values only. The same was done for vegetable exclusive analyses. For vegetables, French fries were excluded from the preference, availability, and NCI results.

J. Summation

The methods utilized in this study were primarily qualitative. They relied heavily on qualitative interviews, observations notes, and some questionnaires. The analyses were primarily descriptive and the statistical analyses are constrained by sample size. Concepts, preference, availability, and dietary intake data on fruits and vegetables generated by the children were communicated collectively in addition to some individual examples to illustrate the common themes and experiences that were generated by the children. Clusters were used in an attempt to identify differences and intervening areas in low scoring groups. Primary care providers were analyzed similarly for consistency. Analyses on the childcare providers were limited due to sample size. Altogether, the methods aided in obtaining and representing some critical
parameters in assessing low-income, African American, young children’s understanding of fruits and vegetables.
CHAPTER V:

RESULTS AND DISCUSSION
CHAPTER V: RESULTS AND DISCUSSION

A. Introduction

This chapter presents the results of this study in the order of the research aims:

1) To explore the concepts, preference, availability, and dietary intake of fruits and vegetables in low-income, African American preschoolers who participate in an inner-city Head Start childcare center;

2) To explore the concepts, preference, availability, and dietary intake of fruits and vegetables in primary care providers (parents, grandparents, etc.) of the children studied under the first aim; and,

3) To determine the level of shared meaning, preference, availability, and dietary intake of fruits and vegetables between the children studied under the first aim and both their primary care providers (studied under the second aim) and their childcare providers.

Each aim will contain the results for that aim and then will be followed by a discussion of those findings. The results and discussion of aim one will begin this chapter and will be followed by the results and discussion of aim two. The results and discussion of aim three will follow aim two. In other words, there will be three separate results sections (B, D, and F) along with three separate discussion sections (C, E, and G). An overall discussion (H) of all three aims concludes this chapter. The overall discussion contains hypotheses based on all three aims’ findings.


1. Children’s Naming Fruits and Vegetables Scores

Table 5.1 illustrates the children’s average score for naming the fruits and vegetables by using picture cards and actual foods. The fruit and vegetable cards and actual foods’ scores were not significantly different (p=0.71). The children’s scores approached significance but did not significantly differ by age (p=0.06). No significant difference was found by gender (p=0.10).
Table 5.1: The Children’s (n=24) Average Scores and Range of Scores (Lowest Score to Highest Score) by Age for Naming the Fruits and Vegetables Cards and Pictures.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Average Food Picture Score (%) (Range)</th>
<th>Average Actual Food Score (%) (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (n=5)</td>
<td>63 (42-100)</td>
<td>62 (33-100)</td>
</tr>
<tr>
<td>4 (n=11)</td>
<td>70 (33-100)</td>
<td>70 (25-92)</td>
</tr>
<tr>
<td>5 (n=8)</td>
<td>83 (67-100)</td>
<td>90 (67-100)</td>
</tr>
<tr>
<td>Overall</td>
<td>73 (33-100)</td>
<td>75 (25-100)</td>
</tr>
</tbody>
</table>

2. Children’s Concepts of Fruits and Vegetables

Table 5.2 represents the children’s concept scores by age for fruits, vegetables, and for fruits and vegetables combined. The ordering of the questions, i.e. fruit questions first then vegetable questions, did not have an effect on the children’s fruit (p=0.11) or vegetable (p=0.31) concept scores. When and where you eat fruits and vegetables were difficult questions for most of the children, and as a result, probes were used in most of the interviews. Some children were more familiar with these when and where questions. No significant differences were noted by age (p=0.36 for total concepts, p=0.28 for fruit concepts, and p=0.94 for vegetable concepts) or gender (p=0.41 for total concepts, p=0.24 for fruit concepts, and p=0.51 for vegetable concepts).

Figures 5.1 and 5.2 illustrate maps generated from a five-year old (MBP) versus a three-year old (MGG) to capture the range in maps by age. Figure 5.3 is a four-year child (MGR) who despite knowing all the names of the selected fruits and vegetables did not articulate many concepts about vegetables. Figure 5.4 (YGT) can be compared to Figure 5.5 (MGA) as both are five-year old girls, but YGT participated in Head Start since she was three while MGA just started Head Start that school year. Although gender did not seem to influence the concept scores, my classroom observations of the girls noted that they were more prone to say: “Don’t drink milk because it will make you fat” or ask me: “Why aren’t you fat?” Boys did express concepts in regards to weight, though. Fruit concept scores were not significantly higher (p=0.67) than vegetable concept scores. Figure 5.6 can be compared to Figure 5.3 as MGR had the largest gap (13) between her concepts of fruits and her concepts of vegetables.

Figures 5.7 and 5.8 represent the common maps for the children’s concepts of fruits and vegetables. These figures illustrate the breadth and depth of responses. These maps do not capture that some children articulated few if any concepts, while others had multiple yet sometimes conflicting concepts. The fruit and vegetable common maps are fairly similar; however, through qualitative analysis, a negative preference towards vegetables was articulated more frequently than was a negative preference or attitude towards fruit.
Table 5.2: The Children’s (n=24) Concept Scores for Fruits, Vegetables, and for Fruits and Vegetables Combined by Age. The range of scores (lowest to highest) is provided.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Fruit Concept Scores (Range)</th>
<th>Vegetable Concept Scores (Range)</th>
<th>Fruit and Vegetable Combined Concept Scores (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (n=5)</td>
<td>19.6 (17-22)</td>
<td>22 (16-27)</td>
<td>39.6 (30-47)</td>
</tr>
<tr>
<td>4 (n=11)</td>
<td>17.2 (0-32)</td>
<td>14.2 (0-28)</td>
<td>31.5 (0-60)</td>
</tr>
<tr>
<td>5 (n=8)</td>
<td>22.1 (14-30)</td>
<td>22.2 (15-32)</td>
<td>44.4 (35-62)</td>
</tr>
<tr>
<td>Overall</td>
<td>19.4 (0-32)</td>
<td>18.5 (0-32)</td>
<td>37.4 (0-62)</td>
</tr>
</tbody>
</table>

Figure 5.1: An Example Concept Map of a Five-Year Old (MBP(5)). This child was one of three that correctly identified all the fruits and vegetables.

Total Concepts Score: 62; Fruit Concepts: 30; Fruit Misconceptions: 1.
Figure 5.2: An Example Vegetable Concept Map from a Three-Year-Old (MGG(3)). This girl had the second highest fruits and vegetables’ naming score (88) among the three-year olds.

Total Concepts Score: 30; Vegetable Concepts: 23; Vegetable Misconceptions: 6.

Figure 5.3: A Vegetable Concept Map from a Child (MGR (4)) who Knew All the Names of the Selected Fruits and Vegetables, But Did Not Articulate Many Meaningful Concepts.

Total Concepts Score: 23; Vegetable Concepts: 5; Vegetable Misconceptions: 1.
Figure 5.4: A Vegetable Concept Map from a Five-Year-Old (YGT(5)) who has Participated in Head Start since she was Three-Years-Old.

Peas, carrots, spinach, salad (1).
I don’t know.

People make’em (1). The chef (1). Home-my mom (1).


come from
are
include

are eaten when
are eaten at

do ... for the body

Make you strong (1).

Vegetables

A vegetable (1). I eat at my mom’s house (1) and at my aunt’s house (1), and at my grandma’s house (1), and at my God mom’s house (1). Morning-no we eat them at dinner (1).

I eat at my mom’s house (1) and at my aunt’s house (1), and at my grandma’s house (1), and at my God mom’s house (1). Morning-no we eat them at dinner (1).

Total Concepts Score: 44; Vegetable Concepts: 20; Vegetable Misconceptions: 0.

Figure 5.5: A Vegetable Concept Map from a Five-Year-Old (MGA(5)) who just Started Attending Head Start that School Year.

Ate everything my ma feeds me (1).
Can’t drink hug (name of fruit-flavored drink) until eat (1).
I don’t like vegetables (1).
Let’s talk about something else.
Ooh baby. I’m not eatin’ vegetables right now (1).
I am grown up—I don’t like (1).

Vegetables

Ate everything my ma feeds me (1).
Can’t drink hug (name of fruit-flavored drink) until eat (1).
I don’t like vegetables (1).
Let’s talk about something else.
Ooh baby. I’m not eatin’ vegetables right now (1).
I am grown up—I don’t like (1).

Peas (1). Carrots (1). Broccoli (1).

come from
are
include

are eaten when
are eaten at

are eaten with

Eat all your vegetables (1).

I don’t know.

No.

School (1). Home (1).

Salad (1).

Breakfast (1). Lunch-some days (1). Dinner-some days (1).

Total Concepts Score: 39; Vegetable Concepts: 15; Vegetable Misconceptions: 0.
Figure 5.6: A Fruit Concept Map from One Child (MGR(4)) to be Compared to this Child’s Concept Map for Vegetables (Figure 5.3) to Illustrate Fruit and Vegetable Concept Map Differences. This four-year-old girl had the largest gap between fruit concepts (n=18) and vegetable concepts (n=5).

Fruits

- Favorite (1), Like it (1)
- From the market (1). Mom takes me there when she gets/needs some food. We went the other day. (1).
- No where (1), (stores name) (1), and home (1).
- At some mall (1). No more, no more, no more, we don’t have no more (referring to fruit) (1). Morning (1). Home (1). School (1).

Vegetables

- Come from
- Are eaten at
- Are eaten when
- Are eaten with
- Do ... for the body

- Peach (1), Banana (1), Grapes (1), Oranges (1), Carrots (M), Apples (1)
- Eat fruit together (1).
- Forgot.

Total Concepts Score: 23; Fruit Concepts: 18; Fruit Misconceptions: 1.
Figure 5.7: The Common Map for All the Concepts of Fruits Generated from All the Interviewed Children (n=24) (Number of Times Expressed by the Children in the Sample).

- **Pointed to food picture cards**: 14.
- **I love fruit**: 3.
- **Eat them at home, school, everywhere**: 3.
- **Strawberry cakes, fruit makes fruit snacks**: 2.
- **Orange, you peel it**: 1.
- **Oranges, you put them in a bowl and share**: 1.
- **Some fruit is vegetable and for dessert and every time after lunch**: 1.
- **They make you healthy, sometimes they make you sick**: 1.

**Fruits**

- **Come from**
  - School/Home: 12
  - A car, food store: 10
  - Out of the woods, trees, ground, etc.: 9
  - I don't know: 2
  - Can, pot, plate, you cook them: 2
  - My momma eats it, and my grandma eats it: 1
  - Snacks, desserts: 1

- **Are eaten at**
  - House: 22
  - School: 17
  - Other places: 11
  - Stores: 2
  - I don't know: 1

- **Are eaten when**
  - Time, days, meals: 18
  - House: 12
  - Other places: 5
  - School: 4
  - Preference: 1

- **Are eaten with**
  - Make you strong: 5
  - Eat: 4
  - Good for you, help your body: 4
  - Negative things, i.e. make you sick: 4
  - Make you comfortable: 3
  - I don't know: 2
  - Things for particular body parts, i.e. eyes: 2
  - Taste: 1
  - Make you grow: 1
  - Make you happy: 1

- **Do ... for the body**

**Include**

- Peaches: 21
- Grapes: 20
- Oranges: 18
- Banana: 17
- Apple: 16
- Carrots: 7
- Greens: 5
- Broccoli: 5
- Corn: 5
- Salad: 5
- Peas: 5
- French fries: 5
- Fruit cocktail: 1
- Baked beans: 1
- Apple juice: 1
- Don’t have Kool-Aid and Cherries: 1
Figure 5.8: The Common Map for All the Concepts of Vegetables Generated from All the Interviewed Children (n=24) (Number of Times Expressed by the Children in the Sample).

- **Vegetables**
  - Pointed to food picture cards (10).
  - Eat (6).
  - Taste/preference (5).
  - Food (3).
  - Cooking (2).
  - I don't know (2).
  - Vegetables (2).
  - Meals (1).

- **come from**
  - Store (7).
  - Out of the woods, etc. (6).
  - Home (5).
  - School (5).
  - Bowl (3).
  - I don't know (3).
  - Stove (3).
  - Meals (2).
  - Barn (1).
  - Cows (1).
  - Food (1).

- **are eaten at**
  - Home (19).
  - School (15).
  - Other places (5).
  - Meals (4).
  - Preference (2).
  - On your plate (1).
  - Stove (1).

- **are eaten when**
  - Time, meal, season (17).
  - School (8).
  - Grandma’s (5).
  - Home (5).
  - Other places (2).
  - Contingency-based (1).
  - If they’re cooked (1).
  - No more (1).
  - Store (1).
  - When I feel like it, I will ask (1).

- **are eaten with**
  - Mixed vegetables (10).
  - Other foods (9).
  - Nope (4).
  - I don't know (3).
  - Meals (3).
  - On the table (1).
  - With Daddy (1).

- **do…for the body**
  - Help body, feel better, healthy (6).
  - No/nothing, negative things (6).
  - Makes you strong (5).
  - You got to eat the carrots (5).
  - Make you happy (2).
  - Things for a particular body part, i.e., eyes (2).
  - They’re good for snack (2).
  - You can grow (2).
  - I don't know (1).
  - Sometimes they’ll be on T.V. rolling around (1).
  - You go faster (1).

- **include**
  - Peas (20).
  - Broccoli (18).
  - Carrots (17).
  - Greens (17).
  - Salad (16).
  - Corn (13).
  - French fries (9).
  - Apples (6).
  - Oranges (6).
  - Peaches (6).
  - Bananas (5).
  - Grapes (5).
  - None (1).
  - Don’t have potatoes (1).
Table 5.3 lists the children’s definition of healthy. Most (88%) of the children said they eat fruits and vegetables and think fruits and vegetables are healthy (81%). Table 5.4 draws attention to some of the children’s more qualitative and interesting responses to the interview questions.

### Table 5.3: The Children’s (n=24) Concepts of Healthy.

<table>
<thead>
<tr>
<th>Children’s Concepts</th>
<th>Number of Times Concept was Used by the Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps particular body parts</td>
<td>11</td>
</tr>
<tr>
<td>You eat certain foods</td>
<td>9</td>
</tr>
<tr>
<td>Good</td>
<td>7</td>
</tr>
<tr>
<td>Keeps you from getting sick</td>
<td>6</td>
</tr>
<tr>
<td>Bad</td>
<td>5</td>
</tr>
<tr>
<td>I don’t know</td>
<td>5</td>
</tr>
<tr>
<td>They help you</td>
<td>2</td>
</tr>
<tr>
<td>Taste</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 5.4: Other Examples of the Children’s (n=24) Interview Responses.

**YBB (4) On Vegetables:**
“You buy them, you cook them, & throw them in the trash. They (referring to mom and grandma) make nasty stuff (referring to vegetables) for me. I don’t like that.”

**MGO (5) On Vegetables (During this week, the children were learning about plants in class. They each planted their own lima beans in a cup.):**
“They grow out of plants. You put seeds in the ground and they start to grow. Water. Sun.”

**YGB (3) On Vegetables:**
“You eat, you make noise, and you eat and you make noise.”

**YBI (5) On Why He Does Not Eat Fruit:**
“It might be cold and your teeth will go wee it’s cool. And it might hurt cause I got one (referring to cavity) right here. And it burns. It’s bleeding a lot. I have two (filled cavities). The other filled cavity came out.”

**YGH (4) On Fruits:**
“My mommy puts the fruit in the bowl so everybody can get a fruit and go outside.”

**YGK (5) On Fruits:**
“I usually go to the (Restaurant)-NO FRUIT! FOOD!

### a. Children’s Misconceptions of Fruits and Vegetables

Table 5.5 represents the children’s misconception scores by age. The three-year-olds’ misconceptions of vegetables approached significance (p=0.06) but were not significantly different from the five-year-olds. There was no gender difference in misconceptions.
for fruits \((p=0.59)\) or vegetables \((p=0.42)\). No significant difference occurred between the children’s misconceptions of fruits versus vegetables \((p=0.52)\). The ordering of the questions did not have an effect \((p=0.89\) for fruit misconceptions and then \(p=1.00\) for vegetable misconceptions). Table 5.6 lists all of the expressed misconceptions for fruits while Table 5.7 lists all of the expressed misconceptions for vegetables.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Average Fruit Misconception Score (Range)</th>
<th>Average Vegetable Misconception Score (Range)</th>
<th>Average Fruit and Vegetable Combined Misconception Score (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (n=5)</td>
<td>4.4 (0-11)</td>
<td>4.2 (3-6)</td>
<td>8.6 (5-17)</td>
</tr>
<tr>
<td>4 (n=11)</td>
<td>2.1 (0-7)</td>
<td>1.2 (0-7)</td>
<td>3.3 (0-7)</td>
</tr>
<tr>
<td>5 (n=8)</td>
<td>1.7 (0-6)</td>
<td>1.4 (0-8)</td>
<td>3.75 (0-12)</td>
</tr>
<tr>
<td>Overall</td>
<td>2.7 (0-11)</td>
<td>2.2 (0-8)</td>
<td>4.8 (0-12)</td>
</tr>
</tbody>
</table>

Table 5.6: The Misconceptions \((n=64)\) about Fruits Expressed by the Children \((n=24)\) (Frequency of Times Expressed within the Entire Sample of Children).

Misidentification (46).

- Carrots (9), Salad (7), Broccoli (7), French Fries (6), Corn (5), Greens (5), Peas (5), Baked beans (1), Vegetable (1).
- Chemo (1).
- Sometimes they make you sick (1).
- Help with bones (1).
- Don’t eat stuff or drink stuff on T.V. (1).
- Cookies-strawberry cake and cookies (1).
- They make you fat (1).
- Grapes is good for your head (1).
- Oranges is good for your head (1).
- Bananas is good for your hand (1).
- Choke (1).
- Some fruit is vegetable (1).
- Kool-Aid (1).
- And we got blueberry Popsicle, but they are frozen (1).
- Peaches is good for your stomach, your whole body (1).
- When you grown you eat a lot and then fat (1).
- Fruits make some snacks, fruit makes fruit snacks (1).
- I eat little fruits (referring to fruit snacks) and big fruit (1).
- Sometimes they sick, if you eat them for a long time, sometimes you can’t eat them then you throw up (1).
Table 5.7: The Misconceptions (n=51) about Vegetables Expressed by the Children (n=24) (Frequency of Times Expressed within the Entire Sample of Children).

<table>
<thead>
<tr>
<th>Misidentification (37).</th>
<th>Orange (8), Apple (7), Grapes (6), Peaches (6), Banana (5), Fruit (3), Blueberries (1), Juice (1).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off the trees (1).</td>
<td>In the other morning time (1).</td>
</tr>
<tr>
<td>None (1).</td>
<td>Cake-I get fat, fat (1).</td>
</tr>
<tr>
<td>Poison (1).</td>
<td>Vegetables come from cow (1).</td>
</tr>
<tr>
<td>Trees-all of them (1).</td>
<td>When heart hurts (1).</td>
</tr>
<tr>
<td>Carrots-if cooked, then they’re vegetables (1).</td>
<td>It’s food, don’t snack on it (1).</td>
</tr>
<tr>
<td>Broccoli makes from trees and drinks water (1).</td>
<td>You eat them and your teeth and body turn orange (1).</td>
</tr>
<tr>
<td>Nothing, it just kills you, because they make poison every night (1).</td>
<td>Sometimes they’ll be on T.V. rolling around doing a fashion show (1).</td>
</tr>
</tbody>
</table>

b. Specific Question Analyses

Tables 5.8-5.12 contain the results on the five targeted interview questions.

Table 5.8: “Where Do Fruits Come From?” Response Analyses.
These analyses compare study constructs (naming, concepts, preference, availability, intake, and misconceptions) between the children who answered “trees” to “where do fruits come from?” versus the children who answered “store” or something not related to trees for this question.

<table>
<thead>
<tr>
<th>Age Group Break Downs</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Three-year-olds</strong></td>
<td>Preference (p=0.02)</td>
</tr>
<tr>
<td>Trees (n=2)</td>
<td>Availability (p=0.02)</td>
</tr>
<tr>
<td>Store (n=3)</td>
<td></td>
</tr>
<tr>
<td><strong>Four-year-olds</strong></td>
<td>Concepts (p=0.04)</td>
</tr>
<tr>
<td>Trees (n=4)</td>
<td></td>
</tr>
<tr>
<td>Store (n=7)</td>
<td></td>
</tr>
<tr>
<td><strong>Five-year-olds</strong></td>
<td></td>
</tr>
<tr>
<td>Tree (n=3)</td>
<td>Concepts (p=0.02)</td>
</tr>
<tr>
<td>Store (n=5)</td>
<td>Fruit Concepts (p&lt;0.01)</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
</tr>
<tr>
<td>Tree (n=9)</td>
<td></td>
</tr>
<tr>
<td>Store (n=15)</td>
<td></td>
</tr>
</tbody>
</table>
Table 5.9: “Where Do Vegetables Come From?” Response Analyses.
These analyses compare study constructs (naming, concepts, preference, availability, intake, and misconceptions) between the children who answered “ground” to “where do vegetables come from?” versus the children who answered “store” or something not related to ground for this question.

<table>
<thead>
<tr>
<th>Age Group Break Downs</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Three-year-olds</strong></td>
<td></td>
</tr>
<tr>
<td>Ground (n=1)</td>
<td>Availability (p=0.02)</td>
</tr>
<tr>
<td>Store (n=4)</td>
<td></td>
</tr>
<tr>
<td><strong>Four-year-olds</strong></td>
<td></td>
</tr>
<tr>
<td>Ground (n=1)</td>
<td></td>
</tr>
<tr>
<td>Store (n=10)</td>
<td></td>
</tr>
<tr>
<td><strong>Five-year-olds</strong></td>
<td>Concepts (p=&lt;0.01). Vegetable Concepts (p=&lt;0.01)</td>
</tr>
<tr>
<td>Ground (n=2)</td>
<td></td>
</tr>
<tr>
<td>Store (n=6)</td>
<td></td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
</tr>
<tr>
<td>Ground (n=4)</td>
<td></td>
</tr>
<tr>
<td>Store (n=20)</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.10: “What Do Fruit Do for the Body?” Response Analyses.
These analyses compare study constructs (naming, concepts, preference, availability, intake, and misconceptions) between the children who answered something related to the body when asked “what do fruits do for the body?” versus the children who answered something not related to body for this question.

<table>
<thead>
<tr>
<th>Age Group Break Downs</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Three-year-olds</strong></td>
<td></td>
</tr>
<tr>
<td>Body (n=1)</td>
<td>Availability (p=0.03)</td>
</tr>
<tr>
<td>Nothing (n=4)</td>
<td></td>
</tr>
<tr>
<td><strong>Four-year-olds</strong></td>
<td>Concepts (p=0.03)</td>
</tr>
<tr>
<td>Body (n=7)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=4)</td>
<td></td>
</tr>
<tr>
<td><strong>Five-year-olds</strong></td>
<td>Misconceptions (p=0.02)</td>
</tr>
<tr>
<td>Body (n=7)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=1)</td>
<td></td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
</tr>
<tr>
<td>Body (n=15)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=9)</td>
<td></td>
</tr>
</tbody>
</table>
Table 5.11: “What Do Vegetables Do for the Body?” Response Analyses.
These analyses compare study constructs (naming, concepts, preference, availability, intake, and misconceptions) between the children who answered something related to the body when asked “what do vegetables do for the body?” versus the children who answered something not related to body for this question.

<table>
<thead>
<tr>
<th>Age Group Break Downs</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-year-olds</td>
<td></td>
</tr>
<tr>
<td>Body (n=2)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=3)</td>
<td></td>
</tr>
<tr>
<td>Four-year-olds</td>
<td></td>
</tr>
<tr>
<td>Body (n=3)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=8)</td>
<td></td>
</tr>
<tr>
<td>Five-year-olds</td>
<td>Misconceptions (p=0.02)</td>
</tr>
<tr>
<td>Body (n=2)</td>
<td>Preference (p&lt;0.01)</td>
</tr>
<tr>
<td>Nothing (n=6)</td>
<td>Availability (p=0.04)</td>
</tr>
<tr>
<td></td>
<td>Vegetable Preference (p&lt;0.01)</td>
</tr>
<tr>
<td></td>
<td>Vegetable Availability (p&lt;0.01)</td>
</tr>
<tr>
<td>Overall</td>
<td>Misconceptions (p=0.01)</td>
</tr>
<tr>
<td></td>
<td>Vegetable Concepts (p=0.01)</td>
</tr>
</tbody>
</table>

Table 5.12: “What Does Healthy Mean?” Response Analyses.
These analyses compare study constructs (naming, concepts, preference, availability, intake, and misconceptions) between the children who answered something related to the body or health when asked “what does healthy mean?” versus the children who answered something not related to body or health for this question.

<table>
<thead>
<tr>
<th>Age Group Break Downs</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-year-olds</td>
<td></td>
</tr>
<tr>
<td>Body/Food (n=5)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=0)</td>
<td></td>
</tr>
<tr>
<td>Four-year-olds</td>
<td></td>
</tr>
<tr>
<td>Body (n=6)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=5)</td>
<td></td>
</tr>
<tr>
<td>Five-year-olds</td>
<td></td>
</tr>
<tr>
<td>Body (n=8)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=0)</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td></td>
</tr>
<tr>
<td>Body (n=19)</td>
<td></td>
</tr>
<tr>
<td>Nothing (n=5)</td>
<td></td>
</tr>
</tbody>
</table>

Analyses were run to compare the four children that answered all five of these questions correctly versus the seven children that answered either none of the five questions correctly or just the healthy question correctly. No differences were noted. Concept scores were approaching
significance, though (p=0.06). These two groups’ model constructs are later illustrated in Figures 5.28-5.29.

3. Children’s Preference for Fruits and Vegetables

Preference ratings were positive with 80% of the fruits and vegetables being rated as “yummy.” Fruits were preferred. The rankings from highest to lowest (summation of ranking scores of 1 (highest) to 12 (lowest)) were as follows: 1) French fries (77), 2) grapes (96), 3) peaches (116), 4) oranges (123), 5) apples (156), 6) corn (159), 7) broccoli (170), 8) banana (172), 9) peas (175), 10) salad (190), 11) carrots (196), and 12) greens (207).

4. Children’s Availability of Fruits and Vegetables

a. Head Start Availability

A total of 77 days with a complete breakfast, lunch, and snack were observed. Tables 5.13-5.15 summarize the foods most frequently served for breakfast, lunch, and snack. For breakfast, as suggested by the United States Department of Agriculture Child and Adult Care Food Program (CACFP), milk, fruit, and a grain product were usually served. The grain products served other than cold cereal included foods such as pancakes or granola bars. For lunch, as suggested by CACFP, milk, a carbohydrate-based food, a protein item, and either two vegetables or a fruit and vegetable were generally served. Snacks were typically composed of a beverage and a food from the “grain group.” A further examination of the fruits (Table 5.16) and vegetables (Tables 5.17) served are provided. Additionally, the most frequently served food items at this Head Start center were as follows (number of times offered during breakfast, lunch, or snack over the 77 days observed): Milk (186), canned fruit (75), canned vegetables (53), snacks from the grain group (53), juice (47), cold cereal (42), grains other than cereal (35), fresh vegetables (32), vegetables in mixture (31), ground beef (27), carbohydrate/starch (27), fresh fruit (26), and potatoes (22).
Table 5.13: Food Served for Breakfast in an Inner-City Head Start Childcare Center from January 4th through June 20th, 2002 in the 77 Days Analyzed.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Frequency (# days served, % of days served out of 77 days analyzed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>Fruit</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>Canned fruit</td>
<td>44 (57%)</td>
</tr>
<tr>
<td>Fruit or fruit-flavored juice</td>
<td>18 (23%)</td>
</tr>
<tr>
<td>Fresh fruit</td>
<td>12 (16%)</td>
</tr>
<tr>
<td>Packaged fruit</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Cold Cereal</td>
<td>42 (55%)</td>
</tr>
<tr>
<td>Grain Products Other Than Cold Cereal</td>
<td>35 (45%)</td>
</tr>
</tbody>
</table>
Table 5.15: Food Served for Snack in an Inner-City Head Start Childcare Center from January 4\textsuperscript{th} through June 20\textsuperscript{th}, 2002 in the 77 Days Analyzed.

<table>
<thead>
<tr>
<th>Food Item (food/beverage particular food item was served with)</th>
<th>Frequency (# days served, % of days served out of 77 days analyzed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Snacks from the grain group</strong></td>
<td></td>
</tr>
<tr>
<td>Cookies</td>
<td>53 (69%)</td>
</tr>
<tr>
<td>Cereal bar</td>
<td>21 (27%)</td>
</tr>
<tr>
<td>Cheese curls</td>
<td>11 (15%)</td>
</tr>
<tr>
<td>Pretzels</td>
<td>9 (12%)</td>
</tr>
<tr>
<td>Cheese curls</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Rice cakes</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Mini-donuts</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Graham crackers</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Rice Crispy</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Pizza roll</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td></td>
</tr>
<tr>
<td>Fruit or fruit-flavored juice</td>
<td>42 (55%)</td>
</tr>
<tr>
<td>Fresh fruit</td>
<td>28 (36%)</td>
</tr>
<tr>
<td>Packaged fruit</td>
<td>13 (17%)</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>7 (9%)</td>
</tr>
<tr>
<td><strong>Dairy</strong></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>39 (51%)</td>
</tr>
<tr>
<td>Yogurt</td>
<td>33 (43%)</td>
</tr>
<tr>
<td>Cheese cube</td>
<td>5 (7%)</td>
</tr>
<tr>
<td>Cheese cube</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

Table 5.16: Types of Fruit Served at an Inner-City Head Start Childcare Center from January 4\textsuperscript{th} through June 20\textsuperscript{th}, 2002 in the 77 Days Analyzed. 155 fruits were offered during this time.

<table>
<thead>
<tr>
<th>Type of Fruit</th>
<th>Frequency (number of fruits offered, % of that type of fruit offered out of total fruits offered (n=155))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canned fruit</td>
<td>75 (48%)</td>
</tr>
<tr>
<td>Fruit or fruit-flavored Juice</td>
<td>47 (30%)</td>
</tr>
<tr>
<td>Fresh fruit</td>
<td>26 (17%)</td>
</tr>
<tr>
<td>Packaged fruit</td>
<td>7 (5%)</td>
</tr>
</tbody>
</table>
Table 5.17: Types of Vegetable Served at an Inner-City Head Start Childcare Center from January 4th through June 20th, 2002 in the 77 Days Analyzed. 141 vegetables were offered during this time.

<table>
<thead>
<tr>
<th>Type of Vegetable</th>
<th>Frequency (number of vegetables offered, % of that type of vegetable offered out of total vegetables offered (n=141))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canned vegetables (non-potatoes)</td>
<td>53 (38%)</td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>32 (23%)</td>
</tr>
<tr>
<td>In mixture (stews, marinara, soups, etc.)</td>
<td>31 (22%)</td>
</tr>
<tr>
<td>Potatoes (packaged or canned, includes French fries)</td>
<td>22 (16%)</td>
</tr>
<tr>
<td>Packaged</td>
<td>4 (3%)</td>
</tr>
</tbody>
</table>

b. Head Start Menu Analysis

Days omitted from the comparison due to the aforementioned criteria included: early dismissals (n=10), “Chef’s Surprise (n=4),” and observed meals (n=12) that did not have a menu listing to be compared to. Eight meals/snacks were omitted due to unscheduled parties or childcare providers’ special snacks because these events were neither on the menu nor featuring food items provided by the center. These occasions usually featured: ice cream, cake, cheese curls, and pop. Parties or childcare providers’ snacks typically involved children having cake, ice cream, pop, candy, and chips first portioned for them by the childcare providers and then available to them ad-lib for the entire post-lunch to home period (usually about two hours). Some of these occasions were coordinated with the Head Start foodservice staff and, thus, the children would have no snack provided by the center. On the other hand, some of these occasions were not coordinated with the foodservice staff and resulted in the children receiving, in addition to their party foods, a snack provided by Head Start.

For example, on an “Ice Cream Day,” childcare providers served ice cream cones and then passed out the center-supplied cheese curls, though they did not serve the orange juice that was also supplied. Children also received their center-provided snack despite purchasing food items such as pop and chips from the school store that was open every Wednesday and Friday. The school store, which was run by a parent volunteer, was never listed on the menu. It competed with breakfast and lunch as well.

Of the 269 meals and snacks used in this comparative analysis, only four, complete, actual meals (i.e. entrée, beverage, and accompanying foods) matched the meals described on the provided menu. Three of these meals were breakfast and included cereal, milk, and either some flavor fruit or fruit-flavored juice or canned peaches. The fourth meal was an “ethnic day” (milk, biscuit, cabbage, corned beef, and red potatoes). When comparing just the individual foods
offered on a given day (n=861) to what was listed on the menu (n=895), only 74 food items matched with the exception of milk (n=201). These food items are listed in Table 5.18.

Table 5.19 lists the foods described on the menu that were never actually served to the children. Items such as deviled eggs were featured on the menu four times, but were never served. Water was listed on the menu multiple times, mostly for snack, but was rarely served at all throughout the entire day. This included days in which the temperature outside was in the nineties. Although a few of the meals listed on the menu accurately identified all meal components or at least the entrée such as chicken and collard greens, they were not dated correctly. Even “Ethnic Day,” which was supposed to be the last Friday of every month, was not listed accurately on all six months. Also, Table 5.19 lists the foods that were served to the children, but were never mentioned on the menu. Table 5.20 illustrates some example menu descriptions versus the foods actually served to the children on a specified day. Table 5.21 highlights some example food items and how often they were under-served, over-served, or equally-served in comparison to their appearance on the menu (in regards to frequency of times offered not portion size). These food item mismatches illustrate the center’s reliance on canned fruit.

The menus provided the portion sizes of each food item listed that the children should consume. They were hung in each of the classrooms, but my qualitative observations note that the childcare providers hardly referred to them as a portion aid. As a result, the childcare providers, by my estimate, tended to either under-serve or over-serve the children. No exact food portions were measured for this study, but the following example illustrates one of the portioning problems that occurred at the center. In three different classrooms on three different days, the same lunch of a turkey sandwich with tomatoes, lettuce, and cheese was served to the children. Besides not giving the children the correct amount of meat, tomatoes, lettuce, and cheese as prescribed by the menu, the childcare providers only gave the children one of the four carrots they were supposed to get. The children consequently were under-served; yet, the children in each of these classrooms ended up getting additional food such as chips and pretzels from their childcare providers because the childcare providers “did not think that the children ate enough.” On the other hand, given that most of the classrooms did not practice family-style eating, i.e., a child serves herself/himself, childcare providers would frequently dish out portions for some foods such as mashed potatoes that were, in my judgment, excessive.
Table 5.18: Food Items (n=895) Listed on an Inner-City Head Start Menus that Matched the Food (n=861) that was Actually Served to the Children on a Specified Date between January 4th through June 20th, 2002.

<table>
<thead>
<tr>
<th>Name of food item</th>
<th>Number of times the food item was listed on the menu and matched what was actually served to the children on that specified date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Milk</td>
<td>201</td>
</tr>
<tr>
<td>2) Cold cereal</td>
<td>36</td>
</tr>
<tr>
<td>3) Fruit or fruit-flavored juice</td>
<td>5</td>
</tr>
<tr>
<td>4) Canned peaches, carrots</td>
<td>4</td>
</tr>
<tr>
<td>5) Tossed salad, wheat bread</td>
<td>3</td>
</tr>
<tr>
<td>6) Assorted cookies, yellow rice</td>
<td>2</td>
</tr>
<tr>
<td>7) Banana, biscuit, cabbage, canned apricots, chicken, corned beef, greens, mashed potatoes, mixed vegetables, Nutri-grain bars, pear halves, red potatoes, string beans, yogurt, water</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total matching food items</strong></td>
<td><strong>252</strong></td>
</tr>
</tbody>
</table>

Table 5.19: Foods Described on the Inner-City Head Start Menus that were Never Served to the Children during the Months Specified along with Foods Served to the Children that were Never Listed on the Menu.

| Foods described on the menu that were never served.                           | Animal crackers (1), appragus (original menu spelling) al dente with dressing (1), beets (1), butter nut squash cubes (1), chicken gumbo (1), chicken stir-fry (5), cobette (6), deviled eggs (4), ginger snaps (1), juice bar (1), Lorna Doons (1), nectarine (1), peach (1), plum (1), pretzel rods (2), pudding (1), Reuben (1), rice pilaf (1), seafood salad (1), Spanish rice (1), Swiss cube steak (1), succotash (1), taco stick (4), tangerine (4), and tomato soup (1). |
| Foods that were served, but were never listed on the menu.                   | Baked beans (1), beef lo-mien (2), beef stew (2), cheese bread (2), chicken a la king (3), chicken enchilada (2), chicken pasta salad (1), country fried steak (1), egg noodles (1), kidney beans (2), lima beans (1), peanut butter pretzel (1), pizza roll (1), potato soup (2), potatoes with cheese (1), potatoes with onions (1), pot roast (2), soft pretzel (1), turkey ham and Swiss cheese sandwich (2), water ice (1) and ziti with mixed vegetables in a white sauce (1). |
| **Total food items**                                                         | **75**                                                                                           |
Table 5.20: Example Comparisons between the Published Inner-City Head Start Menu and the Foods Served for Breakfast (B), Lunch (L), and Snack (S) on Specified Dates.

<table>
<thead>
<tr>
<th>Menu’s description for breakfast, lunch and snack on a specific date</th>
<th>Foods actually served to the children for breakfast, lunch and snack on a specific date</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-Toasted Raisin Bread (1/2 Slice with Butter), Fruit Cocktail (1/2 cup), 2% Chocolate Milk</td>
<td>B-Oatmeal, milk, canned apricots</td>
</tr>
<tr>
<td>L-Turkey Hot Dog with Bun, French Fries (1/2 cup), Sauerkraut (1/2 cup), Orange Quarters (2), 2% Chocolate Milk (3/4 cup)</td>
<td>L-Chicken with skin and herbs, sweet potatoes, green peas, milk</td>
</tr>
<tr>
<td>S-Yogurt, Banana (1/2), Water</td>
<td>S-Raisins, orange juice</td>
</tr>
<tr>
<td>B-Cold Cereal (1/3 cup), Fruit Cocktail (1/2 cup), 2% Milk (3/4 cup)</td>
<td>B-Cereal, orange juice, milk</td>
</tr>
<tr>
<td>L-Hamburger w/ bun, Oriental Vegetables (1/2 cup), Smiley Fries (1/2 cup), 2% Milk (3/4 cup)</td>
<td>L-Turkey ham, Swiss cheese, peas and carrots, milk, canned fruit cocktail</td>
</tr>
<tr>
<td>S-Deviled eggs (1), Apple Juice (1/2 cup)</td>
<td>S-Banana, chocolate milk</td>
</tr>
<tr>
<td>B-Cold Cereal (1/3 cup), Strawberries (1/2 cup), 2% Milk (3/4 cup)</td>
<td>B-Cereal, milk, canned pineapples</td>
</tr>
<tr>
<td>L-Seafood Salad (1/2 cup), Honeydew Melon (1/2 cup), Asparagus (as spelled) al Dente w/ Dressing, 2% Milk (3/4 cup)</td>
<td>L-Hamburger, ketchup, Cole slaw, canned peaches, milk</td>
</tr>
<tr>
<td>S-Taco stick, Orange Juice (1/2 cup)</td>
<td>S-Water ice, soft pretzels</td>
</tr>
</tbody>
</table>

Table 5.21: Example of Served Food Items and the Frequency by which they Differed from the Provided Menu at an Inner-City Head Start Childcare Center.

<table>
<thead>
<tr>
<th>Category by which the served food item related to the frequency it was listed on the menu</th>
<th>Food item (difference between number of times listed on menu and actually served)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under-served</td>
<td>Cranberry juice (17), wheat bread (14), apple juice (9), fruit salad (7) oriental vegetables (6), pineapple juice (6)</td>
</tr>
<tr>
<td>Equally-served</td>
<td>Crackers (6), grilled cheese (5), peas (5), baked fish (4), croissant (4), fish sticks (4), pasta and tuna salad (4), rice crackers (4), Swedish meatballs (4), sweet potatoes (4) and waffles (4)</td>
</tr>
<tr>
<td>Over-served</td>
<td>Milk (25), canned peaches (18), canned pear halves (12), yellow rice (10), juicy juice (9), mashed potatoes (8), and canned apricot halves (7)</td>
</tr>
</tbody>
</table>
c. Household Fruits and Vegetables Availability

The availability of fruits and vegetables in a child’s household varied, especially for fresh produce. Only six (27%) primary care providers reported having all selected fruits and vegetables in their homes on a regular basis. Table 5.22 provides a rank order of the children’s household availability of the selected fruits and vegetables.

Table 5.22: The Primary Care Providers Average Availability in Rank Order (Highest to Lowest) of the Selected Fruits and Vegetables. (Average Availability of Specific Fruit or Vegetable in the Primary Care Providers’ Household on a Scale of 3 to 1 with 3 = High; 2=Medium; and 1=Low).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Item</th>
<th>Average Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>French Fries</td>
<td>2.32</td>
</tr>
<tr>
<td>2</td>
<td>Canned Green Peas</td>
<td>2.14</td>
</tr>
<tr>
<td>3</td>
<td>Canned Peaches</td>
<td>2.0</td>
</tr>
<tr>
<td>4</td>
<td>Collard Greens (Canned and Fresh)</td>
<td>1.86</td>
</tr>
<tr>
<td>5</td>
<td>Banana</td>
<td>1.81</td>
</tr>
<tr>
<td>6</td>
<td>Grapes, Carrots Sticks, and Salad</td>
<td>1.77</td>
</tr>
<tr>
<td>9</td>
<td>Broccoli</td>
<td>1.68</td>
</tr>
<tr>
<td>10</td>
<td>Apples</td>
<td>1.64</td>
</tr>
<tr>
<td>11</td>
<td>Oranges</td>
<td>1.59</td>
</tr>
<tr>
<td>12</td>
<td>Canned Corn</td>
<td>1.45</td>
</tr>
</tbody>
</table>

5. Children’s Fruits and Vegetables Dietary Intake

The average NCI score (estimated median daily servings of fruits and vegetables) for the children was 7.03 and ranged from 13.87 to 1.86. When French fries were taken out, the average score went down to 6.62 and ranged from 13.6 to 1.59. When French fries and juice were taken out, the average score went down to 4.07 and ranged from 8.70 to 0.88. When only fruit intake was considered, the score was 1.99 and ranged from 6.00 to 0.50. When only vegetable intake was considered (without French fries), the score was 2.08 and ranged from 6.05 to 0.34.

6. The Relationship Between the Children’s Concepts, Preference, Availability, and Dietary Intake of Fruits and Vegetables

The following models are all exploratory in order to generate hypotheses. Given the small sample size and multiple comparisons, the correlations generated from all of these model analyses provide insight and an idea of the relative weights and relationships these constructs may have. These correlations do not have the power, though, to provide strong statistical assignment and even less so when considering the multiple comparisons made.
Figure 5.9: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=24) Interviewed.

No line connection if the correlation was less than 0.25.
- Correlation is between 0.25 and 0.29.
- Correlation is above 0.30.

Figure 5.10 demonstrates the role a child’s ability to name fruits and vegetables have on the construct correlations. None of the relationships were significant, but the correlation between naming and concepts was strong (r=0.36) and approached significance (p=0.08). Figure 5.11 demonstrates how misconceptions relate to a child’s concepts as well as naming of fruits and vegetables.

Figure 5.10: The Correlations Generated between the Study’s Theoretical Constructs When the Children’s (n=24) Naming Score are Added to the Model.

No line connection if the correlation was less than 0.25.
- Correlation is between 0.25 and 0.29.
- Correlation is above 0.30.
Figure 5.11: The Relationship between the Children’s (n=24) Concepts, Misconceptions, and Ability to Name Fruits and Vegetables.

Figures 5.12 and 5.13 capture how the correlations change when the study’s theoretical model is refined to consider the relationships between concepts, preference, availability, and dietary intake for fruits and then vegetables exclusively. The relationship between fruit availability and fruit intake was not significant, but approached significance (p=0.06).

Figure 5.12: The Correlations Generated between the Study’s Theoretical Constructs When the Constructs are Excluded to Only Fruit Values for the Children (n=24) Interviewed.

*p<0.05, - Negative Correlation

No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.
Figure 5.13: The Correlations Generated between the Study’s Theoretical Constructs When the Constructs are Excluded to Only Vegetable Values (French Fries Excluded) for the Children (n=24) Interviewed.

*\(p<0.05\)

No line connection if the correlation was less than 0.25.

←→ Correlation is between 0.25 and 0.29.

←←→ Correlation is above 0.30.

When the model is considered exclusively by age (three-years-old, four-years-old, and five-years-old), no significant correlations were found. Naming the fruits and vegetables, as previously discussed, approached significance \((p=0.06)\) of difference between the five-year-olds and three-year-olds. Interesting differences in the models by age, though, were noted. Specifically, the relationship between naming fruits and vegetables and concepts of fruits and vegetables for three-year-olds had a correlation of \(-0.63\) while in five-year-olds this relationship was \(0.66\). The relationship between intake and availability was also different in magnitude and direction \((0.95\) with a \(p=0.05\) for three-year-olds and \(-0.15\) for five-year-olds\). Figures 5.14-5.15 illustrate these differences. Similar differences were noted when the models were constructed based on fruit or vegetable values exclusively.
Figure 5.14: The Correlations Generated between the Study’s Theoretical Constructs for the Five-Year-Old Children (n=8).

Concepts

Naming

Availability

Preference

Intake

No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.

Figure 5.15: The Correlations Generated between the Study’s Theoretical Constructs for the Three-Year-Old Children (n=5).

Concepts

Naming

Availability

Preference

Intake

*p<0.05, - Negative Correlation

No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.
Although no significant differences between genders were noted in T-test analyses, Figures 5.16-5.19 demonstrate how the model changes slightly based on gender. The gender sample was not matched exactly by age due to the unique classroom compositions, so, differences may be attributed more to an age effect than gender.

**Figure 5.16: The Correlations Generated between the Study’s Theoretical Constructs for the Boys (n=12).**

- Negative Correlation

No line connection if the correlation was less than 0.25.

→ Correlation is between 0.25 and 0.29.

↔ Correlation is above 0.30.
Figure 5.17: The Correlations Generated between the Study’s Theoretical Constructs for the Girls (n=12).

No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.

Figure 5.18: The Correlations Generated between the Study’s Theoretical Constructs for the Boys (n=12) when Looking at Vegetable Values Exclusively.

*p<0.05, - Negative Correlation

No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.
Figure 5.19: The Correlations Generated between the Study’s Theoretical Constructs for the Girls (n=12) when Looking at Vegetable Values Exclusively.

*\(p<0.05\), - Negative Correlation
No line connection if the correlation was less than 0.25.

\[\text{Correlation is between 0.25 and 0.29.}\]
\[\text{Correlation is above 0.30.}\]

The following tables (Tables 5.23–5.26) represent the high and low groups with the group cut-offs for each of the study’s key constructs. The tables also contain where significant differences occurred between the groups on all of the study’s key constructs. These analyses were conducted on fruits and vegetables combined as well as on fruits and vegetables exclusively. The high and low group comparisons are presented and Figures 5.20–5.21 demonstrate how the groups generated slightly different models. The fruit and vegetable exclusive models had slight differences (Figures 5.22-5.25). Figure 5.26 presents a map of a child who was grouped into the low group on all constructs. Figure 5.27 presents a map of a child who was grouped most frequently (three times out of five) into the high group.
Table 5.23: A Comparison of the Study Constructs between the High and Low Groups based on the Fruits and Vegetables Combined Constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>High and Low Group Cut-offs and (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naming</td>
<td>High 90 and above (n=7) Low 60 and below (n=6)</td>
<td>Naming (p&lt;0.0001) Fruit Naming (p&lt;0.0001) Fruit Concepts (p=0.04) Vegetable Naming (p&lt;0.0001)</td>
</tr>
<tr>
<td>Concepts</td>
<td>High 50 and above (n=4) Low 32 and below (n=9)</td>
<td>Naming (p&lt;0.01) Concepts (p&lt;0.0001) Fruit Concepts (p&lt;0.01) Vegetable Naming (p=0.03) Vegetable Concepts (p&lt;0.01)</td>
</tr>
<tr>
<td>Preference</td>
<td>High 100 (n=6) Low 67 and below (n=9)</td>
<td>Preference (p&lt;0.0001) Fruit Preference (p&lt;0.01) Vegetable Preference (p&lt;0.0001)</td>
</tr>
<tr>
<td>Availability</td>
<td>High 92 and above (n=11) Low 58 and below (n=5)</td>
<td>Availability (p&lt;0.0001) Fruit Availability (p&lt;0.0001) Vegetable Availability (p&lt;0.0001) Fruit Intake (p=0.04) Vegetable Availability (p=0.03)</td>
</tr>
<tr>
<td>Intake</td>
<td>High 10 and above (n=5) Low 5 and below (n=9)</td>
<td>Intake (p&lt;0.0001) Vegetable Intake (p=0.03)</td>
</tr>
</tbody>
</table>
Table 5.24: A Comparison of the Fruit Study Constructs between the High and Low Groups based on the Fruit Constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>High and Low Group Cut-offs and (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit Naming</td>
<td>High 90 and above (n=12) Low 70 and below (n=7)</td>
<td>Naming (p&lt;0.0001) Fruit Naming (p&lt;0.0001) Fruit Concepts (p&lt;0.01)</td>
</tr>
<tr>
<td>Fruit Concepts</td>
<td>High 25 and above (n=6) Low 15 and below (n=6)</td>
<td></td>
</tr>
<tr>
<td>Fruit Preference</td>
<td>High 100 (n=17) Low 60 and below (n=4)</td>
<td>Preference (p&lt;0.01) Fruit Preference (p&lt;0.0001)</td>
</tr>
<tr>
<td>Fruit Availability</td>
<td>High 100 (n=12) Low 60 and below (n=6)</td>
<td>Availability (p&lt;0.0001) Fruit Availability (p&lt;0.01) Fruit Intake (p=0.02)</td>
</tr>
<tr>
<td>Fruit Intake</td>
<td>High 5 and above (n=3) Low 1 and below (n=11)</td>
<td>Intake (p&lt;0.01) Fruit Preference (p=0.05) Fruit Intake (p&lt;0.01)</td>
</tr>
</tbody>
</table>
Table 5.25: A Comparison of the Vegetable Study Constructs between the High and Low Groups based on the Vegetable Constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>High and Low Group Cutoffs and (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable Naming</td>
<td>High 100 (n=4) Low 50 and below (n=9)</td>
<td>Naming (p&lt;0.0001) Vegetable Naming (p&lt;0.0001) Vegetable Preference (p=0.04)</td>
</tr>
<tr>
<td>Vegetable Concepts</td>
<td>High 25 and above (n=6) Low 15 and below (n=8)</td>
<td>Concepts (p&lt;0.01) Vegetable Concepts (p&lt;0.0001)</td>
</tr>
<tr>
<td>Vegetable Preference</td>
<td>High 100 (n=8) Low 50 and below (n=10)</td>
<td>Preference (p&lt;0.0001) Vegetable Preference (p&lt;0.0001)</td>
</tr>
<tr>
<td>Vegetable Availability</td>
<td>High 100 (n=9) Low 67 and below (n=8)</td>
<td>Availability (p&lt;0.0001) Vegetable Availability (p=0.01)</td>
</tr>
<tr>
<td>Vegetable Intake</td>
<td>High 3 and above (n=5) Low 1 and below (n=6)</td>
<td>Intake (p=0.03) Vegetable Intake (p&lt;0.01)</td>
</tr>
</tbody>
</table>
Table 5.26: A Comparison of the Study Constructs between the High and Low Groups based on the Overall Study Constructs for Fruits and Vegetables Combined as well as Fruits and Vegetables Exclusively. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

<table>
<thead>
<tr>
<th>Group</th>
<th>High and Low Groups (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and Vegetables Combined</td>
<td>High (n=11) Low (n=9)</td>
<td>Naming (p&lt;0.01) Concepts (p=0.05) Availability (p&lt;0.01) Intake (p=0.03) Fruit Naming (p&lt;0.01) Fruit Concepts (p&lt;0.01) Vegetable Naming (p&lt;0.01) Vegetable Availability (p&lt;0.01) Vegetable Intake (p&lt;0.01)</td>
</tr>
<tr>
<td>Fruits</td>
<td>High (n=13) Low (n=5)</td>
<td>Naming (p&lt;0.01) Availability (p&lt;0.04) Fruit Naming (p=0.03) Fruit Concepts (p=0.01) Fruit Preference (p=0.05) Fruit Intake (p&lt;0.01)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>High (n=8) Low (n=12)</td>
<td>Concepts (p&lt;0.01) Vegetable Naming (p&lt;0.01) Vegetable Concepts (p&lt;0.01) Vegetable Availability (p=0.02) Vegetable Intake (p&lt;.01)</td>
</tr>
</tbody>
</table>
Figure 5.20: The Correlations Generated between the Study's Theoretical Constructs for the Children (n=11) who were Grouped into the High Group for Fruits and Vegetables Combined. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

*\(p<0.05\), - Negative Correlation
No line connection if the correlation was less than 0.25.

- Correlation is between 0.25 and 0.29.
- Correlation is above 0.30.

Figure 5.21: The Correlations Generated between the Study's Theoretical Constructs for the Children (n=9) who were Grouped into the Low Group for Fruits and Vegetables Combined. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

*\(p<0.05\), - Negative Correlation
No line connection if the correlation was less than 0.25.

- Correlation is between 0.25 and 0.29.
- Correlation is above 0.30.
Figure 5.22: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=13) who were Grouped into the High Group for Fruits Based on the Fruit Values Exclusively. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

*p<0.05, - Negative Correlation
No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.
Correlation is above 0.30.

Figure 5.23: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=5) who were Grouped into the Low Group for Fruits Based on the Fruit Values Exclusively. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

**p<0.0001
No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.
Correlation is above 0.30.
Figure 5.24: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=8) who were Grouped into the High Group for Vegetables Based on the Vegetable Values Exclusively. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

* $p<0.05$, - Negative Correlation
No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.

Figure 5.25: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=12) who were Grouped into the Low Group for Vegetables Based on the Vegetable Values Exclusively. Children needed to have at least two constructs grouped in the high group or low group to be grouped in the high or low overall group category.

* $p<0.05$, - Negative Correlation
No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.
Figure 5.26: The Fruit Map and Construct Results for the Child (YBE(4)) who was Categorized as Low for all Five Constructs (Naming, Concepts, Preference, Availability, and Intake).

YBE
4 years old
Naming score: avg 29 fruit avg 30 cards 33 (carrots, peas, banana, salad, grapes, broccoli, greens, peaches) fruit cards 40 real 25 (peas, banana, salad, grapes, carrots, greens, broccoli, peaches, orange) fruit real 20
Concepts 0 fruit concepts 0
Preference 50 (salad, carrots, banana, orange, greens, peas-yucky) fruit preference 60
Availability 58 (Banana, French fries, grapes, orange, salad) fruit availability 40
NCI 4.47, 4.20woff, 1.54woffj, .5f
Figure 5.27: The Vegetable Concept Map for a Child who was Categorized in the Overall Study Constructs High Group because he had Three Study Constructs that were Categorized as High.

MBP
5 years old
Naming score: avg 100 vegetable avg 100 cards 100 vegetable cards 100 real 100 vegetable real 100
Concepts 62 vegetable concepts 32, vmisconceptions-1
Preference 50 (orange, salad, broccoli, banana, corn, carrots-yucky)
vegetable preference 43 vf 33
Availability 92 (peaches) vegetable availability 100 vf 100
NCI 4.95, 4.32woff, 3.24woffj, 1.24v
vf

Vegetables.
(Favorite thing about vegetables?) - The cooked (1). I don’t like carrots and corn (1). They taste nasty (1).

Greens (1).
Broccoli (1).
Peas (1).
Corn (1).
Salad (1).
Carrots (1).
French fries (1).
Don’t have-Potatoes (1).

from out of the woods (1).
from off the trees (M).
from off the stove (1).

At lunch (1)-at school (1).
(Eat all the vegetables shown except) - Well I eat carrots that is greasy, but I don’t eat these kinds of carrots (carrot sticks).
I eat the little carrots (1). That be a vegetable (1).
Nope (Does he eat vegetable at home?) I eat French fries at home (1).

At school (1)...
At 3:00 o’clock (1).
At lunch (1), if they’re cooked (1).

Vegetables
include
are eaten at
are eaten when
are eaten with
do … for the body

I eat it with pizza (1) and if it would have these (broccoli) in there I would eat ‘em (1). If they had broccoli in the salad (1), I will eat it. And tomatoes (1). I like ‘em (tomatoes) (1), when they juicy (1). I eat carrots with a salad (1). Peas, greens (1).

It makes your eyes nice (1).
Make you feel better (1).
Figure 5.28: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=4) who Answered all of the Targeted Interview Questions Correctly.

- Negative Correlation
No line connection if the correlation was less than 0.25.

- Correlation is between 0.25 and 0.29.
- Correlation is above 0.30.

Figure 5.29: The Correlations Generated between the Study’s Theoretical Constructs for the Children (n=7) who Answered None of the Targeted Interview Questions Correctly or Just Answered the Healthy Interview Question Correctly.

*p<0.05
No line connection if the correlation was less than 0.25.

- Correlation is between 0.25 and 0.29.
- Correlation is above 0.30.

The Theory of Meaningful Learning (14, 223) emphasizes that understanding the unique conceptual structure each child has about fruits and vegetables is essential for developing effective education efforts. A fundamental aspect of these structures, however, is foundational elements such as the proper names of particular fruits and vegetables. Table 5.1 illustrates that some (~25%) of these children do not know the name of common fruits and vegetables such as orange and banana. Some children had no problem identifying the fruits and vegetables cards. Age, as expected, was associated with higher scores. Regardless, I suggest that one of the most valuable methods of improving a child’s fruits and vegetables identification abilities is to have the childcare providers name and talk about the foods as they are eating them. Childcare providers were rarely observed to name the food served to the children. If the childcare providers did name the food the children were served, then the childcare providers often gave the food items generic names such as “food” or “fruit.” Children can also help each other in naming the foods, but this cannot occur if the children themselves do not know the correct name or cannot talk at mealtime.

Concepts of fruits and vegetables are an essential component of instilling healthy eating habits and nutrition knowledge in children. Table 5.2 and Figures 5.1, 5.2, 5.4, 5.7, and 5.8 demonstrate that the sample had some understanding of fruits and vegetables. But in comparison to the aforementioned Figures, Figures 5.2, 5.3, 5.5, and 5.6 illustrate these concepts varied tremendously from one child to the next. Age and length of time in Head Start seemed to influence concept scores and content. Although there was not a significant difference between fruit and vegetable concept scores for some children like MGR concept scores were different. This difference may be due to a host of factors including varying preference, availability, and intake of fruits and vegetables. Tables 5.8-5.11 provide some evidence that these constructs may influence children’s different concepts of fruits and vegetables. Concept scores, in particular, proved to be an important and not surprising indictor of children’s concept content quality. In other words, children who had higher concept scores were more likely to answer the selected questions correctly. Availability and preference also seem to influence concept content.

Common concepts that did emerge from the children who could express themselves were that you eat fruits and vegetables at home, school, and at meals. Some identified that fruits and vegetables were from the ground, woods, or trees. Yet, many children thought fruits and vegetables came from the stove, the store, the car (probably referring to fruits and vegetables trucks common to the area), cows, and bowls. A contingency nature to eating fruits and
vegetables emerged from many children, especially for fruit. This is not too surprising given that I observed in many classes childcare providers not serving children fruit or allowing them to eat it until they had a “happy plate” (a clean plate). Most of the children expressed a positive preference for the fruits and vegetables during the interviews. Some even wanted to eat the cards as they were talking about them. Negative preference for particular fruits and vegetables or, many times, for vegetables in general, were expressed. One child did not even want to see the collard greens’ picture card. Most of the children thought of fruits and vegetables as healthy. Most of the children were able to discuss how they were good for the body because “they make you strong.” During my classroom mealtime observations, many of the children, sometimes even classrooms at a time, would show their muscles off when eating or convincing other children to eat their vegetables.

Nevertheless, as illustrated in Figure 5.8, children attributed negative things vegetables do for the body as often as they noted that they were good for the body. As Tables 5.5-5.7 demonstrate, this was not the only misconception the children had. Misconceptions, although not extensive in this sample, are difficult to change, as noted by Novak and Gowin (14), and must be taken into consideration when evaluating young children’s concepts of fruits and vegetables. For this sample, learning the difference between fruits and vegetables is one step. This lesson can help preschoolers learn how to group as well as identify individual items. Another misconception these children had was differentiating between fruit-flavored juice, candy, and snacks and actual fruit. Both of these misconceptions are understandably easy for young children to have, but correcting these misconceptions is important to improving healthy eating patterns in preschoolers. Teaching preschoolers to understand the difference between fruits and vegetables helping you to not get sick and how they make you sick is a good lesson, especially in children who are vulnerable to food jags and neophobia. Misconceptions such as “vegetables come from the cow” are insightful as they point to lessons the children are learning about food. It is important to ensure these lessons are differentiated for these children and reinforced by their caretakers in a correct and understandable manner. Table 5.4 further illustrates how children articulate their concepts—right or wrong—for fruits and vegetables. Several children discussed how food affects their teeth. Whether it was one or two dental caries or baby bottle caries, caries were a problem for many of these children. Many children did not like to eat certain foods (like apple wedges) because “they are hard” on their teeth. One child (YBI) explained that he did not like eating cold food as the associated tingling sensation these foods caused “hurt my mouth.”

Understanding the concepts low-income, African American, inner-city, Head Start children have is a starting point to identifying which lessons to focus nutrition education efforts on. The
common maps as well as the various individual maps direct nutrition educators to focus on the basics: where, when, and how one can eat fruits and vegetables, where fruits and vegetables come from, and what fruits and vegetables can do for the body. Many childcare providers told the children “carrots are good for the eyes.” This was a common concept for the children, but some children started to think that every fruit and vegetable must help one particular body part. It was not clear to me whether the children or childcare providers actually understood the relationship between carrots and eyes or if they were both echoing back something they had been told. Emphasizing that fruits and vegetables are good for the entire body—physically and mentally—along with a simple rationale for why may be a more effective approach to developing life-long healthy eating habits.

This study’s theoretical framework, which stresses the importance of inter-relational systems, helped in my interpretation and understanding of the children’s concepts. In other words, understanding whom, where, and how these concepts are developing in these children is a vital component to interpreting, understanding, and then using them as a guide to future educational materials. My observations of the classroom, interviews with the primary care providers (to be further discussed in Research Aim Two), and work with the children demonstrate that Head Start is influencing these children’s concepts of fruits and vegetables. In many cases, unfortunately, this impact is not in a positive direction. As the contingency concepts specifically illustrated, children are learning from their childcare providers to clean their plates and that fruits are a treat, often at the expense of vegetables. MGO, as illustrated in Table 5.4, is learning about where vegetables come from through her classroom curriculum. Other concepts that emerged from the children and based on my classroom observations: children are also learning from their playtime activities in the kitchen area at Head Start. This study demonstrates that mealtime, child-feeding practices, and nutrition education curriculum and resources, such as the kitchen area, are learning environments for at-risk children. Nonetheless, they are not always encouraging healthy eating habits or correct nutrition knowledge. Future research and theory should address how to ensure that Head Start childcare providers, curriculum, meals, and resources are fulfilling the program’s aim of improving at-risk children’s both nutritional status as well as nutrition knowledge.

As the first study to assess inner-city Head Start children’s preferences, the findings illustrate that these children can express their preference for foods. These children liked fruits and vegetables and tended to prefer canned fruit, such as peaches, to fresh fruit (perhaps due to familiarity). Many also indicated that they preferred dressing on their salad and carrots as well as cheese on their broccoli. Although the children did not have a problem expressing if a food was “yummy” or “yucky” or in their words “nasty,” some children did have a difficult time ranking
the foods. Future research should assess fruit and vegetable preference in comparison to more energy dense foods, such as cookies and candy, in this population, but maintain the foods tested to around ten items at a time.

Availability, as illustrated in Figure 5.6 and Tables 5.8-5.11, plays an influential role in a child’s concepts of fruits and vegetables. The analyses of the food served at this inner-city Head Start center (Tables 5.13-5.17) demonstrates that this center is serving fruits and vegetables, but not many fresh fruits and vegetables. It also relies heavily on fruit or fruit-flavored juice (30%) and does not stress fresh vegetables as a snack food (9%). The foods used in this study were not served often in the 77 days examined, i.e., bananas were served a total of eight times, apples were served a total of six times, and grapes and oranges were served a total of five times. Canned peaches were served 25 times. In the interviews as well as the preference experiment, the children were more familiar and had a higher preference for canned peaches. Tables 5.18-5.21 demonstrate how relying on a center’s menu to determine if foods are available at a center may not be the most effective method. In other words, future studies as well as evaluation agencies such as the United States Department of Agriculture’s Child and Adult Care Food Program (200) may want to utilize more direct observations of what the children are actually being served over a series of unannounced visits. In addition, national health efforts, such as 5-A-Day (22), are trying to encourage the consumption of fresh fruits and vegetables as a means of diet-disease prevention, especially in at-risk populations. Future research and work on these intervening efforts may want to capitalize on Head Start’s food provision to incorporate more fruits and vegetables, especially fresh fruits and vegetables.

In the household, fruit and vegetable availability was low. Table 5.22 reports that several primary care providers relied more on canned fruits and vegetables than fresh fruits and vegetables. The primary care providers tended to provide their children with a lot of fruit-flavored juice. Two mothers explained to me that they are “allergic” to fruit and, consequently, one does not have any fruit in the house. Other primary care providers discussed how fresh fruits and vegetables are expensive. If the primary care providers do buy them, then there are, as explained by MGR in Table 5.4, quickly “no more.” In addition, primary care providers’ shopping patterns, which in many cases tended to be dictated by their food assistance (such as Food Stamps), governed a monthly or bi-monthly trip to the grocery store. These types of shopping patterns, as the primary care providers will further express in Research Aim Two, may hinder the consumption of fresh fruits and vegetables because fresh produce tends to spoil or be consumed rather quickly. To improve fruit and vegetable availability in the household, especially fresh fruits and vegetables, government assistance programs may want to re-evaluate their forms
of assistance. Further work in the area of availability is needed. More thorough assessments of Head Start availability, in addition to local grocery stores or fruit and vegetable venues’ availability and purchasing, will be needed.

The National Cancer Institute Fruit and Vegetable Screener scores (estimates of median daily servings of fruits and vegetables) for the children were higher than the values reported in another children’s study (99) as well as the adults used in the instrument’s validation studies (243). A number of reasons may explain these differences. One important factor to consider is that the instrument has not been extensively validated in children, ethnic minorities, low-income populations, or low-literate samples. Reading the instrument and going over the questions and responses with the primary care providers helped me to see that the sample tended to not account for the children’s Head Start food consumption. This may be because the primary care providers viewed me as someone who works at Head Start and assumed that I was taking account of or knew the childcare intake. Future assessments of dietary intake in this population should use this instrument in conjunction with multiple 24-hour food recalls. These recalls will need to be taken multiple times in the beginning of the month when Food Stamps are provided and again toward the end of the month to get a better sense of this population’s fruit and vegetable intake.

The study’s theoretical model guided this work (Figure 3.7). Although this model served well as a tool to drive the methodology and study interpretations, analyses trying to put actual numerical value or statistical assignment to the study constructs (concepts, preference, availability, and intake) and individual groups (child, primary care provider, and childcare provider) were constrained by the sample size. Despite this, the sample provided a small, but thorough resource of exploring how these constructs and groups operate. As Figure 5.9 illustrates, concepts, preference, availability, and intake of fruits and vegetables are not strongly correlated. Even though strong relationships among variables in eating behavior studies are not typical (131), various factors such as the children’s age seemed to influence the study’s theoretical model. These factors provided insight into the children’s eating behaviors.

First, as Figure 5.10 illustrates, concepts or quality concept content were not generated by all the children in this sample. The children’s ability to name fruits and vegetables, consequently, seemed to be a logical construct to add to the model. As Figure 5.11 demonstrates, the children’s naming ability was related to concepts, although, not significantly. This may be due to the fact that some children have concepts of fruits and vegetables even though they are not that extensive and meaningful i.e. they know fruits are good, but do not know why or how. Although misconceptions were related to concepts as well and need to be taken into account to
produce a more accurate concept score, adding misconceptions as its own construct to the study model did not seem to be useful.

Evaluating the study model using fruit and vegetable values exclusively was useful. As Figures 5.12 and 5.13 illustrate, the study constructs relate somewhat differently and in some cases (such as preference to intake and availability to intake) relate more strongly. Focusing the evaluation of the relationships between the constructs based on age showed how certain constructs’ relationships are more sensitive to age such as availability to intake \( (r = 0.95, p<0.05 \) for three year olds versus \( r = -0.15 \) for five-year olds). Gender specific analyses did not seem to differ that much as illustrated in Figures 5.16-5.19. The differences, such as between preference and intake \( (r = 0.59 \) for boys versus \( r = 0.03 \) for girls), may be more of a result of an age imbalance between the genders. Future studies using this model may want to focus more on a certain age group or gender or at least study sample sizes where these analyses can more effectively take these variables into account.

The study model was sensitive to whether or not it was constructed in a group that had high values for a particular study construct or low values. Tables 5.23-5.26 note where constructs were found to be significantly different between the high and low groups. Not surprisingly, the construct of interest, i.e. naming, found significant differences between the high and low groups in that particular construct. Of more interest were the other constructs that emerged as different in the construct-specific analyses. The most interesting was the relationship between availability and intake. Tables 5.24 and 5.25 provide similar findings, except vegetable availability analyses did not find significant differences in vegetable intake. This may be because most of the primary care providers qualitatively reported better availability and intake of vegetables, particularly having at least one vegetable a day at dinner. The primary care providers were not as certain and routine about the availability and consumption of fruit.

Table 5.26 demonstrates that when high and low groups are constructed for the overall trend in individual constructs, several significant differences in constructs are present. Figures 5.20-5.25 capture how high and low groups produce different study models. In many cases, the high group produces stronger and more significant correlations. This may mean that the study model is better able to describe fruits and vegetables in children who know more, like more, eat more, and have more fruits and vegetables available. The low group, however, also generated relationships of interest, particularly between naming and preference \( (r = 0.35) \), concepts and availability \( (r = 0.29) \), and preference and availability \( (r = 0.45) \). The groups constructed on fruit exclusively illustrate a particularly interesting relationship in the low group between preference and availability \( (r = 0.83) \), preference and intake \( (r = 0.83) \), and naming and preference \( (r = 0.70) \).
For vegetable exclusive models, the relationship between naming and preference ($r = -0.78$) was noteworthy in the high group as was the relationship between concepts and availability ($r = -0.58$) in the low group. These results provide a foundation for using concepts, preference, availability, and intake to differentiate preschoolers on fruits and vegetables. Although this study did not aim to change any of the preschoolers’ constructs, the high and low group differences suggest that intervening in children’s preference for fruits and vegetables may help to improve their concepts and intake. Improving availability, concepts, and intake also seems to provide venues of positive impact on that particular construct, as well as, a positive influence on one, if not more, of the other constructs. Future studies and interventions targeted on fruits and vegetables should use concepts, preference, availability, and intake in conjunction and should consider evaluating these constructs separately for fruits and vegetables.

Figures 5.26 and 5.27 provide a more qualitative individual assessment of how the study model is of value in differentiating and evaluating individual children. Although the child, MBP, grouped more frequently in the high group had a high concept score and availability, he did not have that high of a preference or intake for fruits and vegetables. Through qualitative assessments as well as reviewing various models, children who had higher concepts or naming scores sometimes had a more articulate interest in voicing their dislike for particular food items as well as not eating them. Figures 5.28 and 5.29 provide models that take into account concept content quality and reveal interesting differences among high and low groups; specifically, the opposite relationships between preference and intake ($r = -0.71$, $p<0.05$ for the high group versus $r = 0.78$, $p<0.05$ for the low group). These findings highlight the role as well as range of cognitive ability in Head Start children. Given that these children spend a significant portion of their Head Start day in preparation for or engaging in mealtime (breakfast, lunch, and snack), finding low nutrition knowledge in these children may indicate that their knowledge in other domains is limited as well or even more impoverished. Nutrition educators should work with Head Start to design, implement, and evaluate how mealtime can be used to increase nutrition knowledge in preschoolers. These lessons should aim to encourage improvements in other cognitive abilities by integrating other skill sets such as colors and counting.

Based off of these exploratory findings, future work should assess how availability, such as increased fresh fruits and vegetables, at Head Start influences preschoolers’ naming and concepts of fruits and vegetables. To maximize the role of availability and link it more effectively to concepts, efforts should be made to increase nutrition knowledge and child-feeding practices in childcare providers. Particular attention should be given to aiding the childcare providers in transferring their knowledge of fruits and vegetables to the children and sharing this knowledge.
and effort with the children’s primary care providers. Based on these findings, special attention should be given to intervening in availability and concepts of fruits and vegetables so that these efforts facilitate increases in preference and intake and do not result in positive influences on concepts and availability but negative influences on preference and intake. Taken together, these construct analyses provide insight into future work with this study model, but, further studies are needed to better capture how these constructs operate.

As an exploratory qualitative study, this study’s main objective was to examine inner-city Head Start children’s concepts, preference, availability, and intake of fruits and vegetables. This study did explore how Head Start’s food provision, child-feeding practices, mealtime environment, and nutrition education curriculum influences these constructs. Observing the Head Start classroom, without biasing the food provision and nutrition education efforts provided at the center, was essential to the study protocol. I acknowledge the study’s limitations: a small sample size, no documentation of the exact types and amounts of food consumed by an individual child, no 24-hour recalls or records of household daily consumption, no formal assessment of the community’s fruit and vegetable availability, and the study focused on only a select sample of fruits and vegetables. My hope is that future research will address some of these limitations. Despite these limitations, the study’s findings supply a foundation for future research and intervening efforts. These findings also enabled me to evaluate the other study aims.
D. Results for Research Aim Two: To Explore the Concepts, Preference, Availability, and Dietary Intake of Fruits and Vegetables in Primary Care Providers (Parents, Grandparents, etc.) of the Children Studied under the First Aim.

1. Primary Care Providers’ Naming Fruits and Vegetables Scores
   All primary care providers correctly named all of the fruits and vegetables when naming either the picture cards or the actual foods.

2. Primary Care Providers’ Concepts of Fruits and Vegetables
   Table 5.27 represents the primary care providers’ concept scores for fruits, vegetables, and for fruits and vegetables combined. Fruit concepts were not significantly different from vegetable concepts (p=0.45). The ordering of the questions, i.e. fruit questions first then vegetable questions, did not significantly affect (p=0.93 for total concept scores, p=0.49 for vegetable concept scores, and p=0.32 for fruit concept scores) the primary care providers’ concept scores. Figures 5.30 and 5.31 illustrate differences in concept content generated by two different primary care providers despite generating about the same number of concepts. Figures 5.32-5.33 illustrate the various concepts generated by all of the primary care providers on fruits and vegetables. Table 5.28 lists the primary care providers’ concepts of healthy.

   Table 5.29 captures some of the more qualitative responses from the primary care providers on grocery shopping and their support system. Example responses to where they learned about fruits and vegetables are listed in Table 5.29. The primary care providers expressed that home or their family (n=18) was their primary source of nutrition education. Other sources were: school (n=11), doctors (n=5), work (n=4), books/magazines/radio (n=2), and nutritionists/The Supplemental Program for Women, Infants, and Children (WIC) (n=1). The primary care providers were asked if hearing/knowing fruits and vegetables were healthy influenced them to eat them. Only about half said it did influence them (50% for fruit and 59% for vegetables). Many of the primary care providers explained that they liked fruits and vegetables anyways. Table 5.29 shows some of the responses from the primary care providers regarding their conversations with their respective child’s childcare provider. Most (95%) said that they talked with the childcare provider, but only five said that any of these conversations were about food or health issues. Instead, more than half of the primary care providers (54%) said they talk about the center’s meals with their child.

   Most of the primary care providers said that they eat fruits (86%) and vegetables (91%). Most think fruits and vegetables are healthy (100%); although one primary care provider (YGKp) said it: “Depends on how much you eat.” Another primary care provider (MGLp) said that some
fruits “have a lot of sugar, like the canned fruit.” One primary care provider (YBSp) sternly said: “They better be healthy, all those years they been telling me this.”

Table 5.27: The Primary Care Providers’ (n=22) Concept Scores for Fruits, Vegetables, and for Fruits and Vegetables Combined. The range of scores (lowest to highest) is provided.

<table>
<thead>
<tr>
<th>Fruit Concept Scores (Range)</th>
<th>Vegetable Concept Scores (Range)</th>
<th>Fruit and Vegetable Combined Concept Scores (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.6 (15-58)</td>
<td>26.8 (17-61)</td>
<td>52.0 (33-102)</td>
</tr>
</tbody>
</table>

Figure 5.30: An Example Fruit Concept Map for a Primary Care Provider (MGRp). This primary care provider had about the same number of concepts as Figure 5.31, but the content differs.

Total Concept Score: 42; Fruit Concept Score: 21; Fruit Misconceptions: 0.
Figure 5.31: An Example Fruit Concept Map for a Primary Care Provider (YGPP). This primary care provider had about the same number of concepts as Figure 5.30, but the content differs.

I just call it fruit that’s all. I just call it fruit.

They come from how they grown (1). Like orange off a tree (1), grapes off a tree (M), apples too (1).

No, I don’t eat no fruit (1). I would eat it at home. I like to eat fruit like bananas (1). Apples good for you too (1).

I would eat them like during the morning (1), or, in the afternoon (1), if I don’t feel like eatin’ ’cause I just had breakfast (1); start eating bananas (1).

Make you strong (1).


Total Concept Score: 36; Fruit Concept Score: 17; Fruit Misconceptions: 1.
Figure 5.32: The Common Map for All the Concepts of Fruits Generated from All the Interviewed Primary Care Providers (n=22) (Number of Times Expressed by the Primary Care Providers in the Sample).

Nutritious/healthy (11).
Taste/sweet/juicy/not candy sweet (6).
Grown (5).
High in vitamins/minerals (5).
Preference (3).
An apple a day... (2).
Good to snack on (2).
Naming fruit (2).
Help you grow (2).
Doesn’t have a lot of sugar on it (1).
I guess it’s the opposite of vegetables (1).
Allergic, don’t bother (1).
Something you need 3-5 a day, don’t eat that either (1).
Citrus (1).
Be smart (1).

Trees, vines, grounds, earth, etc. (20).
Florida, Islands, Where are the other farms? (2).
Supermarket, farmer’s market (1).

Home (20).
Work (6).
Anywhere (4).
Restaurants (4).
Car (3).
Walking (3).
Friends/Family (2).
Market (1).
It depends on if it is there (1).

Fruits

are come from

are eaten at

are eaten when

are eaten with

do ... for the body

gives it vitamins/minerals (7).
cleans system out (5).
strengthens body (5).
maintains health (4).
prevent diseases (3).
fight infections (2).
keeps you hydrated (2).
sustains life (2).
keeps weight down (1).
makes you feel better, not bloated (1).
im not really sure of fruit (1).
makes skin healthy (1).
cavities (1).
healthier than candy. (1).

include

Apple (22).
Banana (22).
Grapes (22).
Oranges (22).
Peaches (22).
Pears (1).

Snack/meals (17).
# of times a day (4).
when available (3).
it depends on if it is there (1).
Figure 5.33: The Common Map for All the Concepts of Vegetables Generated from All the Interviewed Primary Care Providers (n=22) (Number of Times Expressed by the Primary Care Providers in the Sample).

Vegetables

- Healthy, good for body (15).
- Grown (7).
- High in vitamins/minerals (5).
- Makes the body strong (3).
- Green (3).
- Different than fruit (1).
- Gives the body energy (1).
- Side dish (1).
- Different color/shapes/flavors (1).
- Didn’t eat them, don’t care for them (1).
- Fresh in bag or can in pan (1).
- Not a fatty food, want to lose weight, eat vegetables (1).

are

- Ground, trees, etc. (22).
- Home (21).
- Restaurant (11).
- Work (3).
- Friends/family (2).
- Car (2).
- Anywhere (1).

are eaten at

- Meals, mainly dinner and snacks (22).

are eaten when

- With dinner (16).
- With salad (6).
- On sandwich (2).
- In soup (1).
- With dip (1).
- No (1).
- Snack (1).

are eaten with

- Give energy, makes body feel great (6).
- Provides vitamins/minerals (6).
- Provides strength (6).
- Maintains health (4).
- Prevents disease (3).
- Fights infection (3).
- Helps body grow (1).
- Provides antioxidants (1).
- Makes body more fit (1).
- Provides nutrients (1).
- Keeps skin healthy (1).
- Something with acids, fluoride acid (1).
- Gives you self-esteem (1).
- Helps eyes, blood (1).

include

- Broccoli (22).
- Peas (22).
- Greens (22).
- Carrots (21).
- Corn (20).
- Salad (20).
- French fries (9).
Table 5.28: The Primary Care Providers’ (n=22) Concepts of Healthy.

<table>
<thead>
<tr>
<th>Primary Care Providers’ Concepts</th>
<th>Number of Times Concept was Used by the Primary Care Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good for you/helps body</td>
<td>10</td>
</tr>
<tr>
<td>Eating the right things</td>
<td>4</td>
</tr>
<tr>
<td>Lots of energy, not sluggish</td>
<td>4</td>
</tr>
<tr>
<td>Absence of disease and sickness</td>
<td>4</td>
</tr>
<tr>
<td>Have vitamins/minerals</td>
<td>4</td>
</tr>
<tr>
<td>Have good eye sight</td>
<td>4</td>
</tr>
<tr>
<td>Fit</td>
<td>4</td>
</tr>
<tr>
<td>Provide nutrition/nutrients</td>
<td>2</td>
</tr>
<tr>
<td>Sustains life</td>
<td>2</td>
</tr>
<tr>
<td>Good blood</td>
<td>2</td>
</tr>
<tr>
<td>Regular, good bowel function</td>
<td>2</td>
</tr>
<tr>
<td>Doesn’t have a lot of sugar</td>
<td>1</td>
</tr>
<tr>
<td>Strong</td>
<td>1</td>
</tr>
<tr>
<td>Growing</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 5.29: Examples of Primary Care Providers’ (n=22) Interview Responses.

**On Grocery Shopping**

MGLp: “I don’t like long lines.” (Expressed by the majority of the primary care providers.)

MBPp: “The market is sometimes really overcrowded. Stuff is overpriced. Sometimes stuff is not fresh there.”

MGAp: “I think that they (grocery store) are a little bit too expensive. You know like this is a neighborhood market, come on!”

YGBp: “I need the food so I got to get someone to take me.” (Many of the study participants relied on family, neighbors, a taxi-like service, or public transportation to get to and from the grocery store.)

YGKp: “Sunday paper is my best friend.” (Some, but not most used coupons when shopping. Many, however, discussed how grocery shopping “is money” and they do not like to spend money on food.)
### On Grocery Shopping for Fruits and Vegetables

MGNp: “I enjoy that (shopping for fruits and vegetables), going home, and taste it. I got the right one.”

MBFp: “Picking up bruised bananas when there’s nothing but bruised bananas. Or, the potatoes are mushy like they’ve been in the bag too long. Or, the grapes are brown.”

MGAp: “Sometimes I get tangled up because there sometimes is not a wide selection of vegetables. You will see the same vegetables like canned corn, string beans, peas, and lima beans and we eat Brussels sprouts and stuff like that so. When I am in a rush and I feel overwhelmed.”

MGLp: “My kids get the fruit cups. I get the fruit.”

YGBp: “I do like the lettuce and stuff like that. We haven’t had that. I don’t keep it around.”

MGOp: “…not as often as I should, because it’s hard for me to get to the supermarket like I want to. If I could get there more often I’d probably buy it more often.”

### On Grocery Shopping with the Kids

MBFp: “They (referring to his children) get stuff off the shelves, put them in the shopping cart. Push the shopping cart. They want to do everything, but pay for it.”

MGAp: “Sometimes I will take ‘em (referring to her children). I will pick one up you know what I mean, but I just get overwhelmed. It is just so much, like I can’t debate on whether or not, you know, you try not to have so much junk food…”

YGTp: “We love shopping. It is a good family activity.”

### On Where They Learned About Fruits and Vegetables

YBRp: “I was always in the kitchen with her (referring to her mother). Always by the cook.”

MGNp: “…school, they used the triangle of food groups and all of that stuff.” (One of the only times the United States Department of Agriculture’s Food Guide Pyramid (201) was mentioned.)

YBSp: “Well, I guess being a parent, sometimes you just have to know, instinct.”
Table 5.29: Examples of Primary Care Providers’ (n=22) Interview Responses, Continued.

<table>
<thead>
<tr>
<th>Conversations They Have or Don’t Have with their Child’s Childcare Providers in General and on Food, Nutrition, and Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGLp: “Yes (I talk with the childcare provider), progress, but it’s not food.”</td>
</tr>
<tr>
<td>MGOp: “After she got that big belly (I started to talk to the childcare providers about food). My kid’s starting to look like mom. And, I’m like I don’t want her to get so heavy, like me. I’m having problems and I don’t want that for her.”</td>
</tr>
<tr>
<td>YBRp: “Normally, I talk to him (referring to son) about school meals.”</td>
</tr>
<tr>
<td>MBWp: “No (I don’t talk to the childcare providers about food), because I always look at the calendar they give out.” (In the menu analysis provided in Research Aim One’s results, it was found that only four of the 269 meals observed matched the provided menu.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On their Support System</th>
</tr>
</thead>
<tbody>
<tr>
<td>YGBp: “No one.” Or, YBSp: “Me.” (This was expressed by six of the primary care providers. Two individuals only named the church. Only one individual each expressed government/health agencies and schools.)</td>
</tr>
<tr>
<td>MGAp: “I don’t rely on them. I am independent. I do it myself, because I can’t wait on people. I have to be a mother.”</td>
</tr>
<tr>
<td>MGGp: “That’s a sensitive question. I don’t have one. I really don’t have anyone to depend on. I think about it sometime.”</td>
</tr>
<tr>
<td>YGBp: “No one, pretty much in house.”</td>
</tr>
<tr>
<td>YBRp: “Never did food banks—people don’t know, (I am) interested in other sources.”</td>
</tr>
</tbody>
</table>

### a. Primary Care Providers’ Misconceptions of Fruits and Vegetables

Table 5.30 represents the primary care providers’ misconception scores. No significant difference occurred between the primary care providers’ misconceptions of fruits versus vegetables (p=0.92). The ordering of the questions did not have an effect (p=0.07 for fruit misconceptions and then p=0.66 for vegetable misconceptions). Table 5.31 lists all of the expressed misconceptions for fruits, while Table 5.32 lists all of the expressed misconceptions for vegetables. There was not a strong relationship between the primary care providers’ concepts for fruits and vegetables and their misconceptions of fruits and vegetables (for total concepts/total
misconceptions p=0.26, for fruit concepts/fruit misconceptions p=0.34, and for vegetable concepts/vegetable misconceptions p=0.34).

Table 5.30: The Primary Care Providers’ (n=22) Average Misconceptions for Fruits, Vegetables, and for Fruits and Vegetables Combined. The range of scores (lowest to highest) is provided.

<table>
<thead>
<tr>
<th>Average Fruit Misconception Score (Range)</th>
<th>Average Vegetable Misconception Score (Range)</th>
<th>Average Fruit and Vegetable Combined Misconception Score (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.77 (0-6)</td>
<td>0.82 (0-4)</td>
<td>1.6 (0-9)</td>
</tr>
</tbody>
</table>

Table 5.31: The Misconceptions (n=17) about Fruits Expressed by the Primary Care Providers (n=22) (Frequency of Times Expressed within the Entire Sample of Primary Care Providers).

I guess you could say fruits high in protein (1).
(Talking about vitamins) Like bananas give you potassium (1).
Pears give you iron (1).
I guess fruit is the opposite of vegetable (1).
Fruit is grown by the root too (3).
(Talking about fruit) Greens come from trees (1).
Fruit is healthier than vegetables (1).
Fruit provides the body with vitamin D (1).
Grapes grow off a tree (1).
(Talking about fruit) Carrots (1) make your teeth strong (1). Your teeth strong and your eyes (1).
We try to eat fruit, but don’t eat ’em five times a day like you are suppose to (2).
Fruit provides the body with zinc (1).

Table 5.32: The Misconceptions (n=18) about Vegetables Expressed by the Primary Care Providers (n=22) (Frequency of Times Expressed within the Entire Sample of Primary Care Providers).

Corn is a starch (7).
French fries is not a vegetable or is it? It is a potato (1).
A potato is a starch. Starch is a potato (1).
Corn and French fries as a meal-starch (1).
Vegetables come from a tree (1).
Tomatoes are a vegetable (2).
Corn not really good for your digestive system (1). I don’t know what corn is good for. Let me see iron (1).
Four food groups (1).
Vegetables keep acids out, put acids in. Which one of those does it? Cabbage one of them (1).
Carrots stop bleeding too (1).
3. Primary Care Providers’ Preference for Fruits and Vegetables

Preference ratings were positive with 82% of the fruits and vegetables being rated as “yummy” by the primary care providers. The order from high to low (summation of ranking scores of 1 (highest) to 12 (lowest)) went as follows: 1) grape (84), 2) corn (101), 3) broccoli (105), 4) greens (120), 5) oranges (128), 6) salad (137), 7) apples (141), 8) peaches (156), 9) banana (168), 10) French fries (174), 11) peas (198), and 12) carrots (204).

4. Primary Care Providers’ Availability of Fruits and Vegetables

All of the primary care providers said that they bought fruits and vegetables. Availability, as described previously in the children’s section (B.4.c.), was low for fresh produce and varied among the sample.

5. Primary Care Providers’ Dietary Intake of Fruits and Vegetables

The average NCI scores (estimated median daily servings of fruits and vegetables) for the primary care providers were 8.69 and ranged from 15.97 to 0.85. When French fries were taken out, the score went down to 8.18 and ranged from 15.48 to 0.70. When French fries and juice were taken out, the score went down to 5.66 and ranged from 13.31 to 0.56. When only fruits were considered, the score was 1.82 and ranged from 6.0 to 0. When only vegetables were considered, the score was 3.82 and ranged from 12.31 to 0.06.

6. The Relationship Between the Primary Care Providers’ Concepts, Preference, Availability, and Dietary Intake of Fruits and Vegetables

Figure 5.34 demonstrates the correlations generated for the study’s theoretical model. Figure 5.35 captures the model exclusively for fruits, while Figure 5.36 captures the model exclusively for vegetables. All key study constructs (concepts, preference, availability, and dietary intake) were evaluated for differences among the three determined age categories (29 years old and younger; 30 through 49 years old; 50 years old and older). Differences were only noted between the youngest age category and the middle age category on fruit and vegetable availability (p=0.03) and fruit availability (p=0.02). No gender differences were noted. Marital status or family size did not significantly affect the results either. Analyses were then run in a similar manner as conducted on the children’s data in differentiating high and low scorers on the study’s key constructs. Some of these findings are displayed in Tables 5.33-5.35. The models constructed for the overall high and low groups on these parameters are illustrated in Figures 5.37-5.42. The construct differences between these groups are presented in Table 5.36. Maps of
primary care providers who scored high (Figure 5.43) or low (Figure 5.44) on all of the study constructs are provided.

Figure 5.34: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) for Fruits and Vegetables Combined.

*\textit{p}<0.05, - Negative Correlation

No line connection if the correlation was less than 0.25.

\begin{itemize}
  \item [\textless\textless\textgreater\textless\textgreater] Correlation is between 0.25 and 0.29.
  \item [\textless\textless\textgreater\textless\textgreater\textless\textgreater] Correlation is above 0.30.
\end{itemize}
Figure 5.35: The Correlations Generated between the Study’s Theoretical Constructs when Only Fruits are Considered for the Primary Care Providers (n=22).

*\(p<0.05\)

No line connection if the correlation was less than 0.25.

\(\leftrightarrow\) Correlation is between 0.25 and 0.29.

\(\leftrightarrow\leftrightarrow\) Correlation is above 0.30.

Figure 5.36: The Correlations Generated between the Study’s Theoretical Constructs when Only Vegetables are Considered for the Primary Care Providers (n=22).

*\(p<0.05\)

No line connection if the correlation was less than 0.25.

\(\leftrightarrow\) Correlation is between 0.25 and 0.29.

\(\leftrightarrow\leftrightarrow\) Correlation is above 0.30.
Table 5.33: A Comparison of the Study Constructs between the High and Low Groups based on the Fruits and Vegetables Combined Constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>High and Low Group Cutoffs and (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concepts</td>
<td><strong>High</strong>&lt;br&gt;55 and above (n=7)&lt;br&gt;<strong>Low</strong>&lt;br&gt;42 and below (n=7)</td>
<td>Concepts (p&lt;0.01)&lt;br&gt;Intake (p=0.03)&lt;br&gt;Fruit Concepts (p&lt;0.01)&lt;br&gt;Fruit Intake (p=0.05)&lt;br&gt;Vegetable Concepts (p=0.02)</td>
</tr>
<tr>
<td>Preference</td>
<td><strong>High</strong>&lt;br&gt;100 (n=7)&lt;br&gt;<strong>Low</strong>&lt;br&gt;75 and below (n=7)</td>
<td>Preference (p&lt;0.01)&lt;br&gt;Fruit Preference (p=0.03)&lt;br&gt;Vegetable Preference (p&lt;0.01)</td>
</tr>
<tr>
<td>Availability</td>
<td><strong>High</strong>&lt;br&gt;100 (n=6)&lt;br&gt;<strong>Low</strong>&lt;br&gt;75 and below (n=10)</td>
<td>Availability (p&lt;0.0001)&lt;br&gt;Fruit Availability (p&lt;0.01)&lt;br&gt;Vegetable Availability&lt;br&gt;(p&lt;0.01)</td>
</tr>
<tr>
<td>Intake</td>
<td><strong>High</strong>&lt;br&gt;10 and above (n=9)&lt;br&gt;<strong>Low</strong>&lt;br&gt;5 and below (n=6)</td>
<td>Preference (p=0.04)&lt;br&gt;Intake (p&lt;0.0001)&lt;br&gt;Fruit Intake (p&lt;.01)&lt;br&gt;Vegetable Availability (p=0.04)&lt;br&gt;Vegetable Intake (p&lt;0.01)</td>
</tr>
</tbody>
</table>
Table 5.34: A Comparison of the Fruit Study Constructs between the High and Low Groups based on the Fruit Exclusive Constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>High and Low Group Cutoffs and (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit Concepts</td>
<td><strong>High</strong> 26 and above (n=6) <strong>Low</strong> 20 and below (n=6)</td>
<td>Concepts (p=0.02) Fruit Concepts (p=0.01)</td>
</tr>
<tr>
<td>Fruit Preference</td>
<td><strong>High</strong> 100 (n=18) <strong>Low</strong> 99 and below (n=4)</td>
<td>Preference (p&lt;0.0001) Fruit Preference (p=0.02) Fruit Intake (p&lt;0.01)</td>
</tr>
<tr>
<td>Fruit Availability</td>
<td><strong>High</strong> 100 (n=12) <strong>Low</strong> 60 and below (n=6)</td>
<td>Availability (p&lt;0.0001) Fruit Availability (p=0.02)</td>
</tr>
<tr>
<td>Fruit Intake</td>
<td><strong>High</strong> 3 and above (n=6) <strong>Low</strong> 0.99 and below (n=8)</td>
<td>Intake (p&lt;0.01) Fruit Intake (p&lt;0.01)</td>
</tr>
</tbody>
</table>
Table 5.35: A Comparison of the Vegetable Study Constructs between the High and Low Groups based on the Vegetable Exclusive Constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>High and Low Group Cutoffs and (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable Concepts</td>
<td><em>High</em> 30 and above (n=4) <em>Low</em> 20 and below (n=5)</td>
<td>Concepts (p=0.03) Intake (p=0.02) Vegetable Concepts (p&lt;0.01)</td>
</tr>
<tr>
<td>Vegetable Preference</td>
<td><em>High</em> 100 (n=8) <em>Low</em> 50 and below (n=10)</td>
<td>Preference (p&lt;0.01) Vegetable Preference (p&lt;0.01) Vegetable Intake (p=0.05)</td>
</tr>
<tr>
<td>Vegetable Availability</td>
<td><em>High</em> 100 (n=9) <em>Low</em> 67 and below (n=8)</td>
<td>Availability (p&lt;0.0001) Vegetable Availability (p&lt;0.01)</td>
</tr>
<tr>
<td>Vegetable Intake</td>
<td><em>High</em> 4 and above (n=8) <em>Low</em> 2 and below (n=5)</td>
<td>Intake (p&lt;0.01) Vegetable Intake (p&lt;0.01)</td>
</tr>
</tbody>
</table>
Figure 5.37: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) who were Grouped into the High Group (n=7) on at Least Two of the Study’s Constructs (Concepts, Preference, Availability, and Intake).

*\( p<0.05 \), - Negative Correlation
No line connection if the correlation was less than 0.25.

\[ \longleftrightarrow \text{Correlation is between 0.25 and 0.29.} \]
\[ \longleftrightarrow \text{Correlation is above 0.30.} \]

Figure 5.38: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) who were Grouped into the Low Group (n=7) on at Least Two of the Study’s Constructs (Concepts, Preference, Availability, and Intake).

*\( p<0.05 \), - Negative Correlation
No line connection if the correlation was less than 0.25.

\[ \longleftrightarrow \text{Correlation is between 0.25 and 0.29.} \]
\[ \longleftrightarrow \text{Correlation is above 0.30.} \]
Figure 5.39: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) who were Grouped into the High Group (n=5) on at Least Two of the Study’s Constructs (Concepts, Preference, Availability, and Intake) when Only Fruit Values were Considered.

*\( p<0.05 \)

\(^*\)All preference scores for these five primary care providers were 100.
No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.

Figure 5.40: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) who were Grouped into the Low Group (n=6) on at Least Two of the Study’s Constructs (Concepts, Preference, Availability, and Intake) when Only Fruit Values were Considered.

*\( p<0.05 \), - Negative Correlation

No line connection if the correlation was less than 0.25.

Correlation is between 0.25 and 0.29.

Correlation is above 0.30.
Figure 5.41: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) who were Grouped into the High Group (n=10) on at Least Two of the Study’s Constructs (Concepts, Preference, Availability, and Intake) when Only Vegetable Values were Considered.

*\( p<0.05 \), - Negative Correlation
No line connection if the correlation was less than 0.25.

\[ \leftrightarrow \] Correlation is between 0.25 and 0.29.

\[ \longleftrightarrow \] Correlation is above 0.30.

Figure 5.42: The Correlations Generated between the Study’s Theoretical Constructs for the Primary Care Providers (n=22) who were Grouped into the Low Group (n=6) on at Least Two of the Study’s Constructs (Concepts, Preference, Availability, and Intake) when Only Vegetable Values were Considered.

*\( p<0.05 \), - Negative Correlation
No line connection if the correlation was less than 0.25.

\[ \leftrightarrow \] Correlation is between 0.25 and 0.29.

\[ \longleftrightarrow \] Correlation is above 0.30.
Table 5.36: A Comparison of the Study Constructs between the High and Low Groups based on the Overall Study Constructs for Fruits and Vegetables Combined as well as Fruits and Vegetables Exclusively.

<table>
<thead>
<tr>
<th>Group</th>
<th>High and Low Groups (n=Group Size)</th>
<th>Constructs Found to be Significantly Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and Vegetables Combined</td>
<td>High (n=7)  Low (n=7)</td>
<td>Concepts (p=0.02)  Preference (p=0.02)  Intake (p&lt;0.01)  Fruit Concepts (p=0.05)  Fruit Intake (p=0.01)  Vegetable Concepts (p=0.03)  Vegetable Preference (p=0.05)  Vegetable Intake (p=0.03)</td>
</tr>
<tr>
<td>Fruits</td>
<td>High (n=5)  Low (n=6)</td>
<td>Concepts (p=0.04)  Intake (p&lt;0.01)  Fruit Concepts (p=0.03)  Fruit Preference (p=0.04)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>High (n=10) Low (n=6)</td>
<td>Concepts (p=0.03)  Preference (p=0.05)  Intake (p&lt;0.01)  Vegetable Preference (p=0.02)  Vegetable Intake (p&lt;0.01)</td>
</tr>
</tbody>
</table>
Figure 5.43: An Example Vegetable Concept Map (MGAp) Illustrating High Scores on All Four Study Constructs (Concepts, Preference, Availability, and Intake).

Preference 100 vegetable preference 100 vf 100
Availability 100 vegetable availability 100 vf 100
NCI 15.78, 15.12woff, 8.46woffj, 2.46vf

Vegetables

- Nutritious (1).
- Nutritious I will just say all right. It is a side dish to a meal (1).
- The ground (1). They grow ‘em (1).
- Trees (M). You know they grow up from the ground (1).
- Come from
  - Corn (1).
  - Peas (1).
  - Greens (1).
  - Broccoli (1).
  - Carrots (1).
  - Salad (1).
  - French fries (1) - because potatoes (1).

Are

- Include
  -总是 (1)
  - Dinner (1)-vegetables, starch (1), and meat (1).
  - Yes, Chinese food (1), (Restaurant) (1), that is like take out (1), like fast food (1). We eat Chinese food, beef and broccoli (1), and chicken and broccoli (1). Shrimp fried rice. Well you know that is not a vegetable, but rice (1).
  - We eat vegetables we like a grain (1) with (Restaurant) chicken we eat mashed potatoes. We eat (Restaurant) chicken (1). Pizza-tomatoes (M).
  - You know when you make spaghetti and all that (M).

Are eaten when

- Do...for the body
  - always (1)
  - Dinner (1)-vegetables, starch (1), and meat (1).
  - Yes, Chinese food (1), (Restaurant) (1), that is like take out (1), like fast food (1). We eat Chinese food, beef and broccoli (1), and chicken and broccoli (1). Shrimp fried rice. Well you know that is not a vegetable, but rice (1).
  - We eat vegetables we like a grain (1) with (Restaurant) chicken we eat mashed potatoes. We eat (Restaurant) chicken (1). Pizza-tomatoes (M).
  - You know when you make spaghetti and all that (M).

At home (1).
- Out for dinner (1).
- At holidays (1) at family’s houses (1) you know. Vegetables are a part of our meal (1) every day (1). These are really our main vegetables (1) that we cook (1). Greens and stuff like that (1).
- At home for dinner (1)
  - Every night (1), everyday (1), daily.

Vegetables are a part of our meal (1)
- At dinnertime (1).
  - Well, we eat vegetables for breakfast (1) because I have the home fries (1).
  - If I make French fries for lunch (1) or dinner (1). French fries would be for lunch (1).
  - Dinner (1)-basically broccoli, corn, peas, like this stuff, we make all the time (1). And, I make carrots (1), but not as much (1).

Total Concept Score: 102; Vegetable Concept Score: 61; Vegetable Misconceptions: 3.
Figure 5.44: An Example Vegetable Concept Map (MBSp) Illustrating Low Scores on All Four Study Constructs (Concepts, Preference, Availability, and Intake).

Preference 67 (peas, banana, carrots, French fries-okay) vegetable preference 57 vf 67
Availability 67 (French fries, banana, greens, carrots) vegetable availability 57 vf 67
NCI 2.46, 2.46woff, 2.46woffj, 1.96v vf

They have vitamins (1) what everybody needs (1) in their body (1).

The garden (1).

When we go out (1) to dinner (1).

Broccoli (1).
Greens (1).
Carrots (1).
Peas (1)
Salad-I guess (1)
Corn is a starch (M).

Vegetables

include

d… for the body

They give you vitamins (1), sometimes you get iron (1).

are eaten when

Mainly (1), at dinnertime (1).

are eaten at

Yes (1), with a starch (1), meat (1).

are eaten with
7. Child-Feeding Practices

Table 5.37 lists and compares the mean values generated by the primary care providers’ responses to the child-feeding questionnaire versus the instrument’s confirmatory means. The number of primary care providers grouped in the high group on each category is also listed in this table. Seven primary care providers were grouped into the high group on each of the seven categories. These primary care providers were all female, single mothers, had less than two children, and, by observation, were overweight. Three primary care providers, by observation and Head Start growth charts, had children that had a weight-for-height greater than the 95th percentile. The primary care providers that were grouped the least amount of times in the high category were two grandmothers. These grandmothers both did a significant portion of the feeding, but felt it was “their mom’s responsibility.” The four male primary care providers were less likely to be grouped in the high category. One female provider (YGBp) was in the lower half of the groupings. YGBp expressed little interest in food and nutrition as illustrated in Figure 5.45. Analyses correlating the child-feeding means with the primary care providers’ means on the study constructs as well as the children’s study constructs are listed in Tables 5.38-5.39.

Another interesting finding relating to child-feeding practices emerged from the primary care providers’ interviews. This finding demonstrated how the difference of skills can be different in individuals in the same predicament. Some of these skills included: knowing how to cook, knowing how to “bargain” shop, taking the time to make food, and making a common meal a priority. For example, Figure 5.43 captures a mother (MGAp) of four children on welfare who expressed in other components of her interview that she loves to cook and wants to ensure that her children are growing up healthy and strong. Figure 5.45 captures a pregnant mother on welfare (YGBp) who has two children. She expressed in other components of her interview that she had no interest or desire in food and explained that she doesn’t really know how to cook.
Table 5.37: A Comparison between the Study’s Participants’ (n=22) Child-Feeding Survey Means (Range) and the Instrument’s Confirmatory Means. This table also presents the number of primary care providers in this study who were categorized as high in each of the seven instrument’s categories.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Primary Care Provider Means</th>
<th>Instruments Confirmatory Means</th>
<th>Number of Primary Care Providers who were Categorized as High in Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Feeding Responsibility</td>
<td>4.24 (5-2)</td>
<td>3.4 (4.35-2.45)</td>
<td>18</td>
</tr>
<tr>
<td>Perceived Parent Overweight</td>
<td>3.23 (4-2.25)</td>
<td>3.1 (3.88-2.32)</td>
<td>11</td>
</tr>
<tr>
<td>Perceived Child Overweight</td>
<td>3.02 (4-1)</td>
<td>2.9 (3.4-2.4)</td>
<td>20</td>
</tr>
<tr>
<td>Concerns about Child Overweight</td>
<td>3.03 (5-1)</td>
<td>2.3 (3.45-1.15)</td>
<td>15</td>
</tr>
<tr>
<td>Pressure to Eat</td>
<td>3.84 (5-1.5)</td>
<td>2.5 (4.78-2.22)</td>
<td>19</td>
</tr>
<tr>
<td>Restriction</td>
<td>3.86 (5-1)</td>
<td>4.0 (4.78-3.22)</td>
<td>11</td>
</tr>
<tr>
<td>Monitoring</td>
<td>4.24 (5-2)</td>
<td>3.6 (4.51-2.69)</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 5.38: The Correlations (r ≥ 0.30) between the Primary Care Providers’ (n=22) Child-Feeding Survey Means and their Study Constructs (Concepts, Preference, Availability, and Intake).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Fruits and Vegetables Combined Constructs</th>
<th>Fruit Constructs</th>
<th>Vegetable Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Feeding Responsibility</td>
<td>Preference (r=0.45, p=0.03) Intake (r=0.46, p=0.03)</td>
<td></td>
<td>Preference (r=0.43, p=0.04)</td>
</tr>
<tr>
<td>Perceived Parent Overweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Child Overweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerns about Child Overweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure to Eat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td></td>
<td>Intake (r=0.36)</td>
<td>Availability (r=0.30)</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Preference (r=0.33) Intake (r=0.64, p&lt;0.01)</td>
<td>Intake (r=0.39)</td>
<td>Intake (r=0.45)</td>
</tr>
</tbody>
</table>
Table 5.39: The Correlations ($r \geq 0.30$) between the Primary Care Providers’ (n=22) Child-Feeding Survey Means and the Children’s (n=24) Study Constructs (Concepts, Preference, Availability, and Intake).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Fruits and Vegetables Combined Constructs</th>
<th>Fruit Constructs</th>
<th>Vegetable Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Feeding Responsibility</td>
<td></td>
<td>Intake ($r=0.42$, $p=0.05$)</td>
<td></td>
</tr>
<tr>
<td>Perceived Parent Overweight</td>
<td>Intake ($r=0.43$, $p=0.05$)</td>
<td>Intake ($r=0.50$, $p=0.02$)</td>
<td>Intake ($r=0.37$)</td>
</tr>
<tr>
<td>Perceived Child Overweight</td>
<td>Fruit Concepts ($r=0.30$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerns about Child Overweight</td>
<td>Preference ($r=0.71$, $p&lt;0.01$)</td>
<td>Intake ($r=0.34$)</td>
<td>Preference ($r=0.77$, $p&lt;0.0001$) Availability ($r=0.31$)</td>
</tr>
<tr>
<td>Pressure to Eat</td>
<td></td>
<td>Fruit Preference ($r=0.32$)</td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>Concepts ($r=0.37$)</td>
<td>Fruit Concepts ($p=0.37$)</td>
<td>Vegetable Concepts ($r=0.35$)</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Intake ($r=0.44$, $p=0.04$)</td>
<td></td>
<td>Intake ($r=0.57$, $p&lt;0.01$)</td>
</tr>
</tbody>
</table>
Figure 5.45: A Concept Map of One of the Primary Care Provider’s (YGBp) Concepts of Fruits. This provider received public assistance, had little interest in food, and explained that she had limited cooking skills.

Preference 100; Fruit Preference 100
Availability 67 (broccoli, carrots, greens, salad); Fruit Availability 100
Intake 2.79; Fruit Intake 0.067

Fruit is something that you need (1) kind of like three to five times a day (1), but I don’t eat that either (1).


Trees (1). In my house (1) or the bus (1).

I eat them when I don’t feel like cooking (1). I grab one (1). that’s it, when I don’t feel like cooking.

‘Cause it was sweet. I think the grapes they give you water. The grapes keep them hydrated pretty much (1). Other than that, bananas give you potassium (1). I don’t know.

By self (1). No (1).

Total Concept Score: 46; Fruit Concept Score: 17; Fruit Misconception: 0.
E. Discussion on Research Aim Two: To Explore the Concepts, Preference, Availability, and Dietary Intake of Fruits and Vegetables in Primary Care Providers (Parents, Grandparents, etc.) of the Children Studied under the First Aim.

Based on the study’s theoretical framework (13-16), understanding the concepts, preference, availability, and intake of fruits and vegetables of children’s primary care providers should be a critical component to understanding children’s concepts, preference, availability, and intake of fruits and vegetables. This aim tried to explore primary care providers for the children studied under the study’s first aim. The exploration of the primary care providers, as their own group, supplied this study with essential baseline descriptions of individuals in this community. These individuals were both primary care providers who play a vital role in helping their children develop healthy eating patterns and individuals who themselves are at risk of developing chronic diet-related diseases.

The first aspect of the primary care providers’ exploration was their concepts of fruits and vegetables. Numerically, their concept scores are somewhat low, varied, and do not differ much in terms of concepts of fruits and concepts of vegetables. The primary care providers’ concepts were not that much more elaborate than some of the children’s concepts. Figures 5.32 and 5.33 illustrate that the primary care providers had some understanding of fruits and vegetables, but for most primary care providers, this knowledge was very basic. Even though most primary care providers believed fruits and vegetables were healthy, came from the ground/trees, provided the body with vitamins and minerals, and strengthened the body, most of the primary care providers were not that knowledgeable or articulate in explaining most of these concepts. Many would say “I don’t know,” “That is what they say,” “I am not certain,” or “Is that right?” A few of the primary care providers expressed: “You are supposed to eat five a day, but I don’t do that.” Since the fruit and vegetable questions were the first aspect of the interviews, I tried my best to probe with respect and patience. I also tried my best to make the primary care providers feel comfortable talking with me (i.e., not feel like they were being tested on material that some felt uncomfortable talking about). I attempted to keep the conservations fun and, if needed, focused on what they would tell their child. Future studies with this community should rely on qualitative methods to build trust and understanding of the community. Nonetheless, question and probe the participants with care. Getting the participants to talk and trust you is more important then having them define or discuss every aspect of their thoughts and lives.

Most of the primary care providers, as illustrated in Table 5.29, enjoyed talking about grocery shopping, how they learn or would like to learn about fruits and vegetables, and their conversations with their children’s childcare providers. Grocery shopping stories were
particularly entertaining and insightful. Many of the primary care providers enjoyed shopping, especially for fruits and vegetables. Almost all of the primary care providers, however, voiced their dislike of their grocery stores’ crowded lines. They were also dissatisfied with their grocery stores’ fruit and vegetable selection and prices. These dislikes might be voiced by many Americans as most people do not like to wait in lines; yet, evidence (141-146) supports the fact that inner-city grocery stores serve more customers, offer less and/or inferior selection of healthy foods including fresh fruits and vegetables, and tend to have higher prices. More work is needed in understanding the role of grocery stores’ size, customer reach, selection, and prices, particularly in inner-city settings where transportation, crime, and socio-economic status may factor heavily into shopping patterns. Researching how to use the grocery stores and shopping as an educational experience for both the primary care providers as well as their children may be a worthwhile endeavor. Most primary care providers “need to shop” and many, due to lack of available childcare, “need to drag their kids with.” These lessons could also serve as a fruitful medium for empowering primary care providers to work with their children in balancing food selections to include a variety of foods, such as fruits and vegetables, along with cookies and snack food.

Developing education materials and methods for primary care providers is an essential criterion in this community as many view the home or family as the first and primary source of nutrition education. Many primary care providers feel a sense of duty in ensuring their children are healthy and “eating right.” These primary care providers, nonetheless, face more barriers to parenting than the average American household (159-161). Some of these barriers include: being a single parent, living in government-issued housing/moving frequently within the community, low socio-economic status, caring for multiple young children, working multiple low-wage jobs/struggling to find work at all, and living in a crime-ridden community. These selected barriers can hinder, directly or indirectly, a primary care provider from shopping, cooking, or working one-on-one with their children. They can also overwhelm primary care providers and add stress to their lives. Future research and education methods need to work with and within primary care providers’ current scope of activities and means. This will provide a feasible and sustainable medium of collaboration and education.

Understanding primary care providers’ current concepts of fruits and vegetables, as well as misconceptions of fruits and vegetables, as this study’s theoretical framework advises is instrumental to working effectively with them. This understanding may additionally empower the primary care providers to work with their children. Misconceptions were not extensive in this sample (probably because overall knowledge was low as well). From an educational perspective,
this is a positive finding because misconceptions are hard to change. With few misconceptions to compete with, nutrition educators’ teaching efforts should have a stronger chance of being accepted. Misconceptions were present nonetheless in this population. Primary care providers were particularly unsure of whether or not corn, French fries, and potatoes were vegetables. These are tricky foods to classify, but these foods are staples in this community’s diet. Addressing these misconceptions will be valuable for future fruit and vegetable intake assessment methodologies. Many of the other misconceptions expressed by the primary care providers seemed to develop out of their attempts to understand exactly what fruits and vegetables do for the body. Many of the misconceptions seemed like messages that had been passed down (for generations) from their parents or grandparents. Messages such as “carrots are good for the eyes” are somewhat accurate, but lack further understanding, rationale, or specificity to the statement. Some misconceptions seemed to evolve from using such terms as vitamins or minerals they heard about from television shows, news programs, or advertisements. Although they were familiar with these terms, most did not seem familiar with what exactly they did, which fruits and vegetables provided which, and that not all vitamins and minerals are in all foods. Iron was a particular mineral discussed by the primary care providers. This may have stemmed from their WIC lessons as some explained that they used that service; nonetheless, they were not very clear or accurate about what iron did or which foods contained iron. They seemed to just understand that it was good “when they were pregnant.” Identifying misconceptions and then devising methods and messages to resolve them are critical to educating and empowering these primary care providers. These efforts should facilitate primary care providers to eat healthy as well as to help in developing healthy eating patterns in their children.

Preference ratings were positive and the methodology seemed to work in this sample. Future studies should work on exploring how preference of fruits and vegetables compares with preference for more energy dense foods. Measuring and, if needed, increasing preference for a wider selection of fruits and vegetables may be worthwhile in this population, as many individuals expressed that they tended to eat the same fruits and vegetables and are reluctant to try new ones. Utilizing the preference methodology used in this study as part of an intervention targeted towards increasing fruits and vegetables in preschoolers and their primary care providers can serve as a method to assess baseline and post-intervention preference. To increase preference, future studies should work with Head Start to add taste-testing of fruits and vegetables served at the centers to the parent meetings. Head Start can also have samples available when primary care providers come to drop off or pick up their children. Taste-testing activities can help increase preference (135). These activities can also serve as a medium for
primary care providers, childcare providers, and children to eat and discuss fruits and vegetables together. This may lead to increases in concepts, availability, and intake.

Fruits and vegetables, particularly fresh ones, are expensive. Because of this, these primary care providers may be less inclined to venture into unknown and, in the case of some fruits and vegetables, odd-looking territory. Taste-testing of fruits and vegetables, which tend to be expensive (such as blueberries and bell peppers) and the children (based on the availability analyses) may not be too familiar with, may help widen the children and primary care providers’ exposure. Then, hopefully, these efforts can increase their preference and then potentially concepts, availability, and intake of fruits and vegetables. Targeting increasing preference for fruits and vegetables eating during different meals and eating patterns seems to be a critical task. Almost all of the primary care providers explained that they eat vegetables for dinner. Eating vegetables or snacking on them at other time periods seemed less regular or seldom thought of. These messages could even target adding lettuce and tomatoes to sandwiches or bell peppers and onions to sauces, soups, or stews. Combination foods or adding vegetables to meals did not seem to be a regular cooking pattern in this sample. African and Jamaican families, however, seemed to cook various stews and soups. The majority of the primary care providers, though, seemed drilled to serve at dinner: meat, starch, and vegetable. Communicating that it is good to snack on fruit, eat it for breakfast, or add it to foods, such as apples in stuffing, may also be effective ways to increase fruit consumption in this community. Using fruits in food may be a way for this community to stretch their use of fresh fruits. Fruits and vegetables are vital nutrients, but they also add color and taste to meals. Future work in this community should utilize the colorful and tasteful attributes of fruits and vegetables as a means of increasing preference and consumption in this population.

Fruit and vegetable availability, as illustrated in Figure 5.6 and Table 5.22 in the children’s results, is important to understanding fruits and vegetables in this population. As discussed in the children’s section, several primary care providers relied more on canned fruits and vegetables than fresh fruits and vegetables. Two mothers explained to me that they are “allergic” to fruit and, consequently, one does not have any fruit in the house. Other primary care providers discussed how fresh fruits and vegetables were expensive. If the primary care providers do buy them, then there are, as explained by MGR in Table 5.4 in the children’s section, quickly “no more.” In addition, primary care providers’ shopping patterns, which in many cases tended to be dictated by their food assistance (such as Food Stamps), governed a monthly or bi-monthly trip to the grocery store. These types of shopping patterns, as the primary care providers expressed in Table 5.29, may hinder the consumption of fresh fruits and vegetables, as fresh produce tends to
spoil or be consumed rather quickly. To improve fruit and vegetable availability in the household, especially fresh fruits and vegetables, government assistance programs may want to re-evaluate their forms of assistance. Nutrition education efforts may want to develop more economically and context-specific ways for this population to buy, keep, use, and incorporate fruits and vegetables in their diet in a more regular, consistent, and cost-friendly way. Further work in the area of availability is needed. More thorough assessments of household availability and the influence of government assistance, season, and economic fluctuations, in addition to, local grocery stores or fruit and vegetable venues’ availability and purchasing are needed. Future studies are also needed on understanding how primary care providers view, complement, and, in many cases, rely on Head Start to provide their children with meals. These studies should pay attention to particular foods (such as fruits and vegetables), as well as, other foods, like milk.

The National Cancer Institute Fruit and Vegetable Screener scores (estimated median daily servings of fruits and vegetables) for the primary care providers were higher than the values reported for the adults used in the instrument’s validation studies (243). A number of reasons may explain these differences. One important factor to consider is that the instrument has not been extensively validated in ethnic minorities, low-income populations, or low-literate samples. Reading the instrument along with going over the questions and responses with the primary care providers helped me to see that the sample tended to have a consistent intake and understanding of their vegetable intake at dinner. The primary care providers had a less consistent understanding of their consumption of fruits and vegetables outside of this meal. This difference may be because their fruit intake is inconsistent and hard to explain, measure, etc. Their responses may have been higher than the validation studies and higher than their actual intake because they reported their consumption of fruits and vegetables in an ideal situation. In other words, they described their consumption of fruits when fruits were in the household. Combining the availability and intake information from these participants together, fruits were not available that often. Hence, they may eat bananas every day when bananas are at their home, which seemed to be pretty infrequently, such as once a month. The NCI instrument may not have been able to detect this type of eating pattern in the typical “average or usual” frequency manner. Future assessments of this population’s dietary intake should use this instrument in conjunction with multiple 24-hour food recalls. These recalls will need to be taken multiple times in the beginning of the month when Food Stamps are provided and again, towards the end of the month, to get a better sense of this population’s fruit and vegetable intake. Measuring availability in the household and community via grocery stores and other fruit and vegetable venues (such as fruit trucks) is a necessary component to intake assessment studies.
Whether or not the NCI instrument can be used without a researcher reading it, by mail, or by telephone will need to be determined in future work. Based on this study, direct interactions are most effective as long as they are brief, pertinent, and fun. Convenience of meeting time and place are important to data collection success. The most essential component to obtaining data in this community is trust. Building trust comes with time. Recruiting primary care providers in this sample did require trust-building and time, but it was fundamental for the primary care providers to see that their time was being used to help their children. Working at the center with their children and interacting with the primary care providers on a daily basis outside of the study was a critical aspect to data collection. Seeing and interacting with the primary care providers at the park, grocery stores, throughout the community and while walking to and from the center added an extra and essential opportunity for communication. Future studies with this sample and in other communities must take into account the vitality of building trust within the community. Small, exploratory, qualitative studies provide an excellent venue to initiate this building process (231-232, 234).

The study’s theoretical model guided this work (Figure 3.7). Although this model served well as a tool to drive the methodology and study interpretations, analyses trying to put actual numerical value or statistical assignment to the study constructs (concepts, preference, availability, and intake) and groups (child, primary care provider, and childcare provider) were constrained by the sample size. Despite this, the study sample provided a small, but thorough, resource of exploring how these constructs and groups operate. Concepts, preference, availability, and intake of fruits and vegetables, as Figure 5.34 illustrates, are not strongly correlated. Noteworthy relationships were found between: concepts and preference, preference and intake, and concepts and intake. These relationships were much stronger and different than the relationships found in the studied children (Figure 5.9). This may be because adults’ constructs and construct relationships are more established (i.e., the primary care providers’ concepts or preference of fruits and vegetables probably have not changed much in the last few years while the children are still discovering and learning new concepts). Adults also exert more control over their availability and intake of fruits and vegetables than children can. Even though strong relationships among variables in eating behavior studies are not typical (131), as illustrated in Figures 5.35-5.42, various factors, such as whether or not the model was based on high scorers or low scorers, seemed to influence the study’s theoretical model. These factors provided insight into the primary care providers’ eating behavior.

Evaluating the model based on age, gender, marital status, and family size did not seem to significantly change the model. Evaluating the model exclusively on fruit and then vegetable
values changed the model in some constructs’ relationships; yet, it did not seem overly necessary to make this distinction. The lack of distinction might be because the primary care providers’ concepts and preference for fruits and vegetables were relatively the same. The availability and intake instruments may not also be sensitive and specific enough to detect differences in fruit and vegetable consumption. Moreover, the Fruit and Vegetable Screener may not have been able to numerically capture the idea that a primary care provider has a banana as a snack once or twice a week, when the bananas are available in the household. Future work is needed in developing instruments sensitive to truly capture this population’s intake and availability. This work will aid in understanding how availability and intake relate to concepts and preference. These studies should assess whether or not fruit and vegetable consumption needs to be considered either exclusively or in combination; or, at least estimating the limits of doing both.

Differentiating high and low groups in this sample influenced the study model. Table 5.33 demonstrates that the high and low group construct-specific cut-offs resulted in two significantly different groups on that particular construct. Other construct differences were noted. Intakes were different specifically between high and low concept groups, while preference and vegetable availability were different in high and low intake groups. The fruit-specific high and low group analyses only illustrated group differences based on the construct of interest. In other words, high and low groups, based on fruit concept scores, only had significant differences in their total fruit and vegetable concept scores as well as fruit concepts scores. These findings illustrate that fruit and vegetable patterns tended to coincide. For vegetable analyses, intake factored into group differences in the concept groups as well as the preference groups.

Figures 5.37-5.38 capture how high and low groups constructed on overall high and low construct patterns resulted in different models. Some of the high and low groups’ construct-relationships were different from their comparison group as well as the primary care providers’ original model (Figure 5.34). The high groups’ negative relationship between concepts and intake (\( r = -0.07 \)) is an interesting contrast to the low group (\( r = 0.40 \)) and the original model (\( r = 0.49, p<0.05 \)). The high groups’ relationship between concepts and preference (\( r = -0.22 \)) was also different than the original study model (\( r = 0.42, p<0.05 \)). These differences imply that the number of concepts generated by the primary care providers is not the best indicator of their nutrition knowledge on fruits and vegetables. The concept scores might not effectively indicate how concepts related with other constructs. The primary care providers’ concept content quality may be a more effective indicator of how concepts relate with other constructs such as availability and intake. This study aimed to describe the current concepts of the primary care providers and did not aim to assess or judge their nutrition knowledge. Based on the primary care providers’
breadth and depth of concepts in relation to their fellow primary care providers, as well as misconceptions, primary care providers’ concept quality seemed to influence their availability and intake of fruits and vegetables. Their concepts or understanding of nutrition and health also seemed to influence their cooking and mealtime patterns and thoughts on how their children should eat. Future work might want to distinguish participants further on concept content quality as a means of intervening and evaluating program efforts.

The fruit specific high and low groups’ (Figures 5.39-5.40) models had differences amongst themselves and with the original study model. The relationship between concepts and availability was particularly noteworthy. Fruit models demonstrated the strongest and most construct relationships and may imply that fruit operates differently in this sample than vegetables. The selected fruits and the behaviors of eating them, knowledge of them, and preferences for them may be more homogenous then for the selected vegetables. The vegetable analyses (Figure 5.41-5.42) illustrate intriguing group differences between the constructs of concepts and availability. Although both preference and intake operate in a negative direction, they each have a marked difference in strength \( r = 0.02 \) for the high group versus \( r = -0.55 \) for the low group. These values are both different than the value \( r = 0.41 \), \( p<0.05 \) generated from the original vegetable exclusive model (Figure 5.36). Table 5.36 represents how the high and low groups produced significant differences in a host of constructs. Availability did not seem to generate marked differences. This might be because the primary care providers’ reports of availability tended to be similar. Availability of fruits and vegetables for primary care providers may not be a critical element in determining their concepts or preference for fruits and vegetables. Further work is needed with these primary care providers to truly understand the operation of each of the study constructs: concepts, preference, availability, and intake. Larger sample sizes will help in assigning strength and direction to these constructs and construct relationships.

Determining high and low groups based on the study model helped to make sense of this exploratory study’s more qualitative findings. As illustrated in Figures 5.43 and 5.44, different phenomena are operating in this sample. Some primary care providers generated many concepts on fruits and vegetables, had them in their household on a regular basis, liked, and ate them. Others may have liked them, but could not afford to buy or eat them. Others may not have known much about them, but liked, purchased, or ate them. Future work should not only locate where differences in these constructs operate but also find commonalities in these constructs to help weave the community together through common nutrition education messages, educational endeavors, and intervening efforts. These efforts will hopefully lead to increases in concepts,
preference, availability, and intake along with producing stronger relationships between these constructs.

Exploring child-feeding practices in this sample was a foundational piece to understanding how these primary care providers feed, eat, and talk to their children about food. The Child-Feeding Questionnaire, as Table 5.37 demonstrates, seemed to produce valuable insight into these primary care providers. Future work with this instrument should take literacy levels into account as well as how the instrument is being completed. In other words, the length and style of the questionnaire was quick and easy enough for the primary care providers to complete on their own, but researchers may need flexibility and patience with getting the primary care provider of particular interest to complete the instrument. In other words, for some of the interviews, the grandmothers completed the instrument. Although these grandmothers did a substantial amount of the feeding and childcare in the household, they felt it was the mother’s responsibility to feed the child. Table 5.37 demonstrates that many of these providers were categorized as high on one, if not all seven, of the instruments’ categories. Results from this population indicate that primary care providers tended to feed their children and did not allow the children to serve themselves. Many of the primary care providers expressed that they used food as a reward. Some expressed that they had issues dealing with their child’s picky eating. Table 5.38 illustrates how there was some relation between child-feeding practices and the study model constructs. Primary care providers’ preference and intake were particularly noteworthy. In children (Table 5.39), preference and intake were related. In some cases, concepts were related and, to a lesser extent, availability.

Figures 5.43 and 5.45 capture how the child-feeding practices instrument sheds light on the qualitative findings and can help in differentiating particular areas of concern, in particular, primary care providers. Further work is needed in exploring child-feeding practices in this population. Research (15) has demonstrated that child-feeding practices play a critical role in a child’s dietary habits and weight status; yet, this work has not been extensively conducted in low-income, African American populations. Culture and economics factor into many dietary habits including each of the study constructs (15). Understanding the specific influence/relationship of culture and economics in relation to child-feeding practices is needed. This work will help refine and accommodate how child-feeding practices influence primary care providers as well as their children’s concepts, preference, availability, and intake of fruits and vegetables. More studies are needed to help primary care providers, especially those who endure socio-economic challenges, to deal with “picky eaters” and to help expose young children, in particular, to a wide variety of foods in a positive manner. This lesson may incorporate the importance of being a positive role
model and how to create a positive eating environment for the children. Using food as a reward would not be a part of this environment. Nutrition professionals should work with other disciplines, such as child psychology, to develop behavior management strategies for these primary care providers. Often times, the primary care providers (via qualitative assessment) relied on food to manage their children’s behavior.

As an exploratory qualitative study, the study’s main objective was to examine inner-city Head Start children’s concepts, preference, availability, and intake of fruits and vegetables. To understand these constructs in children, I needed to study these constructs in their primary care providers. As one of the first research studies in this center, the study needed to ensure that the procedures, content, and activities were fun, friendly, and feasible for the participants. The study needed to work on making its procedures context-sensitive. These steps aided in first ensuring study collection by enough participants and then set the stage for future projects. I acknowledge the study’s limitations: a small sample size, no documentation of the exact types and amounts of food consumed by an individual primary care provider, no 24-hour recalls or records of household daily consumption, no formal assessment of the community’s fruit and vegetable availability, and the study focused on only a select sample of fruits and vegetables. My hope is that future research will address some of these limitations. This study, in spite of its shortcomings, supplied a foundation for future research and intervention efforts. These findings also enabled me to evaluate the other study aims.
F. Results for Research Aim Three: To Determine the Level of Shared Meaning, Preference, Availability, and Dietary Intake of Fruits and Vegetables between the Children Studied under the First Aim and both their Primary Care Providers (Studied under the Second Aim) and their Childcare Providers.

1. Childcare Providers’ Naming, Concepts, Preference, Availability, and Dietary Intake of Fruits and Vegetables

All of the childcare providers correctly named all of the selected fruits and vegetables by using picture cards and actual foods. Figures 5.46-5.47 illustrates the childcare providers’ concepts of fruit while Figures 5.48-5.49 illustrates the childcare providers’ concepts of vegetables. These maps provide their concept scores. Both of the childcare providers had similar concepts amongst themselves and with the primary care providers (Figures 5.32 and 5.33). Table 5.40 captures some of the childcare providers’ more qualitative responses. Sources of nutrition education for them were: school (n=1), doctor (n=1), family (n=1), and magazines (n=1). Knowing that fruits and vegetables were healthy influenced one of the childcare providers, but not the other. Both childcare providers ate fruit and said that fruits and vegetables were healthy. Preference was somewhat positive with 67% of the fruits and vegetables being rated as “yummy.” Both childcare providers said they bought fruits and vegetables. Availability was 63%. The childcare providers’ estimated median daily servings of fruits and vegetables were 6.16. This estimate went down to 6.08 when French fries were taken out and then down to 4.85 when French fries and juice were taken out. The estimated median daily servings of fruits were 0.36, while the estimated median daily servings of vegetables were 4.50. The average feeding practice scores were: perceived feeding responsibility (1.33), perceived parent overweight (3.25), concerns about child overweight (4.5), restriction (3.69), pressure to eat (2.25), and monitoring (2.5).
Figure 5.46: An Example Fruit Concept Map from one of the Childcare Providers (MCCP).

Fruit. Fruit is oh. Fruit is something that is good (1) for your body. It is sweet (1). It is better tasting (1). It pretty much has more juice than vegetables (1). You can pretty much eat the fruit raw (1). You don’t need to cook the fruit (1).

Ah, vines (1) and trees (1).

We eat fruits at home (1), out (1), between meals (1). We eat fruit mostly everywhere (1) that you may need to eat. We will that fruit (referring to cards) in the car (1), on the bus (1), we will eat fruit between meals.

When we would eat it like between meals (1). We will eat fruit in the morning (1). We will eat fruit when we are in a rush (1) because we grab fruit (1). We might even eat fruit while we watching T.V. (1). We pretty much eat fruit like after dinner (1).

Fruits

come from

Trees (1). I think that all of these came from trees. I guess you would say bananas come from a tree (1), but you get blueberries (1) from bushes (1) and strawberries (1) from little brushes (1) and watermelon (1) from a vine (1) and cantaloupe (1) from a vine (1).

Home (1) or here (school) (1). Like at lunch (1).

Oh, sometimes (1) in the late afternoon (1). Sometimes (1) in the morning (1) with the kids (1).

Trees (1).

We pretty much eat fruit by self (1).

are eaten at Home (1) or here (school) (1). Like at lunch (1).

are eaten when

Are eaten at Home (1) or here (school) (1). Like at lunch (1).

are eaten with

I have had strawberry shortcake (1). In pies (1), cherries (1), apples (1).

are eaten with

They supply the vitamins (1) and calcium (M) and things that feed the bones (M) and muscles. The body needs (1) so they help (1) to feed the bones and muscles.

are eaten when

Do … for the body

Help body function (1), nutrients (1).

are

include

Grapes (1).
Banana (1).
Apple (1).
Peaches (1).
Orange s (1).

are

Figure 5.47: An Example Fruit Concept Map from one of the Childcare Providers (YCCP).

Well it is something that you should have every day (1) in one category (1). You know you should have something in the fruit category every day. It should be part of your diet (1). They have a lot of vitamins (1) and minerals (1).

are

Do … for the body

Help body function (1), nutrients (1).

are

include

Orange (1).
Apple (1).
Grapes (1).
Banana (1).
Peaches (1).

are eaten at

Home (1) or here (school) (1). Like at lunch (1).

are eaten with

I have had strawberry shortcake (1). In pies (1), cherries (1), apples (1).

are eaten with

They supply the vitamins (1) and calcium (M) and things that feed the bones (M) and muscles. The body needs (1) so they help (1) to feed the bones and muscles.

are eaten when

Do … for the body

Help body function (1), nutrients (1).

are

include

Grapes (1).
Banana (1).
Apple (1).
Peaches (1).
Orange s (1).

are

Total Concept Score:  70; Fruit Concept Score:  28; Fruit Misconceptions:  0.

Total Concept Score:  77; Fruit Concept Score:  35; Fruit Misconceptions:  2.
Mainly greens (1) from a family of greens (1) and colors (1). More of like a plant (1) that grows (1) from the ground (1). More nutrition (1) is mainly in the vegetable, like you have vitamins (1). More vitamins like a family of vegetables.

They are mainly grown from the ground (1). They considered plants (1). My kids would say supermarket (1). Maybe like I guess some of them can be grown from a garden (1) or yard (1) or you could say from a farm (1).

Vegetables come from ground (1). They are mainly grown from the ground (1). They considered plants (1). My kids would say supermarket (1). Maybe like I guess some of them can be grown from a garden (1) or yard (1) or you could say from a farm (1).

We try to eat vegetables mostly every meal (1). We try to have a vegetable at lunch (1) and dinner (1) and snacks (1). When we go out (1) we always have a vegetable (1). When my mom when she cooks (1) she has two vegetables (1).

We eat vegetables for lunch (1) and dinner (1) and sometimes snacks (1).

We try to eat vegetables mostly every meal (1). We try to have a vegetable at lunch (1) and dinner (1) and snacks (1). When we go out (1) we always have a vegetable (1). When my mom when she cooks (1) she has two vegetables (1).

We eat vegetables for lunch (1) and dinner (1) and sometimes snacks (1).

Gives it energy (1). Nutrition (1). Helps you function properly as far as your digestive system (1).

With other foods (1). Yes (1). Like fish (1), we will have vegetable with other meats (1). We do a lot of chicken (1). Everyone now and then (1), we do pork (1).

Total Concept Score: 70; Vegetable Concept Score: 42; Vegetable Misconceptions: 0.
Vegetables supply the necessary vitamins (1) and fibers (1) just like your fruits (1).

Well potatoes come from the ground (2). And carrots come from the ground (2). Corn comes from a stalk (2). Peas come out of the pod (2). From the plant (1). These are collard greens they grow like cabbage (3). This one is broccoli and it grows from a plant (3).

At home (1) and here (school) (1).

At lunch (1), here (school) (1). At dinner time (1), at home (1).

Yes (1), chicken (1), beef (1), anything (1), turkey (1), fish (1).

Help give it nutrients (1), vitamins (1), and minerals (1) to support the body (1). They feed the body really (1).


Total Concept Score: 77; Vegetable Concept Score: 42; Vegetable Misconceptions: 0.
Table 5.40: Examples of the Childcare Providers’ Interview Responses.

MCCP: “We learned about the food pyramid, but the things that we cooked in the class were mainly tasteful (desserts).”

MCCP: “We (the primary care providers and I) might talk about food. We might talk about does so and so eat such and such at home because here they don’t like it or whatever.”

YCCP: “You are not only educating the child, but in a way, you are educating the parents.”

2. Shared Meaning among the Children, Primary Care Providers, and Childcare Providers

Tables 5.41–5.45 demonstrate that the concepts expressed by the primary care providers and childcare providers are similar. On the other hand, these tables demonstrate that the concepts expressed by the children were shared minimally with their primary care providers and childcare providers. The concepts expressed by the entire sample did not match up with the messages from any of the selected government and health agencies. Table 5.46 illustrates that minimal shared meaning was found in the individual child-primary care provider-childcare provider comparisons. Misconceptions, as listed in Tables 5.47-5.48, were nominal, but present, and shared minimally among children and their care providers. Analyses comparing the two classes only found differences in vegetable naming scores (p=0.05) and fruit availability (p=0.05). Table 5.49 presents the correlations that were above an r value of 0.30 between the children, primary care providers, and childcare providers on the study’s constructs. Analyses with the children, primary care providers, and the childcare providers were constrained by the small sample size of the childcare providers.

Analyses focused on the more qualitative components of the children, primary care providers, and childcare providers illustrated some intriguing findings in the concept maps. First, Figure 5.50 illustrates how a concept was shared between a child (MGA), primary care provider (MGAp), and childcare provider (MCCP). Figure 5.51, on the other hand, demonstrates how a primary care provider’s (YBEp) response about being allergic to fruit adds insight to her child’s (YBE) lack of concepts on fruit. In analyzing another child’s map (YGH) in light of her primary care provider’s (YGHp) interview, Figure 5.52 captures how one child’s Head Start lesson regarding food and the heart was reinforced by her primary care provider—a foster grandma at
the center. Although the heart idea did not come across in the primary care provider or the childcare provider’s maps, the heart lesson was observed to have happened at the childcare center. The primary care provider discussed during the interview that every time her grandchildren eats vegetables, she now tells her that: “She should eat up, ‘cause they are good for the heart.” This map also demonstrates how children’s misconceptions can easily develop around a concept, especially when the primary care providers have misconceptions too.

Areas that continually arose among the primary care providers as places for a conversation about food and the exchange of meaning on foods to occur were at a common meal or while grocery shopping. Figure 5.53 illustrates a three-year’s (MGG) map and how her one-on-one time with her grandma (MGGp) at meals and in the grocery store helped her to make meaning of food. Likewise, Figure 5.54 captures a four-year old’s (MGL) concepts and how these concepts were influenced by her mother’s (MGLp) job (catering) and interest in making food. Other concepts that frequently emerged in the children, primary care providers, and childcare providers’ interviews were dental issues, but these issues did not come out as much in the responses to the fruit and vegetable questions. Children often discussed how candy hurt their teeth and fruit was good for their teeth. Primary care providers voiced the same messages. For example, MBYp explained that healthy is “as in not cavities, not getting any cavities.” His four-year-old son had tooth decay and had several teeth pulled during the school year. These dental comments emerged in the fruit discussions as well as the primary care providers’ discussions on what were their primary health concerns regarding their children. Limited fruit and vegetable availability, as previously introduced in a child’s (MGRp) “no more, no more” quote, was reinforced by her dad (MGRp). He explained that keeping fruits and vegetables, especially fresh fruits, in a full house, on a regular basis was hard.

The primary care providers and childcare providers also mentioned neophobia or the idea of dealing with a “picky eater.” Classroom observations noted that, on several occasions, the childcare providers would not serve children foods “they didn’t like” and said: “Oh, they’re just picky eaters.” Some children were picky eaters and would not try any “vegetables” because they did not like a certain vegetable (such as carrots). Figure 5.55 represents a child (YGK), who by observation was overweight, and had a mother whose feeding practices were categorized as high on all seven categories. Other types of child-feeding practices or messages that emerged included: “Eat it,” “You eat fruit, after you clean your plate,” “No juice unless you eat your vegetables,” and “Don’t you want a happy plate (clean plate)”? Every primary care provider except one (YGHp) expressed that they portion their child’s plate. The classroom observations also noted that most childcare providers did not practice family-style eating, i.e., a child serves
her/himself. YGH explained a couple times during her interview how: “If you’re hungry, I’ll pick some and put it on a plate.”

Table 5.41: A Comparison between the Children’s and their Primary Care Providers and Childcare Providers’ Answers for “What are Fruit?” (Number of Times the Concept was Mentioned). These Concepts were also Compared to the United States Government and Health Organizations Messages such as the United States Department of Agriculture’s Food Guide Pyramid (201).

<table>
<thead>
<tr>
<th>Primary Care Providers (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritious/health (11).</td>
</tr>
<tr>
<td>Taste/sweet/juicy/not candy sweet (6).</td>
</tr>
<tr>
<td>Grown (5).</td>
</tr>
<tr>
<td>High in vitamins/minerals (5).</td>
</tr>
<tr>
<td>Preference (3).</td>
</tr>
<tr>
<td>An apple a day keeps the doctor away (2).</td>
</tr>
<tr>
<td>Good to snack on (2).</td>
</tr>
<tr>
<td>Naming fruits, pointing to picture cards (2).</td>
</tr>
<tr>
<td>Help you grow (2).</td>
</tr>
<tr>
<td>Doesn’t have a lot of sugar on it (1).</td>
</tr>
<tr>
<td>I guess it’s the opposite of vegetables (1).</td>
</tr>
<tr>
<td>Allergic, don’t bother (1).</td>
</tr>
<tr>
<td>Something you need three to five a day, don’t eat that either (1).</td>
</tr>
<tr>
<td>Citrus (1).</td>
</tr>
<tr>
<td>Be smart (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children (n=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pointed to food picture cards (14).</td>
</tr>
<tr>
<td>I love fruit (3).</td>
</tr>
<tr>
<td>Eat them at home, school, everywhere (3).</td>
</tr>
<tr>
<td>Strawberry cakes, fruit makes fruit snacks (2).</td>
</tr>
<tr>
<td>Orange, you peel it (1).</td>
</tr>
<tr>
<td>Oranges, you put them in a bowl and share (1).</td>
</tr>
<tr>
<td>Some fruit is vegetable and dessert and every time after lunch (1).</td>
</tr>
<tr>
<td>They make you healthy, sometimes they make you sick (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Childcare Providers (n=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good for the body (1).</td>
</tr>
<tr>
<td>Sweet (1).</td>
</tr>
<tr>
<td>Better (than vegetables) tasting (1).</td>
</tr>
<tr>
<td>You can eat it raw and does not need cooking (1).</td>
</tr>
<tr>
<td>It some thing that you should have everyday in one category (1).</td>
</tr>
<tr>
<td>They have a lot of vitamins and minerals (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>USDA Food Guide Pyramid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit and fruit juices provide important amounts of vitamins A and C and potassium.</td>
</tr>
<tr>
<td>Fruits are low in fat and sodium.</td>
</tr>
<tr>
<td>Eat two to four servings of fruits a day.</td>
</tr>
</tbody>
</table>
Table 5.42: A Comparison between the Children’s and their Primary Care Providers and Childcare Providers’ Answers for “Where do Vegetables Come From?” (Number of Times the Concept was Mentioned).

<table>
<thead>
<tr>
<th></th>
<th>Primary Care Providers (n=22)</th>
<th>Children (n=24)</th>
<th>Childcare Providers (n=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground, trees, etc.</td>
<td>(22)</td>
<td>Store (7)</td>
<td>Ground, plants, etc. (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Out of the woods, etc. (6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home (5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>School (5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bowl (3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I don’t know (3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stove (3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meals (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barn (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cows (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Food (1)</td>
<td></td>
</tr>
</tbody>
</table>
Table 5.43: A Comparison between the Children’s and their Primary Care Providers and Childcare Providers’ Answers for “What do Fruits do for the Body?” (Number of Times the Concept was Mentioned). These Concepts were also Compared to the United States Government and Health Organizations’ Messages such as 5-A-Day (22).

<table>
<thead>
<tr>
<th>Primary Care Providers (n=22)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives the body vitamins and/or minerals (7).</td>
<td></td>
</tr>
<tr>
<td>Cleans system out (5).</td>
<td></td>
</tr>
<tr>
<td>Strengthens body (5).</td>
<td></td>
</tr>
<tr>
<td>Maintain health (4).</td>
<td></td>
</tr>
<tr>
<td>Prevent diseases (3).</td>
<td></td>
</tr>
<tr>
<td>Fight infections (2).</td>
<td></td>
</tr>
<tr>
<td>Keeps you hydrated (2).</td>
<td></td>
</tr>
<tr>
<td>Sustains life (2).</td>
<td></td>
</tr>
<tr>
<td>Keeps weight down (2).</td>
<td></td>
</tr>
<tr>
<td>Makes you feel better, not bloated (1).</td>
<td></td>
</tr>
<tr>
<td>I’m not really sure of fruit (1).</td>
<td></td>
</tr>
<tr>
<td>Makes skin healthy (1).</td>
<td></td>
</tr>
<tr>
<td>Cavities (1).</td>
<td></td>
</tr>
<tr>
<td>Healthier than candy (1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children (n=24)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes you strong (5).</td>
<td></td>
</tr>
<tr>
<td>Good for you, help your body (4).</td>
<td></td>
</tr>
<tr>
<td>Eat (4).</td>
<td></td>
</tr>
<tr>
<td>Negative things, i.e. make you sick (4).</td>
<td></td>
</tr>
<tr>
<td>Make you comfortable (3).</td>
<td></td>
</tr>
<tr>
<td>I don’t know (2).</td>
<td></td>
</tr>
<tr>
<td>Things for particular body parts, i.e. eyes (2).</td>
<td></td>
</tr>
<tr>
<td>Taste (1).</td>
<td></td>
</tr>
<tr>
<td>Make you grow (1).</td>
<td></td>
</tr>
<tr>
<td>Make you happy (1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Childcare Providers (n=2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives it vitamins and/or minerals (1).</td>
<td></td>
</tr>
<tr>
<td>Feed the bones and muscles (1).</td>
<td></td>
</tr>
<tr>
<td>Helps the body function (1).</td>
<td></td>
</tr>
<tr>
<td>Provides the body nutrients (1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5-A-Day</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat five to nine fruits and vegetables a day, every day for good health.</td>
<td></td>
</tr>
<tr>
<td>Fruits and vegetables provide a variety of health benefits.</td>
<td></td>
</tr>
<tr>
<td>Fruits and vegetables are rich in vitamin C, vitamin A, fiber, and other nutrients and contain hundreds of phytochemicals.</td>
<td></td>
</tr>
<tr>
<td>Along with physical activity and maintaining a healthy weight, eating five to nine fruits and vegetables a day promotes good health and reduces the risk of cancer, heart disease, hypertension, stroke, diabetes, and other chronic diseases.</td>
<td></td>
</tr>
</tbody>
</table>
Table 5.44: A Comparison between the Children’s and their Primary Care Providers and Childcare Providers’ Answers for “What do Vegetables do for the Body?” (Number of Times the Concept was Mentioned). These Concepts were also Compared to the United States Government and Health Organizations’ Messages such as United States Department of Agriculture’s (USDA) Food Guide Pyramid (201).

<table>
<thead>
<tr>
<th>Primary Care Providers (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives energy, makes body feel great (6).</td>
</tr>
<tr>
<td>Provides vitamins and/or minerals (6).</td>
</tr>
<tr>
<td>Provides strength (6).</td>
</tr>
<tr>
<td>Maintains health (4).</td>
</tr>
<tr>
<td>Prevents disease (3).</td>
</tr>
<tr>
<td>Fights infection (3).</td>
</tr>
<tr>
<td>Helps body grow (1).</td>
</tr>
<tr>
<td>Provides antioxidants (1).</td>
</tr>
<tr>
<td>Makes body more fit (1).</td>
</tr>
<tr>
<td>Provides nutrients (1).</td>
</tr>
<tr>
<td>Keep skin healthy (1).</td>
</tr>
<tr>
<td>Something with acids, fluoride acid (1).</td>
</tr>
<tr>
<td>Gives you self-esteem (1).</td>
</tr>
<tr>
<td>Helps eyes, blood (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children (n=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help body feel better, healthy (6).</td>
</tr>
<tr>
<td>No/nothing, negative things (6).</td>
</tr>
<tr>
<td>Makes you strong (5).</td>
</tr>
<tr>
<td>You got to eat the carrots (5).</td>
</tr>
<tr>
<td>Make you happy (2).</td>
</tr>
<tr>
<td>Things for a particular body part, i.e. eyes (2).</td>
</tr>
<tr>
<td>They’re good for snack (2).</td>
</tr>
<tr>
<td>You can grow (2).</td>
</tr>
<tr>
<td>I don’t know (1).</td>
</tr>
<tr>
<td>Sometimes they’ll be on T.V. rolling (1).</td>
</tr>
<tr>
<td>You go faster (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Childcare Providers (n=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives it nutrition (2).</td>
</tr>
<tr>
<td>Gives it energy (1).</td>
</tr>
<tr>
<td>Helps you function properly as far as your digestive system (1).</td>
</tr>
<tr>
<td>Gives the body vitamins and/or minerals (1).</td>
</tr>
</tbody>
</table>

**USDA Food Guide Pyramid**
Vegetables provide vitamins, such as vitamins A and C, and folate, and minerals, such as iron and magnesium.
Vegetables are naturally low in fat and also provide fiber.
Eat three to five servings of vegetables a day.
Table 5.45: A Comparison between the Children’s and their Primary Care Providers and Childcare Providers’ Answers for “What Does Healthy Mean?” (Number of Times the Concept was Mentioned). These Concepts were also Compared to the United States Government and Health Organizations Messages’ such as the Dietary Guidelines for Americans (84).

<table>
<thead>
<tr>
<th>Primary Care Providers (n=22)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Good for you/helps body (10).</td>
<td></td>
</tr>
<tr>
<td>Eating the right things (4).</td>
<td></td>
</tr>
<tr>
<td>Lots of energy, not sluggish (4).</td>
<td></td>
</tr>
<tr>
<td>Absence of disease and sickness (4).</td>
<td></td>
</tr>
<tr>
<td>Have vitamins and/or minerals (4).</td>
<td></td>
</tr>
<tr>
<td>Have good eye sight (4).</td>
<td></td>
</tr>
<tr>
<td>Fit (4).</td>
<td></td>
</tr>
<tr>
<td>Provide nutrition/nutrients (2).</td>
<td></td>
</tr>
<tr>
<td>Sustains life (2).</td>
<td></td>
</tr>
<tr>
<td>Good blood (2).</td>
<td></td>
</tr>
<tr>
<td>Regular, good bowel function (2).</td>
<td></td>
</tr>
<tr>
<td>Doesn’t have a lot of sugar (1).</td>
<td></td>
</tr>
<tr>
<td>Strong (1).</td>
<td></td>
</tr>
<tr>
<td>Growing (1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children (n=24)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps specific body parts such as carrots are good for the eyes (11).</td>
<td></td>
</tr>
<tr>
<td>You eat certain foods (9).</td>
<td></td>
</tr>
<tr>
<td>Good (7).</td>
<td></td>
</tr>
<tr>
<td>Keeps you from getting sick (6).</td>
<td></td>
</tr>
<tr>
<td>Bad (5).</td>
<td></td>
</tr>
<tr>
<td>I don’t know (5).</td>
<td></td>
</tr>
<tr>
<td>They help you (2).</td>
<td></td>
</tr>
<tr>
<td>Taste (1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Childcare Providers (n=2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Good for the body (1).</td>
<td></td>
</tr>
<tr>
<td>Gives you energy, stamina (1).</td>
<td></td>
</tr>
<tr>
<td>Helps the body function properly (digestive system) (1).</td>
<td></td>
</tr>
<tr>
<td>Provides nutrients (1).</td>
<td></td>
</tr>
<tr>
<td>Gives you vitamins and/or minerals (1).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dietary Guidelines for Americans</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance the food you eat with physical activity—maintain or improve your weight.</td>
<td></td>
</tr>
<tr>
<td>Choose a diet with plenty of grain products, vegetables, and fruit.</td>
<td></td>
</tr>
<tr>
<td>Choose a diet low in fat, saturated fat, and cholesterol.</td>
<td></td>
</tr>
<tr>
<td>Eat a variety of foods.</td>
<td></td>
</tr>
<tr>
<td>Choose a diet moderate in salt and sodium.</td>
<td></td>
</tr>
<tr>
<td>Choose a diet moderate in sugars.</td>
<td></td>
</tr>
<tr>
<td>If you drink alcoholic beverages, do so in moderation.</td>
<td></td>
</tr>
</tbody>
</table>
Table 5.46: The Concepts Generated by a Child (n=24) that Matched the Concepts Generated by their Primary Care Provider (n=22), Childcare Provider (n=2), or Another Observed Source.

<table>
<thead>
<tr>
<th>Child-Primary Care Provider-Childcare Provider Matching Concept</th>
<th>Frequency of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits/vegetables come from trees, ground</td>
<td>6</td>
</tr>
<tr>
<td>Vegetables make you strong, gives you muscles</td>
<td></td>
</tr>
<tr>
<td>Fruits/vegetables are good for the body/you</td>
<td>3</td>
</tr>
<tr>
<td>Eat fruit as a dessert</td>
<td>3</td>
</tr>
<tr>
<td>Good for the body/you</td>
<td>1</td>
</tr>
<tr>
<td>Vegetables help you grow</td>
<td></td>
</tr>
<tr>
<td>Fruits/vegetables clean out your system</td>
<td>1</td>
</tr>
<tr>
<td>Doesn’t eat vegetables at home (child) and don’t care for them, didn’t eat them (primary care provider)</td>
<td>1</td>
</tr>
<tr>
<td>Named broccoli for do you eat vegetables with other foods</td>
<td>1</td>
</tr>
<tr>
<td>An apple a day keeps the doctor away</td>
<td>1</td>
</tr>
<tr>
<td>Fruits/vegetables are good for teeth</td>
<td>1</td>
</tr>
<tr>
<td>Fruits/vegetables help you get healthy, not sick</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child-Primary Care Provider Matching Concept</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits comes from a tree, bush</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child-Lessons Taught During Childcare Matching Concept</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits/vegetables are good for the heart</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 5.47: Fruit Misconceptions Generated by the Children, Primary Care Providers, or Childcare Providers (Number of Times the Misconception was Mentioned).

<table>
<thead>
<tr>
<th>Primary Care Providers (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pears give you iron (1).</td>
</tr>
<tr>
<td>I guess you could say fruits high in protein (1).</td>
</tr>
<tr>
<td>Like bananas give you potassium (explaining vitamins) (1).</td>
</tr>
<tr>
<td>I guess fruit is the opposite of vegetable (1).</td>
</tr>
<tr>
<td>Fruit is grown by the root too (3).</td>
</tr>
<tr>
<td>(Talking about fruit) Greens come from trees (1).</td>
</tr>
<tr>
<td>Fruit is healthier than vegetables (1).</td>
</tr>
<tr>
<td>Fruit provides the body with vitamin D (1).</td>
</tr>
<tr>
<td>Grapes grow off a tree (1).</td>
</tr>
<tr>
<td>(Talking about fruit) Carrots (1) make your teeth strong (1). Your teeth strong and your eyes (1).</td>
</tr>
<tr>
<td>We try to eat fruit, but don’t eat ‘em five times a day like you are suppose to (2).</td>
</tr>
<tr>
<td>Fruit provides the body with zinc (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children (n=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misidentification (46).</td>
</tr>
<tr>
<td>Carrots (9), Salad (7), Broccoli (7), French Fries (6), Corn (5), Greens (5), Peas (5), Baked beans (1), Vegetable (1).</td>
</tr>
<tr>
<td>Chemo (1).</td>
</tr>
<tr>
<td>Sometimes they make you sick (1).</td>
</tr>
<tr>
<td>Help with bones (1).</td>
</tr>
<tr>
<td>Don’t eat stuff or drink stuff on T.V. (1).</td>
</tr>
<tr>
<td>Cookies-strawberry cake and cookies (1).</td>
</tr>
<tr>
<td>They make you fat (1).</td>
</tr>
<tr>
<td>Grapes is good for your head (1).</td>
</tr>
<tr>
<td>Oranges is good for your head (1).</td>
</tr>
<tr>
<td>Bananas is good for your hand (1).</td>
</tr>
<tr>
<td>Choke (1).</td>
</tr>
<tr>
<td>Some fruit is vegetable (1).</td>
</tr>
<tr>
<td>Kool-Aid (1).</td>
</tr>
<tr>
<td>And we got blueberry Popsicle, but they are frozen (1).</td>
</tr>
<tr>
<td>Peaches is good for your stomach, your whole body (1).</td>
</tr>
<tr>
<td>When you grown you eat a lot and then fat (1).</td>
</tr>
<tr>
<td>Fruits make some snacks, fruit makes fruit snacks (1).</td>
</tr>
<tr>
<td>I eat little fruits (referring to fruit snacks) and big fruit (1).</td>
</tr>
<tr>
<td>Sometimes they sick, if you eat them for a long time, sometimes you can’t eat them then you throw up (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Childcare Providers (n=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits supply the body calcium (1).</td>
</tr>
<tr>
<td>Fruits feed the bones (1).</td>
</tr>
</tbody>
</table>
Table 5.48: Vegetable Misconceptions Generated by the Children and Primary Care Providers (Number of Times the Misconception was Mentioned).
The childcare providers (n=2) did not express any vegetable misconceptions.

<table>
<thead>
<tr>
<th>Primary Care Providers (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn is a starch (7).</td>
</tr>
<tr>
<td>French fries is not a vegetable or is it? It is a potato (1).</td>
</tr>
<tr>
<td>A potato is a starch. Starch is a potato (1).</td>
</tr>
<tr>
<td>Corn and French fries as a meal-starch (1).</td>
</tr>
<tr>
<td>Vegetables come from a tree (1).</td>
</tr>
<tr>
<td>Tomatoes are a vegetable (2).</td>
</tr>
<tr>
<td>Corn not really good for your digestive system (1). I don’t know what corn is good for. Let me see iron (1).</td>
</tr>
<tr>
<td>Four food groups (1).</td>
</tr>
<tr>
<td>Vegetables keep acids our, put acids in. Which one of those does it? Cabbage one of them (1).</td>
</tr>
<tr>
<td>Carrots stop bleeding too (1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children (n=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misidentification (41).</td>
</tr>
<tr>
<td>Orange (8), Apple (7), Grapes (6), Peaches (6), Banana (5), Grapes (5), Fruit (3), Blueberries (1).</td>
</tr>
<tr>
<td>Off the trees (1).</td>
</tr>
<tr>
<td>In the other morning time (1).</td>
</tr>
<tr>
<td>None (1).</td>
</tr>
<tr>
<td>Cake-I get fat, fat (1).</td>
</tr>
<tr>
<td>Poison (1).</td>
</tr>
<tr>
<td>Vegetables come from cow (1).</td>
</tr>
<tr>
<td>Trees-all of them (1).</td>
</tr>
<tr>
<td>When heart hurts (1).</td>
</tr>
<tr>
<td>Carrots-if cooked, then they’re vegetables (1).</td>
</tr>
<tr>
<td>It’s food, don’t snack on it (1).</td>
</tr>
<tr>
<td>Broccoli makes from trees and drinks water (1).</td>
</tr>
<tr>
<td>You eat them and your teeth and body turn orange (1).</td>
</tr>
<tr>
<td>Nothing, it just kills you, because they make poison every night (1).</td>
</tr>
<tr>
<td>Sometimes they’ll be on T.V. rolling around doing a fashion show (1).</td>
</tr>
</tbody>
</table>
Table 5.49: Correlations (above an r value of 0.30) Generated Between the Children (n=24) and the Primary Care Providers on the Study’s Constructs (Concepts, Preference, Availability, and Intake).

<table>
<thead>
<tr>
<th>Primary Care Providers Constructs</th>
<th>Children’s Constructs that were Correlated (r value, p value if significant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concepts</td>
<td></td>
</tr>
<tr>
<td>Preference</td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>Availability (r=1.00, p&lt;0.0001)</td>
</tr>
<tr>
<td>Intake</td>
<td>Intake (r=0.36)</td>
</tr>
<tr>
<td>Fruit Concepts</td>
<td></td>
</tr>
<tr>
<td>Fruit Preference</td>
<td>Fruit Availability (r=0.32)</td>
</tr>
<tr>
<td></td>
<td>Fruit Intake (r=0.42, p=0.05)</td>
</tr>
<tr>
<td>Fruit Availability</td>
<td>Fruit Availability (r=1.00, p&lt;0.0001)</td>
</tr>
<tr>
<td>Fruit Intake</td>
<td>Fruit Concepts (r=0.34)</td>
</tr>
<tr>
<td></td>
<td>Fruit Availability (r=0.41)</td>
</tr>
<tr>
<td></td>
<td>Fruit Intake (r=0.34)</td>
</tr>
<tr>
<td>Vegetable Concepts</td>
<td></td>
</tr>
<tr>
<td>Vegetable Preference</td>
<td>Vegetable Preference (r=0.44, p=.03)</td>
</tr>
<tr>
<td>Vegetable Availability</td>
<td>Vegetable Availability (r=1.00, p&lt;0.0001)</td>
</tr>
<tr>
<td></td>
<td>Vegetable Intake (r=0.36)</td>
</tr>
<tr>
<td>Vegetable Intake</td>
<td>Vegetable Intake (r=0.79, p&lt;0.0001)</td>
</tr>
</tbody>
</table>
Figures 5.50: An Example Combined Fruit Concept Map from a Child (MGA(5)) and her Primary Care Provider (MGAp) and Childcare Provider (MCCP).

MGA: This is all I like (1).
MGAp: You are going to take me back all the way to health class (1). Fruit I would say is something that is good to snack on (1). I guess it is the opposite of vegetables (M). Some fruit is grown in a field, you know it grow it by root too (M), peaches, greens (M), apples, oranges, they all come from trees (1) or something. Healthier (M), healthy the same way (1).
I would describe them as the same as vegetables (1).
MCCP: Fruit. Fruit is oh. Fruit is something that is good (1) for your body. It is sweet (1). It is better tasting (1). It is pretty much has more juice than vegetables (1).
You can pretty much eat fruit raw (1). You don’t need to cook the fruit (1).

What is healthy?
MGA: It keeps your body un-sick. It keeps your body good. Keeps body healthy and good, bony.
MGAp: If I had to define healthy, umm how about something fit. Something that you know is good for your lifestyle, good for your body, you know like Campbell’s or whatever they play that is. You know for your body, your cholesterol. You know your nutrients is your body and stuff. Fruits and vegetables help different parts of your body grow and things like that they say.
MCCP: Good for body, energy, stamina, helps body function properly, gives it the nutrients.

MGA: Total Concept Score: 39; Fruit Concept Score: 24; Fruit Misconceptions: 6.
MGAp: Total Concept Score: 102; Fruit Concept Score: 41; Fruit Misconceptions: 6.
MCCP: Total Concept Score: 70; Fruit Concept Score: 28; Fruit Misconceptions: 0.
Figures 5.51: An Example Combined Fruit Concept Map from a Child (YBE(4)) and his Primary Care Provider (YBEp) Illustrating How a Mother’s “Allergy” to Fruit May Have Influenced Her Son’s Lack of Fruit Concepts.

YBE:
YBEp: I couldn’t even tell you. I’ll have to look into it. I am allergic to them (1) so I don’t buy (1) them, but I know they (1) say they are good to eat (1). I love watermelon (1), that is how I found out (1) and bananas (1). I don’t eat banana either (1).

YBEp: From the supermarkets (1), fruit trucks (1), Farmer’s markets (1).

YBE:
YBEp: Home (1).

YBE:
YBEp: Apple (1).
Banana (1).
Oranges (1).
Grapes (1).
Peaches (1).

YBEp: Healthy (1).

YBEp: No (1).

YBE: Total Concept Score: 0, Fruit Concept Score: 0; Fruit Misconceptions: 0.
YBEp: Total Concept Score: 38; Fruit Concept Score: 21; Fruit Misconceptions: 0.
Figure 5.52: An Example Combined Vegetable Concept Map for a Child (YGH(4)) along with her Primary Care Provider (YGHp) and Childcare Provider (YCCP) Illustrating how Lessons Taught at Head Start such as “Fruits and Vegetables are Good for the Heart” can be Reinforced by the Primary Care Provider (Discussed How She Reminded YGH about the Heart at Dinner) and Childcare Provider (Taught Lesson in Class); But, These Lessons if not Properly Instructed and Reinforced may Contribute to Misconceptions.
Figure 5.53: An Example Combined Fruit Concept Map for a Child (MGG(3)) along with her Primary Care Provider’s (MGGp) Illustrating How One-on-One Time During Meals and Grocery Shopping may Influence a Child's Concepts.

MGG: Orange (1). They're food (1). And you peel them (1).
MGGp: Grow on trees (1), on a vine (1), vitamin C (1), not into all that in vegetables too (1).
Orange-vitamin C (1). Apples all kinds of vitamins (1). Banana-something also tell older people to eat (1).

MGG: At the store (1).
The man gave me some grapes (1).
(Store Name) (1).
MGGp: Tree (1) or vines (1).

MGG: Yes.
MGGp: Give you vitamin C (1), A (1), B (1), D (M).
Helps you eliminate waste (1).

MGG: At dinner (1). At the tank (referring to fish tank at Chinese restaurant where she eats broccoli with chicken) (M).
Salad with carrots (1).
French fries-at restaurant (M).
Grapes with seeds (1).
Broccoli with stinky fish (1).
We eat bread at church (1).
MGGp: By self (1).

MGG: Total Concept Score: 30; Fruit Concept Score: 17; Fruit Misconceptions: 1.
MGGp: Total Concept Score: 62; Fruit Concept Score: 25; Fruit Misconceptions: 1.
(MGG also referred to the Chinese restaurant in her discussion on broccoli in her vegetable concept map.)
Figure 5.54: An Example Combined Vegetable Concept Map for a Child (MGL(3)) along with her Primary Care Provider (MGLp) Illustrating how a Primary Care Provider's Food-Related Job may Influence her Child's Concepts.

MGL: We ate them yesterday (1). Broccoli and tomatoes (1).
MGLp: Vegetables is a source of food (1) that is from the earth (1). It’s healthy (1) food. According to how you cook it (1), you can cook the protein out of it (1). If it’s overcooked (1). If you blanch (1) or steam (1) them they’ll really be good for you (1).

Vegetables

are

come from

MGL: Out of the ground (1), leaves (1).
MGLp: Ground (1).

do ... for the body

MGL: Make you strong (1), and make you feel better (1).
MGLp: Some vegetables give you a lot of calcium (1) like dark green vegetables (1). Energy (1). Some vegetables flush you out like lettuce (2). Lettuce has a lot of water in it (1). Cabbage (1) flushes you out (1). Good for the digestive system (1). Not so much corn (M). That’s not really good for your digestive system. I don’t know what corn is good for. Let me see iron (M).

MGL: Total Concept Score: 38; Vegetable Concept Score: 19; Vegetable Misconceptions: 5.
MGLp: Total Concept Score: 91; Vegetable Concept Score: 33; Vegetable Misconceptions: 2.
Figure 5.55: An Example Combined Fruit Concept Map for a Child (YGK(5)) along with her Mother’s (YGKp) Illustrating how her Mom’s Child-feeding Practices (Categorized as High on All Seven Categories by the Child-Feeding Practices Questionnaire) may Influence the Child’s Concepts.

YGK: fruit is vegetable (M) and for dessert (1) and every time after lunch (1). Banana looks like moon shape in sky (1). Orange-play outside with it, step on it, throw it, and trash it in trash (1). Grapes-look like a head (1).

YGKp: Fruits. Fruits are food (1). Vitamins (1) and minerals (1).

YGK: From the people that bring it to the market (1), We ate fruit. We smell fruit (1), snacks/desserts (1). Like downstairs-people make them (1) and bring them to the store (1). Grapes-take little juice and put the skin back on (1). My stomach hurts.

YGKp: From the ground (1).

YGK: Total Concept Score: 45; Fruit Concept Score: 26; Fruit Misconceptions: 4.

YGKp: Total Concept Score: 33; Fruit Concept Score: 15; Fruit Misconceptions: 0.

(YGKp discussed during her interview her concerns on her daughter’s weight. She mentioned that a doctor told her child is overweight and at the rate she is progressing at will be at risk for diabetes within a few years. Diabetes runs in their family.)
G. Discussion on Research Aim Three: To Determine the Level of Shared Meaning, Preference, Availability, and Dietary Intake of Fruits and Vegetables between the Children Studied under the First Aim and both their Primary Care Providers (Studied under the Second Aim) and their Childcare Providers.

The study’s theoretical model (Figure 3.7) involved three individual groups: children, primary care providers, and childcare providers. Sections B-E of this chapter provided an understanding of how the study constructs (concepts, preference, availability, and intake) operate in children and primary care providers. This study’s final aim supplied an understanding of how these constructs operated in the children’s childcare providers and then how these three individual groups related. This discussion will first focus on the childcare provider findings and then on the level of shared meaning, preference, availability, and intake of fruits and vegetables in the entire sample.

The childcare providers studied had fairly similar concepts amongst themselves and with the primary care providers studied in aim two. Preference and availability were somewhat high as was intake. Preference or lack of preference for fruit by one childcare provider was particularly intriguing. She tended to not eat the fresh fruit given to the classroom for any of the meals or snacks, especially the bananas. Some of the children in her class were less inclined, compared to other observed classrooms, to eat bananas. Further research is needed in studying (and potentially increasing) preference for fruits and vegetables in childcare providers, particularly, how their eating habits in the classroom influence the children. Nutrition educators may want to focus on working with childcare providers to understand the importance of being a role model of healthy eating behaviors. Neither childcare provider had extensive misconceptions of fruits and vegetables. Few misconceptions are good in terms of future educational efforts. Novak and Gowin (14) stress that misconceptions are difficult to change. Educational efforts targeted toward childcare providers on fruits and vegetables should help develop the childcare providers’ own concepts of fruits and vegetables as well as aid in their ability to instruct their classrooms. Both of the childcare providers expressed how they communicated with the children as well as the primary care providers about food. The childcare providers felt as if they were educating not only the child but also the primary care provider. More work is needed in understanding how to connect concise and precise communication efforts between the child, childcare provider, and primary care provider. The center menu or posting lessons learned at mealtime by the classroom’s sign-in/out sheet may be consistent, concise, cost-friendly, and child-appropriate mediums to explore.

Tying together and exploring the children’s, primary care providers’, and childcare providers’ study constructs are where this study’s first two aims finally come to fruition. Unfortunately,
Tables 5.41-5.45 demonstrate that the concepts expressed by the children were shared minimally with their primary care providers. Even at an individual child-primary care provider-childcare provider level (Table 5.46), minimal matching was found. A number of reasons may help to explain these findings. One reason is that the children did not express many concepts that could be shared.

Achterberg (16) hypothesized that: “Shared meaning about food and nutrition can only be established between parents and young children on topics with which both are familiar.” Given that neither the children nor the primary care providers expressed many concepts about fruits and vegetables, it is not surprising that extensive shared meaning between these individual groups took place. Future educational efforts must work on increasing the knowledge of fruits and vegetables in children, primary care providers, as well as childcare providers. Efforts should work with primary care providers and childcare providers on appropriate mediums and methods of transferring their knowledge to their children. Achterberg (16) suggested that: “In order for shared knowledge to be established about individual food preferences, there must be: 1) an opportunity for that individual to make choices, i.e. to express his or her preference, and 2) a social setting where those preferences are observed by, and perhaps discussed with, other family members.” This idea of creating opportunities to express preferences or thoughts about fruits and vegetables in this sample may be one medium by which these children as well as primary care providers and childcare providers can increase their concepts of fruits and vegetables. Having the children express their thoughts about fruits and vegetables to their primary care providers and childcare providers may facilitate more opportunities for the primary care providers and childcare providers to promote meaning, particularly shared meaning, in their children. Further work using and building on this study’s theoretical framework may help frame constructs by which to facilitate as well as understand how opportunities for social interaction can help increase meaningful learning in children, primary care providers, and childcare providers. The study framework may also enable analyses of how shared meaning can be created, studied, and if needed, corrected.

In evaluating the misconceptions or the shared misconceptions in this sample, Tables 5.47 and 5.48 illustrate that there were misconceptions, particularly in children, but these misconceptions were not extensively shared. Achterberg (16) hypothesized that: “Children do not absorb parental ideas verbatim. Rather children create unique or idiosyncratic interpretations of things based on their observations and deductions as well as on parental instruction.” YBB’s misconception that fruit is poison may have grown out of his parents’ messages about not eating the seeds or peels of fruit. Teaching children to just eat the fruit and not the seeds and peels is a
tricky lesson, but an important one. Because, scaring a young child from eating fruit entirely can be potentially difficult to reverse. Given that many of the primary care providers and childcare providers did not have extensive concepts or understanding of the concepts they were expressing, it would be logical to deduce that the children developed their own meanings. This included the children developing their own sense of what “good for the body” meant. It is also logical that these children thought that every fruit and vegetable did something for a particular body part as “carrots are good for the eyes.” Targeting a few simple messages about fruits and vegetables seems to be a good medium to get children, primary care providers, and childcare providers interested in eating fruits and vegetables. Providing some basic rationale for what and how fruits and vegetables influence the body may serve to increase this population’s understanding of the importance of fruits and vegetables. These messages might facilitate a medium to learn about vital scientific and health-related concepts.

Statistically, the exploratory analyses provided insight into how children and primary care providers’ constructs relate. Availability, not surprisingly, is a shared construct and a vital construct to target understanding fruits and vegetables in this sample. Intake is also crucial and related to availability. An interesting phenomena is the relation between vegetable preference between the children and primary care providers and the lack of relation between the two’s fruit preference. One explanation for this difference may be the regularity in vegetable consumption (i.e. at dinner) and types of vegetables consumed (i.e. canned greens, peas, corn, etc.) in this sample. Facilitating similar shared experiences (i.e. meals and snacks) and foods (i.e. both eat bananas at breakfast or snack instead of, maybe, the mother eating a banana and the children eating fruit snacks or fruit cups) may help increase shared preference. These experiences may also increase sharing between other constructs (i.e. similar concepts) and strengthen correlational relationships between constructs (i.e. primary care providers’ concepts and children’s intake).

Qualitatively, Figures 5.50-5.55 provide evidence that reinforces the theoretical notion of how inter-relational systems influence a child’s understanding of fruits and vegetables. These maps visually display the ideas expressed earlier about shared opportunities, creating meaning or making deductions from lessons learned or observed, and the importance of all groups (children, primary care provider, and childcare provider) being familiar with a concept. Availability, as Figure 5.51 captures, factors into facilitating meaningful learning in both child and primary care provider. Availability offers various opportunities for facilitating or hindering the sharing of meaning, preference, and intake. In Figure 5.52, YGH was absorbing lessons about the heart from Head Start and her grandmother, YGHp (who helped out at the center) allowed for an additional opportunity at home for message reinforcement. Nonetheless, for successful message
reinforcement and absorption, clear, consistent, and concise messages are needed. These messages, as expressed by Novak and Gowin (14), seem to stick better when they have multiple meanings attached to them. In other words, providing the children, primary care providers, and childcare providers with a basic rationale about why to eat fruits and vegetables or a visual explanation of how water, sun, and soil enables fruits and vegetables to grow may facilitate the development of more meaningful messages. These messages also provide a varied venue in which reinforcing groups a.k.a. primary care providers, childcare providers, and other influencing parties (such as the government and health organizations) can build on and branch off of.

Figures 5.53 and 5.54 provide supporting evidence (although do not in themselves establish any claims) on how identifying venues (such as mealtime and grocery shopping) may be fruitful mediums in which to initiate educational messages. These venues not only provide an opportunity for primary care providers and childcare providers to talk with children and show children fruits and vegetables but also serve as consistent, familiar, convenient, and fun outlets where fruits and vegetables can be purchased and consumed. Government agencies as well as health organizations can easily facilitate, participate, and investigate these venues. Future efforts should explore the use of mealtime and grocery shopping in Head Start as well as the household as educational venues for preschoolers. Figure 5.54 provides insight into how primary care providers who work in foodservice may help teach themselves as well as their children lessons about food, nutrition, and health. Head Start food provision along with other food venues (local schools, grocery stores, and hospitals) may serve as fruitful venues to increase nutrition knowledge and, more specifically, vital cooking skills in at-risk primary care providers.

Future work is needed in understanding the value of incorporating primary care providers into Head Start centers’ foodservice and community food venues. This work also needs to assess the value of more effectively incorporating and linking the foodservice staff into Head Start’s nutrition education goals in the classroom. Briley et al. (205) and Bruening et al. (206), amongst others (11, 207), have assessed the foodservice staff and childcare providers’ menu planning resources and skills in childcare centers. These studies provide support for the important role childcare centers play in preschoolers’ nutrient intake. Briley et al. (207) argued for the improvement in childcare menus, the importance of staff training on nutrition and foodservice, and the need to be sensitive to the mission and culture of different centers. Nevertheless, Briley et al. (207) states that staff knowledge only has an indirect influence on the menus and does not emphasize the role of staff on the children’s concepts, preference, availability, and intake of fruits and vegetables. Head Start and the United States Department of Agriculture Child and Adult Care Food Program regulations have a greater impact on a center’s menu than the center staff.
This study’s food availability and menu analyses, however, demonstrate that the foodservice staff has a critical influence on the foods actually served and consumed by the center’s children. The foods served or what foods are available influences a child’s ability to know, like, and eat particular foods. What the foodservice staff ends up serving the children also influences the primary care providers’ understanding of their children’s food intake.

More work is needed in understanding the role of the foodservice staff on a child’s concepts, preference, availability, and intake of fruits and vegetables. This work should also examine the role of primary care providers who work in foodservice at Head Start. Analyses should assess the value of employing primary care providers to work in Head Start foodservice. To truly understand this value, these analyses may want to expand the economic paradigms of focusing on direct labor costs of foodservice workers. In other words, instead of just considering the cost of foodservice workers versus catering the food served, Head Start may want to factor in how employing primary care providers in foodservice influences: 1) community economic development, i.e. employing individuals within the community, and 2) community health costs, i.e. teaching at-risk primary care providers healthy cooking skills that may be used in their household that, in turn, contribute to improved health and decreased health costs. Figure 5.55 provides support that working with the primary care providers and childcare providers on child-feeding practices is instrumental in creating healthy dietary patterns and messages in preschoolers. More work is needed in assessing feeding-practices in this community as well as exploring how to create and communicate more healthful methods of feeding children. These methods will need to take into consideration that many of these primary care providers and childcare providers may rely on food as a means of behavior management. In order to devise strategies that facilitate healthy eating patterns and manage children's behavior and/or special needs, nutrition professionals may need to collaborate with child psychologists and speech therapists.

This was an exploratory, qualitative study based in one community. This study’s main objective was to examine inner-city Head Start children’s concepts, preference, availability, and intake of fruits and vegetables. To understand these constructs in children, this study needed to examine these constructs in the studied children’s primary care providers as well as childcare providers. This study needed direct observations of the classroom, center, and overall community context. As one of the first research studies in this center, the study needed to ensure that its procedures, content, and activities were fun, friendly, and feasible for the participants. The study needed to work on making all methods and interpretations context-sensitive. These steps aided in not only ensuring study collection by enough participants but also set the stage for future projects.
I acknowledge the study’s limitations: a small sample size, no documentation of the exact types and amounts of food consumed by an individual primary care provider, no 24-hour recalls or records of household daily consumption, no formal assessment of the community’s fruit and vegetable availability, and the study focused on only a select sample of fruits and vegetables. The sample size of childcare providers (n=2) is particularly small; yet, it is logical. This sample size provides an understanding of the key childcare providers in the studied children’s lives. These exploratory findings do not provide substantial foundation for how concepts, preference, availability, and intake operate in childcare providers. These findings do not enable numerical assignment of how these two childcare providers relate to the children. Nonetheless, the interviews of the childcare providers and extensive direct observation of these childcare providers and others (n>28) provide insight into how childcare providers influence children’s concepts, preference, availability, and intake of fruits and vegetables. The interviews may also guide future nutrition education efforts on how to connect the child, primary care provider, and childcare provider. My hope is that future research will address some of these limitations. These findings, in spite of these shortcomings, supplied a foundation for future research and intervening efforts.
H. Overall Discussion.

To summarize and synthesize the findings from each of the study’s three aims, I will conclude this chapter with a set of hypotheses grounded in this work. These hypotheses were not pre-formulated; the methodology and analyses were informed, however, by the study’s theoretical framework. They reflect the integration of these findings and others (13-16). Each of these hypotheses will be supplemented with a brief rationale. The ordering of these hypotheses is non-hierarchical. Following these hypotheses are the study’s overall limitations and strengths. Implications/recommendations are provided as well as a discussion of this work’s ethical considerations.

1. Selected Hypotheses

HYPOTHESIS 1: A childcare center’s context such as geography, ethnicity, and socio-economic status has a significant influence on the center and the observations taken there. They should be evaluated at all points of analysis in order to develop, implement, and evaluate the most effective recommendations.

Bronfenbrenner’s Theory for the Ecology of Human Development (13) as well as Davison and Birch’s Ecological Model of Predictors of Childhood Overweight (15) emphasize the role context (including geography, ethnicity, and socio-economic status) plays in understanding human behaviors such as dietary habits. Evidence (156) illustrates that interventions designed to be culturally and economically sensitive are more effective at changing dietary patterns. The Multi-Cultural Paradigm (231, 232) along with the National Institute for Environmental Health Sciences’ Recommendations for Community-based Research Projects (234) emphasize the importance of community-based relevant research and interventions.

Assessing context needs to be a component of all research studies. This can be accomplished by noting the geographic location, ethnicity, and socio-economic status of the group being studied. Care must be made to protect the participants and maintain a level of confidentiality. Researching the constructs of interest by breadth (within other contexts) and depth (deep within the primary context) are needed to further theoretical development and truly understand the role of contextual factors. Commonalities as well as differences should be identified, tested, and utilized in future studies and interventions.

This study did not collect the data necessary to more thoroughly understand the role of geography, ethnicity, and socio-economic status on the theoretical model. These observations of this community, in comparison to other studies conducted with preschoolers (16, 173), provide
evidence that geography, ethnicity, and socio-economic status may exert an influence in
developing, implementing, and evaluating nutrition studies and interventions. Geographically,
inner-city settings may differ from rural settings in a host of key elements such as the proximity
of farms. Farming may help rural preschoolers better understand where fruits and vegetables
come from as well as facilitate higher fruit and vegetable availability and intake. Inner-city
settings are also plagued with more crime (247). This may have contributed to the study’s
children discussing and playing guns with the bananas while Matheson et al.’s (173) rural Head
Start sample did not. From a cultural standpoint, although this sample was predominantly
African American, one of the childcare centers had a notable proportion of Asian American
students. Based on these observations (language difference) as well as comparing these study
findings to Achterberg (16) and Matheson et al. (173), I believe that culture exerts an influence on
nutrition interventions. Most importantly, I believe, for African Americans, the role of building
trust was critical in this study design. Neither Achterberg (16) nor Matheson et al. (173)
emphasized building trust.

Family structure differences were also noted between Achterberg (16) and this sample.
Achterberg (16) focused on a child’s mother and father. Although some of this sample’s
preschoolers had a mother and a father actively involved in their lives, most of the children were
being raised in families that did not necessarily follow the “traditional” nuclear household. The
role of the grandmother, moreover, was particularly prominent in this sample. Designing a study
as well as an intervention that addresses single motherhood and the stresses unique to that
predicament was essential in this sample. These family situations do not necessarily fall under
“cultural” factors, but research (159-160) emphasizes family dynamics and “non-traditional”
situations in the inner-city African American community. Socio-economic influences, such as
price of fruits and vegetables, arose in this sample. Economical barriers, among others (childcare,
transportation), emerged from studies on low-income populations versus higher-income
populations (141-143, 146). Socio-economic issues may not have factored as strongly into
Matheson et al.’s (173) study as they did not emphasize the role of availability and intake of fruits
and vegetables in which socio-economic issues may weigh more heavily. Further work is needed
in understanding and differentiating the role of geography, ethnicity, and socio-economic status.
This research will enable a better sense of the role these factors play in nutrition studies and
interventions. Context-based research will facilitate, if needed, more effective context-sensitive
studies, recommendations, and interventions.
HYPOTHESIS 2: The foods that children, primary care providers, and childcare providers eat as well as the environment they eat them in can serve as a point of dietary intervention.

Research (135) along with the study’s theoretical framework (13-16) and other theories (248-249) emphasize the role of availability, social interaction, and context in understanding, motivating, and manipulating dietary patterns. The food Head Start children, in particular, eat should be studied further as these children eat at Head Start for two meals and a snack. These meals, along with the environment they are consumed in, can be governed by government agencies. Exploring how intervening in the foods Head Start children consume (i.e. increase the amount of fresh fruits and vegetables served) along with training childcare providers and primary care providers on creating a positive eating environment (i.e. provide lessons on child-feeding practices, role modeling, etc.) can serve as a rich and semi-controlled medium for dietary intervention.

HYPOTHESIS 3: The forms of fruits and vegetables that individuals, particularly young children, consume may influence their preference towards certain fruits and vegetables as well as their health.

Evidence (35, 39, 42) suggests that the types and variety of fruits and vegetables consumed may influence an individual’s health. Understanding how the lack of variety of fruits and vegetables influences young children’s future food preference and health is of special importance as dietary patterns tend to develop early in life. Studying the influence of types and variety of fruits and vegetables on preference, as well as health at various levels (cellular, animal, and human), will provide further insight into the role of fruits and vegetables in health. This research may supply insight into how different fruit and vegetable consumption patterns (i.e. canned fruit and vegetable consumption versus fresh fruit and vegetable consumption) factors into health disparities.

HYPOTHESIS 4: A Head Start center along with a low-income primary care provider’s ability to serve foods such as fruits and vegetables is affected by multiple and complicated factors including economics, storage, and cooking skills.

The buying, serving, and eating fruits and vegetables are affected by a host of factors (89, 135). Understanding each of these factor’s roles and how the individuals of interest perceive, react, and, hopefully, overcome these barriers is essential. Although some studies (205, 11, 206, 207) have assess the foods served and menu planning of childcare centers (including Head Start),
limited research has been conducted focused exclusively and extensively on fruits and vegetables. Future studies, particularly, qualitative studies need to assess how economics, storage facilities (or lack of facilities), and cooking skills (or lack of skills) influence this community’s fruit and vegetable consumption. More attention is needed in understanding the various forms of fruits and vegetables consumed and the consumption of fruits and vegetables throughout a longer period of analyses (i.e., throughout a month when Food Stamps are available earlier in the month and then later when Foods Stamps are already redeemed).

**HYPOTHESIS 5:** Government food assistance programs contribute to fruit and vegetable availability among low-income populations, but may dictate a purchasing pattern that hinders the consumption of fresh fruits and vegetables.

Low-income individuals tend to rely heavily on government food assistance programs such as Food Stamps (225, 226). Head Start centers (8) and schools (138) tend to provide low-income children with a substantial proportion of their dietary needs. Further work is needed in understanding both the positive as well as potentially negative role government feeding programs may have in these populations. Based on this study’s findings, programs and policies may need re-evaluation. Government feeding programs may want to consider integrating and collaborating more effectively in serving low-income populations. Programs such as 5-A-Day (22), which encourages, recommends, and measures the consumption of fresh fruits and vegetables and uses messages such as: “It’s so easy to eat five to nine servings of fruits and vegetable a day” and use of “5-A-Day” pictures that exclusively feature fresh fruits and vegetables may not be affordable, feasible, or appropriate for audiences such as this sample. Health professionals should consider this when developing, implementing, and evaluating their messages.

**HYPOTHESIS 6:** Food, more so than other objects, is used in low-income populations (in comparison to higher socio-economic status groups) as a means of behavior management. Childcare providers and primary care providers who do not have the skills or resources to manage children’s behavior may have a higher likelihood of using food for a quick, and often effective (in the short term), mode of behavior management.

Davison and Birch (15) emphasize the role child-feeding practices play in a child’s weight status; yet, limited work has been done in low-income or African American populations. Scarce evidence is available on the role of Head Start childcare providers’ child-feeding practices. Future studies should evaluate: 1) the practices used in this population to feed children, and 2) methods and messages that can improve child-feeding practices in this sample. Nutrition
professionals may want to team up with child psychologists and special needs specialists (speech therapists, mental and physical disability therapists), amongst others, to design the most effective studies and intervening strategies.

**HYPOTHESIS 7:** Food identification can serve as an educational medium for young children to identify common items in their lives as well as discuss the nutritional and health benefits of the foods they consume. A child’s ability to name foods is influenced by her/his childcare provider and primary care provider as well as classmates’ nutrition knowledge.

The Theory of Meaningful Learning (14, 223) along with Achterberg (16) emphasize the role of instruction and creating consistent and meaningful mediums for instruction in facilitating learning in young children. At Head Start, children eat two meals and a snack. A fruitful venue to encourage food identification abilities in young children may be training childcare providers to take the time at meals and snacks to identify and then briefly discuss the foods. Nutrition professionals should consider working with childcare providers on mediums and methods of utilizing mealtimes in Head Start as a venue for nutrition education. Figuring out ways (such as posting the foods served on a given day by the sign in/out sheet or sending home a weekly, accurate menu) may serve as a communication vehicle to incorporate the primary care providers into the food identification lessons. In order for these efforts to be successful, future studies must research, and if necessary, intervene in the nutrition knowledge of childcare providers, primary care providers, and children.

**HYPOTHESIS 8:** A child’s food identification ability and concepts of fruits and vegetables may relate to her/his availability of fruits and vegetables. Preference may help increase a child’s knowledge and consumption of fruits and vegetables. To understand a child’s concepts of fruits and vegetables, concepts along with preference, availability, and intake of fruits and vegetables need to be assessed concurrently. Adding to this understanding will be investigating this child’s primary care provider and childcare provider’s concepts, preference, availability, and intake of fruits and vegetables.

As the study’s theoretical framework (13-16) and then findings illustrate, concepts, preference, availability, and intake relate in these children, primary care providers, and childcare providers. Even though the relationships between the study constructs were not always strong in this study, an understanding of concepts, preference, availability, and intake provided a more robust analysis of how fruits and vegetables operated in this sample. Even though the study
constructs’ relationships between children, primary care providers, and childcare providers in this study were not always that strong, understanding how concepts, preference, availability, and intake related in a child was aided by understanding these relationships in a child’s primary care provider and childcare provider. Even a lacking relationship between a child and his primary care provider or childcare provider on the study’s constructs was insightful. Future qualitative studies paired with quantitative measures need to further explore the role of concepts, preference, availability, and intake of fruits and vegetables in children. These investigations need to incorporate the primary care provider and childcare provider. Factoring in context is essential. Exploring other factors or mediating variables on these relationships in this sample will aid theoretical development as well as intervention design, implementation, and evaluation.

HYPOTHESIS 9: Head Start’s food provision and nutrition education efforts need to be comprehensively and consistently assessed. The implementation and evaluation of these efforts, ultimately, should focus on the children’s: 1) direct consumption and availability of food offered such as fruits and vegetables, 2) nutritional status (i.e. height for weight), 3) nutrition knowledge, and 4) food preference.

Head Start was originally designed (9) as a comprehensive program including nutrition services. These services were designed to supplement as well as complement the child’s household nutrient consumption. Head Start aimed to utilize these services as a means of improving children’s nutritional status and nutrition knowledge. Seldom and inconsistent evaluation of nutrition have been conducted in Head Start over the decades (8, 10). This research is particularly weak in understanding Head Start’s role in a child’s nutrition knowledge and food preference. Future studies and evaluations should assess Head Start’s role more thoroughly on children’s food identification abilities and concepts of foods such as fruits and vegetables. These studies should consider the role of Head Start’s food provision in exposing and influencing at-risk children’s preference and consumption of fruits and vegetables. Efforts should be made by nutrition professionals to more effectively integrate nutrition into Head Start’s other services such as health (i.e. dental hygiene) and mental health (i.e. child-feeding practices as a means of behavior management). Evaluation of these efforts is essential.

If Head Start’s evaluation methods do not adequately assess the program’s food provision and nutrition education curriculum (including the childcare providers’ nutrition knowledge, child-feeding practices, and behavior management strategies), then the program’s food and nutrition efforts will not be accomplished. Head Start’s food and nutrition efforts will also be overlooked or misjudged. These findings supply insight into the importance of evaluating the childcare
providers’ nutrition knowledge, child-feeding practices, and behavior management strategies. A better understanding of how these influence a child’s nutritional status and nutrition knowledge is vital. Evaluation methods need to assess the childcare providers on multiple levels as well as consider other factors that can help or hinder understanding, implementing, evaluating, and designing nutrition services in Head Start.

2. Overall Study Limitations

As a direct observational study, the main objective was to observe without biasing the food provision and nutrition education efforts provided at the center. I acknowledge the study’s limitations: a small sample size, no exact nutrient analysis of food consumed by the children, no documentation of the exact types and amounts of food consumed by an individual child, no 24-hour recalls or records of household daily consumption, no consideration of competitive food consumption, and no assessment of the center’s food budget. I did attempt to analyze the food served to determine if it met the guidelines of the Food Guide Pyramid and would offer the children 1/3 of their daily energy recommendation. These analyses were constrained, however, by the lack of exact nutrient composition of the foods offered and then eaten by the children. Also, given the contribution and un-even access of competitive foods, the analyses were not completely reflective of every child’s nutrient intake. This study lacked information about how or why food substitutions were made. The study did not formally assess the community’s fruits and vegetables availability. Only a select sample of fruits and vegetables were studied. The study only assessed one primary care provider in these children’s lives and others may be more relevant, influential, etc. The sample size of childcare providers is particularly small. My hope is that future research will address some of these limitations. Despite these limitations, this study supplies a foundation for future research and interventions.

3. Overall Study Strengths

As the first study to comprehensively investigate the concepts, preference, availability, and intake of fruits and vegetables in low-income, African American children who participate in Head Start childcare centers, this work provides a foundation to future nutrition intervention efforts in Head Start and, particularly, for low-income and African American populations who endure a disproportionate burden of diet-related diseases (5). As an exploratory, qualitative study, these data provide a broader analysis of the context in which dietary problems occur. It provides information and rationale for recommendations that are more economically and culturally
sensitive. This small, exploratory, qualitative study also facilitated a fundamental initiating step in building trust in this community and serving as a bridge for future work.

The findings on the children, primary care providers, and childcare providers’ concepts, preference, availability, and intake of fruits and vegetables provide a baseline understanding of how these study constructs operate on an individual as well as collective level. These findings will guide future theoretical developments and intervening efforts in this sample and potentially similar study samples. The interviews with the children, primary care providers, and childcare providers demonstrate that they are willing and interested in participating in nutrition studies. Each of them are able to communicate their preference for fruits and vegetables. The primary care providers and childcare providers in this study can provide vital information on the household availability of fruits and vegetables as well as intake data by using the National Cancer Institute Fruit and Vegetable Screener.

This study’s direct, long-term observations provide insight into how food is served at this particular Head Start. This study’s food documentation of Head Start’s food provision supplies a point of dietary intervention that can be manageably discussed, developed, implemented, and evaluated. Future training materials can utilize this work to instruct Head Start foodserviceworkers more effectively. The United States Department of Agriculture Child and Adult Care Food Program (200) can benefit from this data by seeing how one center serves its children and tries to meet their CACFP regulations. The food assessment demonstrates how food provision at such childcare centers as Head Start can serve as a foundational point of increasing at-risk populations’ consumption of healthier food items. The menu analysis is another critical piece of data as it provides insight into how a menu can be a misleading gauge of a Head Start center’s food provision. The interviews with the primary care providers and childcare providers provide insight into using a menu as a tool to bridge the communication gap between childcare providers, primary care providers, and children on food. A menu may also aid in increasing children’s food identification abilities.

Although this study did not aim to evaluate the Head Start program as a whole or its nutrition education curriculum, these data are important to Head Start. This study helps because Head Start’s food provision and nutrition efforts are inadequately evaluated (8-10, 201). This study implies that Head Start’s comprehensive nature and food and nutrition goals are needed, but are not implemented or evaluated in a manner constructive to the children, Head Start staff, primary care providers, or to the policy makers who ultimately decide the program’s fate. This study illustrates the points at which this deficiency can be improved and, in doing so, Head Start’s
fundamental principles can be more accurately developed, implemented, evaluated, and maintained.

4. Implications/Recommendations

The study’s findings and hypotheses reveal some critical implications for Head Start childcare providers, foodservice workers, unit specialists, primary care providers, and children. The study provides food for thought for agencies that provide Head Start with meal planning regulations and training materials as well as other government agencies that provide food assistance and nutrition education to at-risk populations. The implications and recommendations that I specifically believe this research should address are as follows:

a. Head Start’s mealtime should help to increase at-risk children’s nutrition knowledge. Efforts should be made to ensure that mealtime serves as an opportunity for the children to correctly identify the foods they are eating as well as engaging in basic discussion on where these foods came from, how to eat them, and what they can do for their bodies. These efforts should aim to facilitate mediums of partnership between the childcare center and household.

b. Nutrition education curricula designed for Head Start are needed, but they should take into account the childcare provider’s nutrition knowledge as well as financial resources to purchase foods. They should also accommodate the childcare provider to child ratio in the classroom, which can be as high as 19:1. Books that incorporate healthy messages may be essential to ensure that nutrition education is incorporated into the classroom on a regular basis as Head Start contemplates emphasizing children’s reading skills (250). Kitchen toys and activities that do not require extensive childcare provider supervision may be an effective mode of nutrition education. Head Start childcare providers should pilot these efforts in their centers in order to evaluate their true effectiveness.

c. Head Start childcare providers need to have a basic and correct understanding of nutrition as well as children’s health. They also need training in child-feeding practices. Future research and theory must assess how to enable Head Start childcare providers, who have one of the highest job turnover rates in the country (251), to educate children on nutrition and facilitate a healthy eating environment for every child. To accomplish this, nutrition professionals should work with Head Start’s other comprehensive services such as mental health and special needs. Likewise, research on encouraging, implementing, and evaluating partnerships between Head Start’s various current comprehensive services are needed. This will ensure that every child in Head Start is getting the services he/she demands.
d. Nutrition communication, education, and intervention efforts need to be developed in a culturally and economically sensitive manner. This will require modifications to Head Start’s current food provision and nutrition education curriculum. These modifications will necessitate changes in training materials geared toward low-income foodservice workers and childcare providers who experience high turnover. Focusing on nutrition and meal planning and preparation (including how to properly store and use fresh fruits and vegetables) is important. It is also critical to address barriers to the consumption of fresh fruits and vegetables such as cost, inadequate preparation/cooking skills, limited storage facilities, and government purchasing patterns in Head Start and other food-assistance program.

5. Ethical Considerations

The ethical considerations of this study are the final area I will address in this study’s discussion. Informed consent and adhering to an Institutional Review Board’s policies are vital to ensuring ethical scientific conduct as well as building trust with the community one is studying. Working with human subjects is sensitive; yet, working with low-income and minority populations is particularly sensitive given historical, scientific and medical injustices (252). Exercising extreme precaution is needed to ensure that low-income and minority individuals enjoy and trust the research process. As research methods continue to grow, mature, and adapt to be more community/culturally focused, research policies and ethical considerations need to be constantly re-evaluated and revised. These evaluations and revisions will help ensure that all involved parties are continually practicing ethical scientific conduct. The research participants’ rights and interests, in any case, should always be given number one priority. The scientist working directly with the community opinion should always be given special consideration when determining actions to be taken with or about the community. This scientist has the research and relationship needed to understand what is in the best interest of that particular community.

Community research, especially using qualitative methods, provides a vital means of linking the research produced with the people who are most in need of the work being produced. To obtain this essential work and link, qualitative researchers walk a very fine line. They must build trust, while not biasing critical study observations. Future work needs to assess how to ensure that all research methodologies (including observational studies) can not only practice good science but, more importantly, maintain an open and honest relationship with the community of interest. Future work should study how to facilitate the translation of research findings into the most appropriate and applicable recommendations and intervening efforts that can help the community being studied along with similar communities. Efforts should evaluate
how best to use research findings to inform policy. Scientists amongst others should consider how best to share and discuss particular studies and methodologies’ ethical considerations in order to best govern, practice, and evaluate ethical science and foster a trusting relationship between science and society.
CHAPTER VI:

CONCLUSIONS
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A. Introduction
This chapter aims to build on Chapter V as well as provides a final summation and analysis of the study’s key contributions. In this chapter, I begin with stating the study’s knowledge claims. Then, I analyze the study’s theoretical framework and state the study’s value claims. A description of some particular studies and intervention components follow. This chapter concludes with a brief analysis of the overall study.

B. Knowledge Claims
The knowledge claims derived from this study are listed in Figure 1.1 in order of significance. The most important finding was that the children and their primary care providers and their childcare providers have limited and varied concepts of fruits and vegetables. These concepts include where, when, and how they ate fruits and vegetables, where fruits and vegetables come from, what fruits and vegetables do for the body, and their preference for fruits and vegetables. Misconceptions were expressed. Some children expressed minimal concepts of fruits and vegetables. Preference findings for fruits and vegetables in the children, primary care providers, and childcare providers were positive and provided particular insight on intake, but did not necessarily positively relate to concepts. The availability and intake findings were significant in this study. Availability of fruits and vegetables in this center were limited at snack time and primarily canned, rarely fresh. Household availability varied, especially for fresh produce. Fruit and vegetable intake were varied in the sample, but vegetable intake at dinner was somewhat consistent. Shared meaning and preference among the sample was minimal. Availability and intake were related. The findings on shared meaning, preference, availability, and intake were instrumental in understanding why the children’s knowledge may be under-developed. Theory building is critical to research and this study’s findings are important to future theory-building efforts. The theories used for this study provided a framework by which key elements could be tested and interpreted, but further work is needed to strengthen their applicability. Taken together, the findings and hypotheses generated from this study provide guidance to future Head Start investigations, but should not be generalized without further verification.

C. Theoretical Analysis
As illustrated in Chapter III, four different sources (13-16, 223) were synthesized into this study’s theoretical framework. Each source, whether a theory, model, or series of hypotheses,
provided invaluable insight into this study’s methodology as well as tremendous guidance into how to interpret the data and findings. Each source contributed valuable constructs and methods. Each of this study’s selected constructs and methods were critical to the study and were needed in order to obtain a more robust understanding of how fruits and vegetables operate in this sample. Achterberg’s (16) work along with Davison and Birch’s (15) model were particularly helpful as they provided individual means of incorporating other theories, some of which were already used in the study framework, along with related research and inquiries. Integrating four different sources of thought was challenging, but provided the most effective means of getting a true sense of this study’s focus question. Before, during, and after data collection, I felt that this theoretical framework was insightful and included the key parameters of interest in understanding the study question and constructs.

Specifically, the framework’s focus on concepts, preference, availability, and intake provided guidance on four constructs that proved to provide useful understanding of how fruits and vegetables operate in this sample. Intake of fruits and vegetables will ultimately play a key role in determining an individual’s health status; nonetheless, an individual’s preference, availability, and concepts of fruits and vegetables seem to be the most significant contributors to intake (based on this study and others (131, 133, 135)). Each theoretical resource supplied insight into studying, analyzing, and utilizing one if not more of these constructs. Targeting the primary care provider, childcare provider, and child were crucial. Each individual group supplied critical information that enabled a more robust understanding of fruits and vegetables in the child’s both home and childcare. The Theory for the Ecology of Human Development (13), The Ecological Model of Predictors of Childhood Overweight (15), and Achterberg’s hypotheses (16) laid the foundation for targeting each of these individuals and provided guidance in how to study their interconnections. The Theory of Meaningful Learning (14, 223) and Achterberg’s hypotheses (16) emphasized the importance of understanding each of the individuals as individuals and provided the methodology of obtaining this information. The framework as a whole was most helpful in the development of the study design and interpretations of the study findings.

The areas where I felt the study framework as a whole could improve were in conceptualizing the breadth and depth of theories, models, and research needed in order to actually connect a cause of a problem (i.e., lack of fruits and vegetables in the household) to the potential consequences of that problem (i.e., limited concepts about fruits and vegetables in a child). The framework could also improve in communicating how to connect points of change or intervention (i.e., increase fruits and vegetables in community grocery stores or educate primary care providers on how to buy, store, and cook fruits and vegetables on a limited budget) for that
particular problem (child’s limited concepts about fruits and vegetables). In other words, each of the theoretical resources focused on particular areas: development, learning, or weight status. This singular focus laid the foundation of understanding these particular areas in a robust manner. The problem I found in combining each of these resources and conceptualizing how these resources and the study framework can provide insight into improving the study sample’s constructs was that even though each resource acknowledged the role of primary care provider and childcare provider in a child’s life none provided an in-depth understanding of how to encourage or understand the primary care providers or childcare providers’ ability to exert their influence on the child. The theoretical resources such as Achterberg (shared conversations) suggest ways to encourage the primary care provider/childcare provider and child exchanges. None of the theories, however, dug deep into how to change the primary care providers or childcare providers’ behavior or what elements (such as self-efficacy) go into creating positive change. Future studies with this framework should consider how to use the model to understand how the selected constructs operate in a sample in addition to how to use these individual groups and constructs to improve dietary intake.

Bronfenbrenner (13) and Davison and Birch (15), which provide circular schemas to illustrate their models, informed this study's theoretical framework. These structures were somewhat deceiving in analyzing this study as some of the parameters (i.e. socio-economic status) in the outer circles seemed to have a stronger effect and a more direct effect than the multiple-layered schema captured. Likewise, neither of these two circular schemas illustrated the range of effect one layer may or may not have on the inner most circle, the individual. In other words, for some children, the home and childcare center seemed to have an effect while in other children the childcare center had less of an effect (potentially due to length of years in the center and attendance differences). Although Bronfenbrenner (13) and Davison and Birch (15) both stress the dynamic relationship between the focal point, the individual in the middle, and the outer layers, a one-dimensional schema sometimes fails to convey that critical point. Using computer graphics to illustrate these models and a point and click method on the models’ constructs may allow for further elaboration on the research and relationship between one parameter (such as ethnicity and the individual). This three-dimensional method may help enhance the practical use of these theories. This method may also help researchers use these models to adapt to the individual in question, as the various layers influence may be different from one child to the next. This can aid in de-emphasizing or emphasizing parameters (such as socio-economic status) that may exert more of an effect on a child from a low socio-economic status than a child from a higher socio-economic status. Despite these suggestions, both models provide a critical
foundation for understanding a child’s development (in the case of Bronfenbrenner) and a child’s weight status (in the case of Davison and Birch).

Whether evaluating one aspect of this study’s theoretical framework individually or the framework as a whole, I believe that further research is needed. Synthesizing theories, models, and hypotheses is challenging; yet, from this experience and research, no one theory is capable of addressing the entire problem. Synthesizing these theories was not as difficult for me to do since Achterberg (16) provided a foundation for integrating the Theory of Meaningful Learning (14, 223) and the Theory for the Ecology of Human Development (13). Likewise, Davison and Birch (15) relied heavily on the Theory for the Ecology of Human Development (13) in developing their childhood overweight specific model. The challenge that I see is taking these frameworks and adding in theories that more elaborately address behavior change. In other words, the Theory of Meaningful Learning (14, 223) provides guidance on how to increase a child’s concepts of fruits and vegetables and the Theory for Ecology of Human Development (13) provides insight into how to use the child’s environment to positively influence development; however, other theories such as the Transtheroretical Model (253) or Social Cognitive Theory (248) may be more useful in facilitating more healthful dietary and child-feeding practice change in the primary care providers and childcare providers, which will ultimately influence the children’s eating patterns.

The model I used for this exploratory study targeted four particular study constructs: concepts, preference, availability, and intake. I did not aim to change these constructs. I aimed to examine the constructs as they currently operate in this sample. Although these findings seem to indicate that improving one of these constructs may lead to a stronger relationship with another construct, I did not aim to study how manipulating one construct influences another construct. These exploratory findings with these four constructs in this small sample, and particularly the analyses on how these constructs changed based on whether or not they were high or low values, only provides insight into how manipulating or changing one construct may influence another construct and the model as a whole. Further work with this model will need to address whether or not this model is capable of explaining dietary change or only describing how a couple key constructs operate in a sample. Further studies will also have to assess if the theories used to guide this framework and the framework itself have the capacity to facilitate change or improvements in constructs (such as child-feeding practices) that exerted an influence on the study constructs. These studies will have to assess whether the theories or constructs (such as child-feeding practices) operate differently in childcare providers versus primary care providers and if the practices in the two provider groups have a different influence on children.
Incorporating other constructs into the study’s theoretical model (Figure 3.7) from the study’s theoretical resources (13-16, 223) and other theories may be a critical step in understanding fruits and vegetables in an inner-city Head Start. Figure 6.1 captures some of the other constructs and mediating variables that I believe merit attention in the model. Given that this study did not aim to adequately measure any of these variables, the study cannot sufficiently supply solid assignment, strength, or direction to any of these constructs or variables. This exploratory study can only suggest that further work on these constructs and variables may provide insight into interpreting future findings based on the original study model. Although understanding, acknowledging, and adding other constructs and variables to this model was important in my interpretation of the study model and findings, it is important to emphasize that no one study could possibly address all of these constructs and variable. The constructs this study focused on while potentially inadequate provided a solid and systematic start to understanding their particular role and relationship in the model. These constructs are crucial elements and should remain key constructs in any further work with this model as intake is ultimately a construct nutrition efforts should aim to improve. Concepts, preference, and availability have also proved to be critical constructs in improving intake (131, 133, 135). The constructs and variables added to the model post data collection are additional constructs and variables to consider in understanding, measuring, or in improving the key study constructs. Figure 6.2 provides further methodological additions or refinements to the original study methods model (Figure 4.1). Future studies should use Figures 6.1 and 6.2 to guide their work with this population and similar samples. These studies should refine the model as they see methodologically and analytically relevant and possible.

In order to ensure the most effective and efficient research on particular theories and the synthesis of theories, it is essential to ensure that theories are developed, implemented, and evaluated in the population of interest. Similarly, researchers should never assume that theories, individually or collectively, that work in one population will work equally as well in another population. Testing and retesting of theories, individually and collectively, is essential to designing, implementing, and evaluating the most effective nutrition interventions. Nonetheless, a “good” theory that does not work in the population in “most” need is problematic. In other words, researchers should aim to adapt their theories and models to the population of need, rather than find a situation or population that allows for the best validation and expansion of their theoretical models.

In sum, in order to understand foods such as fruits and vegetables in children participating in an inner-city Head Start, it is essential to rely on multiple theories and research to develop a
framework by which to drive your research inquiry. Theory integration, although a more effective approach, may still not account for all the constructs or mediating variables of influence. Targeting a few constructs (such as concepts, preference, availability, and intake) and their relationships in a systematic fashion is vital. This will help to initiate a more thorough understanding of the targeted constructs and their role in the overall research question. In studies with young children, understanding how these constructs operate in their care providers is critical. The framework developed for this study was useful in designing and interpreting the study findings. Figures 6.1 and 6.2 illustrate, however, other constructs (child-feeding practices, neophobia, etc.) and individual groups (siblings, media, etc.) may enable a more in-depth analysis of how fruits and vegetables operate in this sample. To better understand and evaluate this framework’s worth, pre and post data collection, further studies and validation are needed.
Figure 6.1: The Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center Post-Data Collection.

Others Factors Influencing Model: Community including Job Availability, Transportation, Grocery Stores and their Fruit and Vegetable Availability, Government Programs such as Food Stamps and Welfare, Television/Media, Family/Siblings, Other Care Providers Including Before and After Head Start Childcare, Peer Interactions

*Primary Care Provider Exerts a Larger Influence on Child, Indicated by Darker Arrow.
Figure 6.2: Some Suggested Methodology for Further Studies with this Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center. The study’s key constructs are **bolded**. Underneath each construct are the specific measures that may be used to investigate that particular construct.

(Darker Indicates Larger Influence)

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(Darker Indicates Larger Influence)
Figure 6.2: Some Suggested Methodology for Further Studies with this Theoretical Model to Study Fruits and Vegetables in an Inner-City Head Start Center, Continued.
The study’s key constructs are **bolded**. Underneath each construct are the specific measures that may be used to investigate that particular construct.

**Concepts**
- Ability to name fruits and vegetables, age, observations in kitchen area and mealtime, nutrition education activities, development overtime, Head Start nutrition policy, answers to interview questions

**Availability**
- Center food provision, menu, Grocery stores, CACFP regulations, Household descriptions, food assistance, School store (Competitive Foods)

**Preference**
- Yummy/yucky Ratings, compare to more energy dense foods

**Intake**
- National Cancer Institute Fruit and Vegetable Screener
- Multiple 24-Hour recalls, focus on fruit and vegetable type
- Direct observations in center and home

**Others Factors Influencing Model:** Community including Job Availability, Transportation, Grocery Stores and their Fruit and Vegetable Availability, Government Programs such as Food Stamps and Welfare, Television/Media, Family/Siblings, Other Care Providers Including Before and After Head Start Childcare, Peer Interactions
Community assessments, grocery store food assessments, analysis of government programs and regulations, community use, etc., television/media content assessment, assessment of family/siblings along with other care providers and peers.
D. Value Claims

Figure 1.1 visually captures this study’s focus question along with how the study’s theoretical framework, methodology, results, and conclusions work together. Specifically, the vee diagram illustrates how children’s concepts, preference, availability, and intake of fruits and vegetables relate to contextual factors. These contextual factors include a child’s primary care providers and childcare providers’ concepts, preference, availability, and intake of fruits and vegetables. These factors also include the center’s program priorities. The vee includes the study’s value claims in order of significance. The first of these claims stress that future nutrition communication, education, and intervening efforts should be developed in a culturally and economically sensitive manner. These efforts should focus on developing methods and mediums to increase nutrition knowledge on fruits and vegetables in children, primary care providers, and childcare providers. Efforts should design mediums to facilitate similar dialogue and activities around fruits and vegetables in the home and childcare settings between these three groups. Potential topics and aims can include expressing preference; improving household, childcare center, and community availability; along with targeting messages to increase dietary intake. Future efforts will need to take into account the financial resources of the foodservice staff and childcare providers, child:provider ratio, and Head Start’s school readiness emphasis. These efforts should work to design food and nutrition services that truly incorporate primary care providers’ household and community food availability. Since fruits and vegetables play a critical role in diet-disease prevention, barriers to fruits and vegetables consumption in Head Start needs to be addressed.

Given that Head Start cares for at-risk children at a critical period in their lives, especially when it comes to building healthy food and nutrition habits, nutrition professionals should work to ensure that Head Start continues to develop, implement, and evaluate food and nutrition services. Providing data on these services and working with Head Start’s other services (i.e. education and mental health) is a vital step to ensuring that Head Start truly facilitates a healthy head start in at-risk children. Theoretical frameworks and models should drive the data and research generated by nutrition professionals. The Theory for the Ecology of Human Development (13), the Theory of Meaningful Learning (14, 223), hypotheses generated from Achterberg (16), and the Ecological Model of Predictors of Childhood Overweight (15) are all pertinent theories. Each of these theories provide insight into young children and the role the environment (home, childcare, etc.) and supporting groups (primary care providers, childcare providers, etc.) have on children’s development particularly in the eating and health domain. Theory-driven research can help to further validate these particular theories, models, and hypotheses as well as others. Future work can aid in synthesizing these four theoretical
components, amongst others. Further integration of these theories, models, and hypotheses along with others can help direct future research and intervention efforts. Future work using the model (Figure 3.7) derived for this study can facilitate this process. It can also aid in understanding fruits and vegetables in this population as well as similar samples. Another value claim these findings propel me to address is the importance of constantly re-evaluating and revising research policies and ethical considerations. These evaluations and revisions will ensure that all parties involved are practicing ethical scientific conduct. As an exploratory, qualitative study, the value of this work can only be measured in the success of future application.

E. Future Studies

Each of the hypotheses generated from this study should direct future research endeavors in Head Start. First and foremost, future studies should validate these study’s findings. Within these validation studies, certain hypotheses provided from this work can be further assessed. At this juncture, I believe that one of the most critical research questions should involve obtaining a better understanding of what exactly these children are eating throughout the day, throughout the month, and throughout a year. Meals at Head Start, which typically entail breakfast, lunch, and a snack provide a substantial proportion of at-risk children’s dietary intake; yet, these children should also be eating in their household—ones that should technically qualify for food assistance. The gap in knowledge for this study as well as in the literature is a comprehensive analysis of at-risk preschoolers’ dietary intake—in both a childcare setting and household. Obtaining the most accurate assessment and understanding of a preschool child’s dietary intake, qualitative along with quantitative methods are needed. Specifically, ethnographic data on the children’s household eating patterns, household food supplies, and eating environment are needed. Part of this study would involve researchers taking direct qualitative and quantitative accounts of the child’s childcare intake. Complementing these observations should be multiple 24-hour food recalls directed specifically on the child’s intake. This should be gathered by the prominent primary care provider. These recalls will need to be conducted at multiple times throughout the month. This method will better detect how food assistance program’s monthly or bi-monthly purchasing patterns influence the household as well as child’s dietary intake. Instruments such as the National Cancer Institute Fruit and Vegetable Screener (237, 243) can be further validated in this study along with testing other forms or instruments of food assessment.

Within these studies, assessing fruits and vegetables, in particular, is a critical component to future fruit and vegetable specific interventions. Understanding the type, amount, and preparation surrounding the use of fruits and vegetables in low-income households is essential to
understanding how fruit and vegetable intake influences diet-related disease outcomes in these populations. Further work in other arenas on differentiating the impact of fruit and vegetable quality (i.e. is fresh best?) is needed. Understanding fruit and vegetable variety as well as overall dietary variety’s influence on diet-related diseases are other important food assessments to make in this study. Without having a more elaborate and defined understanding of the different metabolic and health impacts of the varying types of fruits and vegetables (fresh versus canned versus frozen), programs may accomplish their goal of getting low-income, ethnic populations to consume five servings of fruits and vegetables a day, only to find that all five servings are of lower and less influential diet-disease preventing caliber.

Besides collecting these data in at least 100 Head Start children of varying ethnicities, similar studies should be conducted in children aged three to five years old. These children should have varying socio-economic and ethnic backgrounds and be cared for at home or in other forms of childcare. Sampling both rural and urban children is critical. These types of investigations will add to our understanding of young children’s dietary consumption and how economics as well as ethnicity influence dietary intake and consumption. Obtaining data on the children’s body weight and height would provide a vital parameter to connecting dietary intake to body composition. Obtaining blood samples for running tests on iron status, lead level, and blood glucose would contribute additional valuable information. Working with Head Start’s other comprehensive services (such as education, mental health, and family advocates) may also provide invaluable connections. These connections include how dietary intake and nutritional status relate to cognitive abilities, dental caries, and behavior in young children. Taken together, this study will require a tremendous amount of effort on developing valid and reliable research methods and instruments. It will demand keen attention to recruiting and retaining the critical, but often difficult to study, low-income sample. Despite these obstacles, the data generated from this study would contribute to building a solid research foundation on which future nutrition interventions in Head Start or with other preschool populations can be built. These interventions may help to influence near and long term outcomes. They may expand beyond nutritional parameters and have educational and economical repercussions.

Besides studies related specifically to food and nutrition in Head Start children, this research experience has me convinced that further and immediate work is needed on how researchers along with their Institutional Review Boards work and conduct research with communities, particularly ethnic samples and economically challenged individuals. Baseline assessments of who is doing this type of work and how (along with what if any findings, issues, or learning was generated from these endeavors) would be the first step. Another important research question
that evolved throughout this research experience is the connection between research and policy. Although some work (254-256) has assessed the specific role of nutrition scientists in policy, I believe it is crucial as scientists deal with more and more cutting edge techniques and more sensitive and potentially discriminatory research questions such as health disparities that more effort should be put into understanding what scientists believe their role is in policy and what ways or forums they feel are best for them to contribute their findings and recommendations to policy development, implementation, and evaluation. Equally as important, research needs to be conducted on what, who, and how policy makers are using research to develop, implement, and evaluate policy. In sum, these findings and research experience stimulated a cornucopia of research questions. They also provided insight into the work that is needed most to follow these exploratory, qualitative contributions. It is my hope that these suggestions stimulate future researchers to: build on this work, test some of these hypotheses, and, most importantly, consistently think, question, and discuss their methods and findings. Additionally, I hope this work helps researchers think, question, and discuss how to improve the applicability of their work and aid in ensuring their findings actually make a positive impact on the individual, community, or society it aims to serve.

F. Future Head Start Interventions

In order to design the most effective intervention for low-income, African American young children who attend the inner-city Head Start childcare center studied in this project, further validation of these study findings (along with future studies informed by this study’ hypotheses need to be conducted). This study has provided some foundation and informed the following suggested intervention. This suggested intervention, as diagramed in Figure 6.3 and Table 6.1, is grounded in this exploratory, qualitative study’s theoretical framework (13-16, 223) and findings. This intervention is not ready to implement. It demands critical connections with other Head Start comprehensive services and additional insight from child development experts. It also requires a substantial amount of material development and preliminary testing.

Given these constraints and the current knowledge on this community, an intervention for these centers would, first and foremost, involve at least a four-month intensive (September to December) program focused on team-building. Four months is a lot time, but in order to ensure successful program implementation and completion study investigators must invest in building trust with the Head Start center and helping the Head Start workers trust each other and their capabilities to accomplish the study objectives. These lessons should aid in the implementation of program principles (such as healthy child-feeding practices) beyond the intervention period.
The in-service concluding this study with the childcare providers and foodservice workers served as an opportunity to pilot the concept of teams and problem-solving groups. The idea was well received, but would require further and more intensive means of helping childcare providers and foodservice staff along with Head Start’s other comprehensive administrative staff work together. Incorporating other Head Start staff such as mental health and family advocates is crucial in Head Start interventions. These staff not only can provide crucial insight into children’s behavior and family situation but they also serve as role models for the children, other staff members, and the primary care providers. These team-building sessions would first focus heavily on basic team building aspects such as sharing of personal information and working together to accomplish non-Head Start related tasks. Slowly, food and nutrition concepts would be worked in through problem-solving case studies and working together to develop and conduct food and nutrition related activities for the children and primary care providers. Other food and nutrition activities would be used to help build communication and trust amongst the Head Start staff. Staff inservices, which are typically held once a month, would serve as the venue for these team-building activities. More creative ways of conducting these activities would be needed if current Head Start policy (249) eliminates funds to support staff in-services. One potential venue for team-building exercises, if in-services are eliminated, is to use the childcare providers’ preparation time before and after the children arrive for school. Team-building would be the focus of the first four-months of the intervention and these types of activities would slowly aim to integrate the primary care providers. Team-building would continue to be a focal point of the intervention. The team-building activities would serve as the venue for providing trainings for Head Start staff on various intervention related topics. These topics would include teaching foodservice staff to serve the children more fruits and vegetables along with more healthy and varied menu items. Preparation of fruits and vegetables along with other foods would be discussed and healthy preparation methods sensitive to the center’s kitchen constraints would be discussed. Developing, implementing, and evaluating a center-specific menu that would communicate to the childcare providers, children, and primary care providers the foods served on a given day would be covered. These menus would serve as a critical bridge between the foodservice staff, childcare providers, children, and primary care providers, amongst others, to ensure that foods the children eat on a given day are talked about in the childcare center and household. Activities to encourage more coordination between the foodservice staff and childcare providers will be needed so that on a day a book about bananas is being used, bananas are being served to the children. The childcare providers’ training should include communicating: 1) the importance of family-style eating, 2)
mealtime discussions on the foods the children are eating, and other life lessons that can be talked about and learned at the table, 3) not using food as a means of behavior control, 4) incorporating food lessons throughout the day without relying on real food, and 5) serving as a role model for the children by eating the foods served to the class at meals and not external food.

During team-building time (first four months of the intervention), intensive work will be conducted on developing books and resources for Head Start childcare providers. These items will be related to food and nutrition, particularly fruits and vegetables. The books, in particular, would need to meet the intervention specification of being: 1) related to food and nutrition, especially fruits and vegetables, but other food and eating-related concepts will be allowed; 2) at a reading level appropriate for a three to five year old mixed Head Start population; 3) about activities and events sensitive to Head Start children; 4) full of words that are repeated throughout the book so children can “read” them when they “see” (requiring pictures of the word) them; and 5) related to other books in the intervention so a series of book activities can be tied together. A total of five books would function as the key education component of the intervention. These components would not be introduced until the second phrase of the intervention (February through April). Each book would be read three times in one week before the next book would be read and would follow that pattern until all five books have been read. During these intensive five weeks, childcare providers will focus on incorporating the book lessons into the classroom. These methods will be designed and discussed by the childcare providers, foodservice staff, and primary care providers during the “team-building” phase. “Take home” materials for the children along with “classroom decorations” that work with the book theme will be developed by the childcare providers, foodservice staff, and primary care providers. These materials will help all parties working with the children along with the children themselves reinforce the book lessons. “Hands-on” activities such as using cinnamon as germs and discussing hand washing will be critical types of activities to strive for during the childcare provider/foodservice staff and primary care provider material development stage. All materials would need to be low-cost and all activities will need to require little preparation, but a lot of fun. Ideally, the reading component of the project will not take place until February through April to ensure the most steady student population (attendance and transition into the classroom is problematic at the centers).

A researcher will take observations of the “reading” days along with at least a total of fifteen days of full breakfast, lunch, and snack. These observations will focus on if the childcare provider read the book, how he/she read it, and what he/she did to incorporate the book lesson in the classroom and at mealtime. Observations of the childcare provider’s dietary intake during the
school day, child-feeding practices, amongst others, will be taken. Childcare providers along with other involved staff and primary care providers’ nutrition knowledge will be assessed prior to and at the end of the intervention. Researchers will also take a baseline, during, and follow-up assessment of at least ten to fifteen children’s concepts and preference of the fruits and vegetables and foods discussed in the intervention books per classroom. A total of six classrooms will be used for the study and this will involve twelve childcare providers, two foodservice staff, and as many Head Start administrative staff and primary care providers that can be additionally recruited. At least, the ten to fifteen children participating in the study per classroom will have to have their primary care providers participate so that the primary care providers can contribute food availability data. Availability of the fruits and vegetables and foods discussed in the intervention books will be assessed at the childcare center and the household. Informed consent, parental consent, or child assent will be obtained from each study participants.

In addition to measuring the children’s concepts, preference, availability, and intake of selected fruits and vegetables and foods, participating children will be measured for body height and weight and asked for a blood sample to measure iron status, lead levels, and blood glucose. These measurements will be taken at the beginning and end of the school. At the beginning and end of the study, the participating children will also be given a dental, cognitive, behavior, speech, and fine motor skills evaluation.

The intervention will take place over the course of one year. During this time, a Head Start center with six classrooms in another section of the intervention city will be assessed using similar staff and children measurements, but will not be given any training or intervening materials or resources. These classrooms will serve as a control and be compared on the following: childcare providers, foodservice staff, administrative staff, and primary care providers’ concepts, preference, availability, and intake of fruits and vegetables, children’s concepts, preference, availability, and intake of fruits and vegetables and foods, children’s body height, weight, and blood profiles as well as children’s dental caries, fine motor skills, behavior, cognitive, and speech evaluations. Mealtime observations and childcare providers’ practices will be compared.

To compare Head Start’s efforts in an intervention setting and non-intervention setting to childcare from other venues, at least 80 children who live in the intervention city, but who do not participate and could participate in Head Start will be evaluated using the same measurements used for the two Head Start groups.

In all three groups, baseline, during, and after the intervention measurements will be taken on the children, childcare providers, primary care providers, and all involved staff’s dietary intake in
general using multiple 24-hour recalls. And, to assess the selected fruits and vegetables and foods used in the study, all participants will be asked to complete a specific instrument tool designed to measure these particular food items intake. This instrument will be validated before being used. All instruments will be read to all participants.

Having researchers in the classroom will help assess program implementation and help ensure compliance by the children, childcare providers, foodservice staff, and primary care providers. A financial incentive will be used in the non-intervention Head Start sample and the non-Head Start sample to encourage compliance. A range of ten to fifteen children in each classroom along with eighty non-Head Start children provides a sample size that will not be tremendously hindered by usual compliance rates. Staff turnover will be monitored and noted. New staff, if necessary, will be trained using the same materials in a shorter fashion.

Evaluation of the implementation of the intervention will be carefully noted along with extensive evaluation of the intervention from the Head Start staff, primary care providers, and children. Policy developments in Head Start will be noted as well as they may influence both the treatment and non-treatment Head Start staff’s usual classroom practices. Campaigns such as 5-A-Day (22) or other related efforts will be assessed if they affect the study sample. Overall, the intervention will focus on the childcare providers and foodservice staff while also trying to incorporate other Head Start services to work with food and nutrition activities. The education efforts for the children will depend heavily on reading time and related classroom activities that incorporate the reading message. Getting children reading-ready is a crucial element of potential future Head Start changes (250). Mealtime will be a critical time for learning and depends heavily on the childcare providers and foodservice staff. Take home materials, classroom decorations, and a center-specific menu will help bridge the center and household on similar nutrition messages and these will hopefully aid in multiple and varied reinforcement of the selected messages. It is critical to note that although these areas seem to be vital in increasing the children’s knowledge, preference, availability, and intake of fruits and vegetables and other healthy foods and eating behaviors, substantial material development and staff training is needed before any positive impact could be implemented, measured, or noticed in the children of most interest.

Although elements of this proposed intervention have been conducted at some level in my exploratory study, the combination and extend of this intervention have not been tried. The team-building and material development phrase will allow the researchers to work with the community further and assess the feasibility of this study. Pending on the community’s interest and funding, the intervention may be tailored. At the most elementary level, nutrition education efforts should
target childcare providers’ mealtime behaviors and classroom reading materials. Assessments of food availability and dietary intake of the children, particularly focusing on fruit and vegetables, are crucial components of any pre and post intervention that should be sought after at the best level that is feasible and affordable.

This study is multi-faceted and requires a tremendous amount of funding, support, and resources. Low-income, inner-city settings face many obstacles and in order to create a successful intervening environment various and multiple outlets need to be drawn together (145). Table 6.2 provides only an estimate of some of the study’s potential costs. The National Institute of Health, specially the National Institute of Child Health and Human Development, would hopefully be interested in funding the project or components of it. The United States Department of Health and Human Services Head Start officers would be contacted for input and asked to help contribute in funding the project. The proposal, particularly the dietary intake and availability assessments, would be sent to the United States Department of Agriculture for research support. Other smaller organizations focused on nutrition education, education, food security, community development, and ethnic and economic health disparities would be sought after for potential funding. Foundations such as the Robert Wood Johnson Foundation would be contacted for interest. Funding is crucial for the most effective intervention, particularly in intervention development, implementation, and evaluation. Given the population of interest is of low socio-economic status, efforts should be made to focus study efforts to be cost-effective and feasible long-term, post-grant funding.
Figure 6.3: A Diagram of a Proposed Head Start Study Intervention.  
This figure illustrates when certain intervention activities will take place while Table 6.1 lists the tasks that fall under each of these activities.  The line use in the activity row indicates the emphasis of study time spent on that particular activity during the specified months.

For Head Start Intervention Site
Activity: Team-Building

Baseline Data Collection

Classroom Reading Intervention

Follow-up Data Collection, Intervention Evaluation

For Non-Intervention Head Start Sample and Non-Head Start Intervention Sample
Baseline Data Collection

Follow-Up Data Collection
Table 6.1: A Listing of the Tasks that are Involved in the Proposed Head Start Study Intervention (Figure 6.3) Activities.

**Team-Building**

*Letters of Agreement* for participating Head Start (intervention and non-intervention centers) Informed Consent, Parental Consent, Child Assent for participating children, primary care providers, childcare providers, and Head Start staff.

*Team-Building activities* for childcare providers, foodservice staff, and participating Head Start administrative staff and in some activities primary care providers. These activities will include lessons on nutrition related topics including how to deal with children who are “picky eaters,” have behavior issues, or a difficult time feeding themselves. The childcare providers will also use these activities to initiate intervention material development. The providers will also work on activities focused on eating external food in the classroom, role modeling, and using the classroom to share food-related stories and lessons with the children.

*Material development and collection* will involve the development or selection of five intervention reading books, take home materials such as coloring books and crayons, classroom decorations specific for reading books, hands-on classroom materials for reading books, flyers to encourage parents to join the study and promote intervention lessons, menu development and lesson integration. Attention will also be focused on study assessment instruments such as availability surveys and assessments of cognitive, behavior, speech, and fine motor skills. Assessment instrument for nutrition knowledge will also need to be developed.

*Project Staff Recruitment and Management* will include efforts to recruit primary care providers and other community members to help with participant recruitment, data collection, and data entry. Efforts will also be made to utilize local university undergraduate as well as graduate students as in-classroom observers and data collectors. Dental students will be asked to perform the dental assessments. Local agencies will be used to conduct the cognitive, behavior, speech, etc. assessments and primarily discussions will be made with them during this time to decide on assessment tools and methods of data collection and analysis. Post-doctorate students and various investigators will also be needed for project development, implementation, and evaluation.
Baseline Data Collection

Childcare providers (intervention group) (n=12) will complete a pre-intervention nutrition knowledge test and qualitative interview. The interview will focus on gathering information on concepts, preference, availability, and intake of fruits and vegetables and other related selected intervention lessons. The interviews will also gather their thoughts on nutrition in the classroom and their ability to conduct these lessons. Childcare providers (n=12) at the non-Head Start centers will complete the same pre-intervention test and interview. Surveys will also be used in both groups to assess child-feeding practices and intake. In-classroom researchers will take observations of pre-intervention mealtime behaviors and curriculum.

Foodservice staff (n=2) at the intervention center will be interviewed pre-intervention on their meal planning skills, connection with the childcare providers and children, and on the selected intervention content. The staff will be asked about their thoughts on the role of food in educating young children and the barriers they face in serving the children and in interacting with the children. Foodservice staff (n=2) at the non-intervention site will also be interviewed.

Participating Head Start administrative staff at the intervention and non-interventions centers will be interviewed pre-intervention and these sessions will focus on their thoughts and needs for nutrition and their connection to the classrooms. Their thoughts on food and nutrition will be assessed.

Children (intervention group, non-intervention Head Start group, non-Head Start group) will all be interviewed multiple times to gather data on their concepts, preference, availability, and intake of fruits and vegetables. Baseline assessments of weight, height, dental caries, cognitive abilities, fine motor skills, speech, and behavior will be made. Blood will be collected to assess iron, lead, and glucose.

Primary care providers of the children interviewed will be interviewed at baseline to assess their concepts, preference, availability, and intake of fruits and vegetables. They will also complete a survey on child-feeding practices and asked about their connection to Head Start. Questions will also focus on their thoughts of how to teach the children about food and nutrition and how they can help in this process.
Table 6.1: A Listing of the Tasks that are Involved in the Proposed Head Start Study Intervention (Figure 6.3) Activities, Continued.

**Classroom Reading Intervention**

The intervention will involve six classrooms. Each classroom will use five selected books to read by one of the childcare providers three times a week. Activities related to the books will need to be implemented at least five times during the week. Take home materials and classroom decorations will be developed by the childcare providers and classroom. Efforts will be made to coordinate between the classrooms and foodservice staff to serve foods discussed in the books during that specified week. A menu will be located outside the door posting these foods and the childcare providers will be instructed to make an effort to discuss the foods, activities, etc. with the primary care providers. In-classroom researchers will observe the childcare providers implementation of the intervention and the children’s reaction to the activities. Observations of mealtime behavior will be taken. Researchers will also note how the primary care providers interacted with the childcare providers during this time and how the primary care providers responded to the activities.

**Follow-up Data Collection**

*Childcare providers* (intervention group) (n=12) will complete a post-intervention nutrition knowledge test and qualitative interview. The interview will focus on gathering information on concepts, preference, availability, and intake of fruits and vegetables and other related selected intervention lessons. The providers will be questioned on their thoughts of nutrition in the classrooms and their ability to conduct these lessons. Childcare providers (n=12) at the non-Head Start centers will complete the same post-intervention test and interview. Surveys will also be used in both groups to assess child-feeding practices and intake. In-classroom researchers will take observations of post-intervention mealtime behaviors and curriculum.

*Foodservice staff* (n=2) at the intervention center will be interviewed post-intervention on their meal planning skills, connection with the childcare providers and children, and on the selected intervention content. Foodservice staff (n=2) at the non-intervention site will also be interviewed. *Participating Head Start administrative staff* at the intervention and non-interventions centers will be interviewed post-intervention and these sessions will focus on their thoughts and needs for nutrition and their connection to the classrooms.
Table 6.1: A Listing of the Tasks that are Involved in the Proposed Head Start Study Intervention (Figure 6.3) Activities, Continued.

Follow-up Data Collection, Continued.

*Children (intervention group, non-intervention Head Start group, non-Head Start group) will all be interviewed multiple times to gather post-intervention data on their concepts, preference, availability, and intake of fruits and vegetables. Follow-up assessments of weight, height, dental caries, cognitive abilities, fine motor skills, speech, and behavior will be made. Blood will be collected to assess iron, lead, and glucose.*

*Primary care providers of the children interviewed will be interviewed at follow-up to assess their concepts, preference, availability, and intake of fruits and vegetables. They will also complete a survey on child-feeding practices and asked about their connection to Head Start. The intervention providers will also discuss their reactions to their child’s involvement in the intervention.*

*All participants will be asked to evaluation the study and, if pertinent, the intervention.*
Table 6.2: A Primarily Proposed Budget for a Proposed Head Start Study Intervention (Figure 6.3).

Statistical Analysis
$60/hr * 15 hr = $900

Data Entry & Analysis, Transcription of Tapes
-$12.00=rate/hour
-1hr interview = 2 hr transcription time
-Number of interviews:
  Childcare providers: 24 * 2 interviews a piece = 48 interviews
  Children: 260 * 3 interviews a piece = 780 interviews
  Primary Care Providers: 180 * 2 interviews a piece = 360 interviews
  Foodservice Staff: 4 * 2 interviews a piece = 8
  Head Start Staff: 10 * 2 interviews a piece = 20

  Total number of interviews: 1,300*
  * 84 extra interviews are factored in to accommodate for varying interview lengths as well as an undetermined interview number.

-1,300 interviews * 2 hr transcription time * $12 rate/hr = $31,200

-Laptops and related equipment and software for data entry and analysis for each staff member and undergraduate assistants (10) = $30,000

Interview Equipment
-Tape recorder: $27.00 * 8 = $216
-Cassette Tapes:
  -One 90 minute cassette will be used for each interview to allow for varying interview time length.
  -1,300 interviews = 1,300 cassette tapes needed
  -Cassette unit price = 20 90 minute cassette tapes for $16.00
  -Units needed = 1,300 interview tapes/ 20 cassettes/unit = 65 units
  -65 units * $16.00 = $1,040

Compensation for Primary Care Providers, Children, Childcare Providers, Head Start Administrative Staff, Research Assistants, and Project Friends
-Each participant or assistant or friend will receive a water bottle ($2.00/piece).
  -1,500 bottles * $2.00 = $3,000

-Childcare Providers, other Head Start Staff, Research Assistants, and Project Friends will each receive a T-shirt these shirts will be wore on days such as height and weight data collection and dental screens.
  -150 T-shirts * $6.00 = $900

-Each primary care provider, childcare provider, foodservice staff, and Head Start administrator at the non-intervention Head Start site will receive a $10 gift certificate to a local grocery store. Efforts will be made to have the store donate these certificates.
  -109 participants * 10 = $1,090

Office Supplies, Material Development (books, hand outs, coloring books and crayons, etc.), Team-building Materials, Survey and Informed Consent Copies, Menu Copies, Notebooks for Observers, Postage, Phone Bill = $20,000
Table 6.2: A Primarily Proposed Budget for a Proposed Head Start Study Intervention (Figure 6.3), Continued.

**Food for Preference Test**
- 478 preference tests * ~$2.00/each = **$1,000**

**Study Measurements**
- Traveling Scales * 3 = **$250**
- Traveling Height Measurement Scales * 3 = **$35**
- Dental Assessments (conducted free by dental students, but assessment tools, paper, and coordination of activity) = **$500**
- Cognitive, Behavior, Speech, Fine Motor Skill Assessments * $75/child * 2 assessments = **$39,000**
- Blood Collection and Analysis (Iron, Lead, and Glucose) $50/child * 2 assessments = **$26,000**
- Twenty-four hour recalls (3 each- pre and post data collection for each participant) at $29.50/a recall = **$41,418**

**Pictures**
- Cameras (digital and still and related printing materials) * 6 = **$1,000**
- Film development, film, batteries, etc. (pictures will be given to the centers, staff, and children) = **$600**

**Collaborators Salary**
- Three Professors * $15,000/yr = **$45,000**
- Two Post-doctorate Fellows * $45,000/year (for three years) = **$90,000**
- Five Graduate Students * $21,000/year (stipend) + $6,300/year (tuition) = **$136,500**

**Conferences**
- Travel, conference registration fees, hotel accommodations, meals, presentation materials, etc. = **$15,000/yr**

**Total Study Costs for Study Period:** **$484,649**
G. Final Thoughts

This study accomplished its three aims:

1) to explore the concepts, preference, availability, and dietary intake of fruits and vegetables in low-income, African American preschoolers who participate in an inner-city Head Start childcare center;

2) to explore the concepts, preference, availability, and dietary intake of fruits and vegetables of the primary care providers (i.e. parents, grandparents, etc.) of the children studied under the first aim; and,

3) to determine the level of shared meaning, preference, availability, and dietary intake of fruits and vegetables between the children studied under the first aim and both their primary care providers (studied under the second aim) and their childcare providers.

The findings generated from each aim were instrumental in enabling me to understand how key constructs and individual groups operate and relate in exploring and describing the role of fruits and vegetables in an inner-city Head Start childcare center. The lessons Head Start children learn about fruits and vegetables are thought to be foundational to lifelong healthy eating patterns. Eating a diet rich in essential nutrients early in life will not only enable normal growth and development but also decrease the risk for nutrition-related health problems such as anemia, growth retardation, obesity, dental caries, and chronic diseases in later life. The study’s theoretical framework provided insight into how understanding how and where young children obtain their nutrition knowledge and develop particular food preferences is essential to preventing future nutrition-related problems. The role of availability and intake are also important. An understanding of how concepts, preference, availability, and intake operate in a child’s primary care provider and childcare provider supplied insightful information. These findings suggest that exploring other constructs and mediating variables in conjunction with this study’s main constructs may facilitate a better understanding of how fruits and vegetables operate in an inner-city Head Start. Further theoretical development and studies are needed. It is my hope that the core purpose of this study comes to fruition in the near future. I look forward to these findings and hypotheses providing subsequent work with a foundation and practical insight into using Head Start as one venue to help provide at-risk children with a healthy head start.

Theoretically, this study started with a model that was informed by Ausubel’s (223) statement that: “The most important single factor influencing learning is what the learner already knows. Ascertain this and teach her/him accordingly.” This experience provides support for the importance of ascertaining baseline information from an individual, household, and community. This study implies that the most successful nutrition education efforts will most likely understand
that Ausubel’s idea of teaching depends on having an established trusting relationship with the learner and her or his support systems. Trust is fundamental as Abraham Lincoln (257) stated: “With public trust everything is possible and without it, nothing is possible.” Learning like trust is a building process and its foundation is the learner. Although trust is crucial to successful nutrition communication, education, and intervening efforts, how to exactly initiate trust building, determine if it is established, or measure it is not well defined. Albert Einstein (257) said that: “Not everything that can be counted counts; not everything that counts can be counted.” His observation was insightful to this qualitative study as critical components to this work such as trust did not schematically receive the attention it merits; yet it was the most essential construct. Nutrition educators should strive to first establish a trusting relationship with an individual, household, or community and then utilize what they have and build with them. In this process, nutrition educators should take more of a supporting role then a lead role. Lao Tzu (258) captures this idea best: “Start with what they know. Build with what they have.” This work lays the foundation for future nutrition efforts in this community. But, it is just one building block and just one step in a dynamic building process. Future work with this community will enable a more effective structure in understanding how fruits and vegetables operate in this community and potentially similar samples and, most importantly, facilitate positive change.
REFERENCES


52. Van het Hof KH, de Boer BCJ, Tijburg LBM, Lucius BRHM, Zijp L, West CE, Hautvast JG AJ, Weststrate JA. Carotenoid bioavailability in humans from tomatoes processed in different ways determined from the carotenoid response in the triglyceride-rich lipoprotein fraction of plasma after a single consumption and in plasma after four days of consumption. *J Nutr*. 2000;130:1189-1196.


APPENDIX A:

Cover Letter and Letter of Agreement with Head Start Childcare Center
Ms.
Nutrition Coordinator
Heat Start

Dear Ms.:

I just want to take this opportunity to thank you for your initial interest and help. As we discussed on the phone and as I explained in my earlier email, I am a nutrition graduate student at Pennsylvania State University, interested in learning more about the influences that affect dietary habits in preschool aged children. Under the supervision of Dr. Cheryl Achterberg, a professor in the Pennsylvania State University Nutrition Department, I will focus my research on the following question: what concepts about food and nutrition do low-income African American preschool children share with their respective single working mothers and childcare providers? In order to effectively grasp the answers to this question, we will utilize a series of three individual interviews with each preschool child (ages 3 to 5 years) and two interviews with each mother and childcare provider. The information these qualitative interviews provide will enable us to learn what, when, where, and how our young children are learning about food and nutrition. Additionally, this study will provide insight about the individuals transferring this knowledge and the conditions that best accomplish it. Our findings will also further theoretical development that may be of interest to investigators in social cognition, family interaction, human development, and nutrition education; specifically, it may help reduce the disproportionate diet-related disease risk that affect low income and African American populations at a high rate.

In order to accomplish our study’s goals, we need your help. In particular, we need you to:

- Help us identify one or two Head Start centers in your region that are willing to participate in our study and each have at least 10 to 12 healthy children who are 3 to 5 years old, low-income, and African American. These children must also have a mother who is currently working.
- Allow me, Sheila Fleischhacker, the study’s primary interviewer, to work at the sites for about four months (January to April, 2002). During January, I will focus on becoming familiar with the centers by observing the children, interacting with the parents and childcare providers, and helping the childcare providers out in any way. Once I feel comfortable at the centers, I will begin recruiting participants for the interviews. The interviews will be conducted on-site at the centers’ convenience. When I am not conducting interviews, I will help out at the centers. All participants and their parents/caregivers will be informed of the study requirements and their rights as study participants. The mother must provide written parental consent for her child to participate and the child must express a verbal interest in the study in the presence of the parent. All study procedures have been approved by the Pennsylvania State University Institutional Review Board, which focuses on the treatment of Human Subjects in Research.
Provide the space for me to interview the children. These interviews will be conducted at the centers’ convenience. In respect to the study participants, the interviews must be in a room that is private. The childcare centers will be compensated for their efforts in accommodating the interviews. Compensation for the centers will entail a one hundred dollar donation to the center at the end of the study. The childcare providers who are involved in the interview process will receive ten dollars cash plus a basic nutrition education lesson at the end of their participation. The children who participate will each receive a gift of an approximate monetary value of ten dollars at their last interview while each child’s mother who participates will receive ten dollars cash at the end of her interviews. Both the child and mother will also receive some basic nutrition education at the conclusion of the study.

Identify and help me recruit appropriate mothers, children, and childcare providers for the study. Primarily, I will discuss the study with potential childcare providers and mothers while working at the centers. If necessary, the centers will approve me to post flyers at the center, enclose a study description in the center’s newsletter (if available), and provide the child’s phone number to call home to discuss the study with the child’s parent.

If you are capable of fulfilling our study requests and choose to participate in our study, we will provide you with a summary of our study’s findings. Also, as previously described, the centers we will work with as well as the children, mothers, and childcare providers who participate will be compensated for their time and effort. At the conclusion of the study (not prior as it might bias the study), I will provide basic nutrition education to the study participants.

If you have any questions, comments, or concerns at this point or at any point during or after the study, please feel free to contact me at (814) 360-5737 or flyluxc00@hotmail.com.

If you are capable of fulfilling our study requests and choose to participate, please sign the letter of agreement and mail it back to us as soon as possible.

Ms., I again thank you for your interest and help thus far. I hope this letter provides you with additional background information on our study as well as gives you a clear idea of what your participation in it entails. I look forward to working with you!

Sincerely,

Sheila Fleischhacker

cc: Cheryl Achterberg, Ph.D.
Letter of Agreement
The Pennsylvania State University, Department of Nutrition
Fleischhacker and Achterberg
Food and Nutrition in Young Children

In order to participate in Fleischhacker and Achterberg’s study, Food and Nutrition in Young Children, the responsible parties agree to the following:

• Support Fleischhacker and Achterberg’s study design and treatment of study participants. Their design and treatment is supported and governed by the Pennsylvania State University Institutional Review Board.

• Help us identify one or two Head Start centers in your region that are willing to participate in our study and each have at least 10 to 12 healthy children who are 3 to 5 years old, low-income, and African American. These children must also have a mother who is currently working.

• Allow the study’s primary interviewer, Sheila Fleischhacker, to work at the sites for about four months (January to April, 2002). During January, Sheila will focus on becoming familiar with the centers by observing the children, interacting with the parents and childcare providers, and helping the childcare providers out in anyway. Once Sheila feels comfortable at the centers, she will begin recruiting participants for her interviews. The interviews will be conducted on-site at the centers’ convenience. When Sheila is not conducting interviews, she will help out at the centers. All participants will be informed of the study requirements and their rights as study participants. In order to participate, each study participant must sign an informed consent form. The mother must give parental consent for her child to participate and the child must express a verbal interest in the study in the presence of the parent. All study procedures have been approved by the Pennsylvania State University Institutional Review Board, which focuses on the treatment of Human Subjects in Research.

• Provide the space for Sheila to interview the children. These interviews can be conducted at the centers’ convenience. In respect to the study participants, the interviews must be in a room that is private. The childcare center will be compensated for their efforts in accommodating the interviews. Compensation for the centers will entail a one hundred dollar donation to the center at the end of the study. The childcare providers who are involved in the interview process will receive ten dollars cash plus a basic nutrition education lesson at the end of their participation. The children who participate will each receive a gift of an approximate monetary value of ten dollars at their last interview while each child’s mother who participates will receive ten dollars cash at the end of her interviews. Both the child and mother will also receive some basic nutrition education at the conclusion of the study.

• Identify and help Sheila recruit appropriate mothers, children, and childcare providers for the study. Primarily, Sheila will discuss the study with potential childcare providers and mothers while working at the centers. If necessary, the centers will approve Sheila to post flyers at the center, enclose a study description in the center’s newsletter (if available), and provide the child’s phone number to call home to discuss the study with the child’s parent.
If you are capable of fulfilling our study requests and choose to participate in our study, we will provide you with a summary of our study’s findings. Also, as previously detailed, the centers we will work with as well as the children, mothers, and childcare providers who participate will be compensated for their time and effort. At the conclusion of the study (not prior as it might bias the study), Sheila will provide basic nutrition education to the study participants.

If you have any questions, comments, or concerns at this point or at any point during or after the study, please feel free to contact Sheila Fleischhacker at (814) 360-5737 or flyluxc00@hotmail.com.

I am capable of fulfilling the previously listed study requirements and agree to participate in this study.

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APPENDIX B:

Introductory Letter to Head Start Primary Care Providers and Staff
Principal Investigator:
Sheila Fleischhacker, B.S.
Nutritional Sciences Fellow
Pennsylvania State University
Life Sciences Consortium
514 Wartik
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sfl153@psu.edu
814-360-5737

Co-Investigator:
Cheryl Ackerberg, Ph.D.
Dean of the Honors College and Professor of Nutrition
Pennsylvania State University
Schreyer Honors College
10 Schreyer Honors College
University Park, PA, 16802-3905
Phone: (814) 865-2631
Fax: (814) 865-9900

Dear Head Start Parents and Primary Care Providers,

Hello, my name is Sheila Fleischhacker. I am a graduate student at Penn State University. I am studying nutrition. The project I am working on focuses on young children. From January to August, I will be working at the Head Start Learning Tree. I will be working with all six classrooms. I will also be helping out Ms. ...., the Nutrition Specialist. While I am working at the center, I will be inviting you and your child to participate in my study. My study is trying to evaluate how young children like yours think about food. It is part of a Pennsylvania State University Department of Nutrition research project. By participating, you will help our research team.

I will try to discuss the study further with you when you come to drop-off and pick-up your child. I will also briefly discuss it at future center meetings. If you are interested in learning more about the study or have any questions, please feel free to reach me at the center or by phone (814) 360-5737. I look forward to getting to know all of you better and appreciate your time and effort in helping me with my project.

Sincerely,

Sheila Fleischhacker

College of Health and Human Development
An Equal Opportunity University
APPENDIX C:

Parental Informed Consent Form with Assent Statement
Your child is invited to participate in a study to evaluate food and nutrition in young children as part of a Pennsylvania State University Department of Nutrition research project. In order to encourage healthy eating in tomorrow’s adult and reduce the risk of developing diseases related to diet such as heart disease and cancer that low-income and African American populations endure at a high rate, this project aims to understand what, when, where, and how our young children are learning about food and nutrition. The individuals transferring this knowledge and under what conditions they are capable of accomplishing it is also critical. By having your child participate in three to four individual interviews that will each take approximately twenty minutes, your child will help our research team to conduct an in-depth analysis of what meanings about food and nutrition young children share with their respective primary care provider and childcare provider.

Your child is being recruited to participate in this study because he/she is a healthy, 3 to 5 year old child who attends Head Start.

If you decide to let your child participate, your child’s participation in this study includes completing:

- this Informed Consent Form (this will be completed by you, the primary care provider),
- three to four individual interviews on three different days. Each interview should take approximately twenty minutes. The content of these interviews will focus on basic food and nutrition questions such as what is a meal. The child will also be asked to pick out foods he or she eats, to discuss his or her food preferences, and to sort pictures of food. The activities your child will participate in during the three to four interviews are designed for young children and should be a fun experience. If your child becomes disinterested in the interviews, the session will be ended. The
research team will then work with you, your child, and the childcare center to reschedule another interview session in order to finish the interview questions. If your child continues to demonstrate disinterest in the study, we will end the interviews and your child’s participation in the study. Your child will receive a gift for the time he or she did contribute to the study. Since your child’s interviews must be completed before your interviews, if your child’s participation in the study is ended, you will not be interviewed and, as a result, will not receive reimbursement for your participation. These interviews will be tape-recorded.

Your child’s name will not be on the tapes. The tapes will be labeled by a random code and stored in a locked cabinet in the Penn State University Nutrition Center. Only a limited number of researchers and a trained transcriber will hear these tapes. A transcriber is an individual that listens to the recorded versions of your child’s interview and transfers what is said on the tapes to a typed copy of the interview. This typed copy will be the only source of your child’s interview responses that will be used in the data analysis process, which only a limited number of researchers will have access to. Once the tapes have been transcribed and the data is analyzed, all of your child’s tapes will be destroyed. This date should be by May 2005. Depending on the childcare schedule and the child’s disposition, we aim to conduct the three to four interviews within a three-week time span. The interviews will occur while your child is at the childcare center. They will not take place unless the child agrees via a positive response to the assent statement to be interviewed each time. The assent statement is written below and will be verbally said to your child before each interview to insure that your child wants to participate in each of the interviews.

I understand that:

- my child’s participation in any Head Start or government funded activities will not change in any way,
- no one, aside from the researcher and a limited number of research assistants will see my child’s interview responses,
- my child’s responses will remain confidential and reported only as part of a group,
- my child can decline to answer a specific question,
- my child’s participation is voluntary and I am free to withdraw my consent and stop his/her participation at any time.

At the discretion of the principal investigator, your child’s participation can be ended due to unexpected situations. Possible reasons for ending a subject’s participation in this study include failure to follow study instructions such as repeated absences from interviews. Ending your child’s participation can also occur if he or she demonstrates repeated disinterest in the study or you or the childcare provider is taken out of the study.

There are no known risks or discomforts associated with participating in this study but this study will take time and requires personal information. If the researcher discovers issues such as child abuse or an eating disorder, the appropriate parties will be notified.

By participating in this study, your child might gain a sense of how he or she thinks about food and how his or her nutrition knowledge and attitudes possibly relates with his or her primary care provider and childcare provider. In addition, your child will have the opportunity to receive some basic nutrition advice from nutrition experts. This will be available at the conclusion of the study and not prior to avoid bias in reporting during the study period or influence your child’s responses.
to our interview questions. Once your child has completed his or her three to four interviews, your child will receive a gift that will value approximately $10. Your childcare center as well as you, the child’ primary care provider, will also be compensated or rewarded for your involvement in this study.

In order to maintain confidentiality, we will randomly select code numbers to represent your child’s tapes, your child’s interview transcripts, and any other notes we make that contains your child’s information or regards your child. These numbers will only be attached to your child’s name, address, and contact information so that we can arrange interview times and locations. Your child’s name will not be connected with his or her data. Only a limited number of research personnel will have access to your child’s data.

Your signature indicates that you are 18 years of age or older and have read and understand the above information, that you have been informed of the study’s purpose and what your and your child’s participation in it requires, that you have discussed this study with the principal investigator and/or her staff and during this time you asked and received answers for any questions you had regarding this study and yours as well as your child’s involvement in it, that you have decided to participate based on the information provided, and that a copy of this form has been given to you. If you have any other questions or concerns regarding the rights of research participants, please feel free to call the Pennsylvania State University Office for Research Protections at 814-865-1775.

Primary Care Provider of Participant Signature_______________________ Date:______  
Witness’ Signature______________________________________Date:______________

Assent Section

At this time, the study details and the requirements of participation have also been explained to the child in the presence of the primary care provider before any interviews of the child, primary care provider, or childcare provider have occurred. This information will be explained as follows to the child:

Would you like to work with Ms. Sheila (they will be familiar with Sheila since she will be working for over a month at the center before she begins recruiting)? If you want to work with her, you will look at pictures of food and group them in your our way. You will also be asked questions about food and nutrition and what you like to eat. You can chose not to answer a question if you do not want to and you can stop working with Ms. Sheila at any time you want to. Would you like to do this? You will work with Ms. Sheila for about three to four times. Each time you will work with Ms. Sheila in a room at the childcare center for about twenty minutes. If you are acting out or not working well with Ms. Sheila, Ms. Sheila will end the questioning. Are you interested in working with Ms. Sheila? Your answers to Ms. Sheila’s questions will be tape-recorded on this machine (Sheila will show them the machine and Sheila will ask the child to speak and then listen to themselves on the tape-recorder). Do you mind if your answers are tape-recorded? What is on this tape and what you tell Ms. Sheila will only be heard by a few people interested in your thoughts on food and nutrition and the thoughts of food and nutrition of children like you. Do you mind if a few people besides Ms. Sheila hear your answers to the questions Ms. Sheila will ask you? Your primary care provider ______ (mother, father, name will be used) has said it is okay to work with Ms. Sheila (the child will only be asked if the primary care provider agrees thus far for their child to participate. The primary care provider may decide to change their mind after hearing the assent statement.).
At this time, the researcher will note the child’s response to the assent statement by circling if the child agreed or disagreed to participate in the study. Each question asked during the assent statement must be agreed upon by the child in order for the child to participate in the study and only full agreement to all the questions will receive an agreed response circled below. Each time Sheila will interview a child she will verbally go through the assent statement and only interview the child if the child expresses an interest in doing so. If the child does not want to do the interview on a given day, Sheila will try on another day. If the child repeatedly does not want to interview even though they expressed interest during the parental consent procedure or after one or two interviews, their participation will be ended from the study.

Child verbally expressed (researcher will circle the response given by the child):

Agree

Disagree

The primary care provider will be present when the researcher asks for the child’s response from the assent statement the first time and the child will not be asked unless the primary care provider has given prior parental consent. During the three or more interviews, the primary care provider will not be present but the assent statement which the primary care provider has now heard be stated to his/her child and has in a written form will be stated at the beginning of each of the child’s interviews.
APPENDIX D:

Informed Consent Form for Primary Care Provider
Concepts of Food in Young Children
Pennsylvania State University Institutional Review Board 01B0722
Informed Consent for the Primary Care Provider

Principal Investigator:
Sheila Fleischhacker, B.S.
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sef153@psu.edu
814-360-5737

Co-Investigator:
Cheryl Achterberg, PhD.
Dean of the Honors College and Professor of Nutrition
Pennsylvania State University
Schreyer Honors College
10 Schreyer Honors College
University Park, PA, 16802-3905
Phone: (814) 865-2631
Fax: (814) 865-9900

You are invited to participate in a study to evaluate food and nutrition in young children as part of a Pennsylvania State University Department of Nutrition research project. In order to encourage healthy eating in tomorrow’s adult and reduce the risk of developing diseases related to diet such as heart disease and cancer that low-income and African American populations endure at a high rate, this project aims to understand what, when, where, and how our young children are learning about food and nutrition. The individuals transferring this knowledge and under what conditions they are capable of accomplishing it is also critical. By participating in one individual interview that will take approximately one hour, you will help our research team to conduct an in-depth analysis of what meanings about food and nutrition young children share with their respective primary care provider and childcare provider.

You are being recruited to participate in this study because you are a primary care provider, i.e. mother, father or someone who is a significant caretaker for the child participating in this study and who is older than 18 years of age.

If you decide to participate, your participation in this study includes completing:

- this Informed Consent Form;
- three questionnaires. One asks for your basic background information such as where you grew up and where you currently work. It also asks questions regarding food and nutrition. Another asks about your consumption of fruits and vegetables. The third focusing on your child feeding practices. All of the questionnaires will be completed during the one hour interview;
- one individual interview. The interview should take approximately one hour. The content of this interview will focus on basic food and nutrition questions. This interview will be tape-recorded. Your name will not be on the tape. The tape will be labeled by a random code and stored in a locked cabinet in the Penn State University Nutrition Center. Only a limited number of researchers and a trained transcriber will
hear this tape. A transcriber transfers the interview from the tapes to a written
document. The written form of the interview will then be the only record of the
interview that will be used in the study’s further research. Once the tapes have been
transcribed and the data is analyzed, all of your tapes will be destroyed. This date
should be by May 2005. The interview will take place at the childcare center; unless
you prefer your home or a local library.

I understand that:

- my participation in any Head Start or government funded activities will not change in
  any way,
- no one, aside from the researcher and a limited number of research assistants will see
  my questionnaires and interview responses,
- my responses will remain confidential and reported only as part of a group,
- I can decline to answer a specific question,
- my participation is voluntary and I am free to withdraw my consent and stop
  participation at any time.

At the discretion of the principal investigator, your participation in the study can end due to
unexpected situations. Possible reasons for ending a subject’s participation in the study include
failure to follow study instructions such as repeated absences from interviews. Ending your
participation in the study can also occur if your child demonstrates repeated disinterest in the
study or the childcare provider is taken out of the study.

Your involvement in this study will not affect your government assistance or work status.
However, if the research team observes issues such as child abuse or an eating disorder, this
information will be shared with the appropriate parties. There are no known risks or discomforts
associated with participating in this study but this study will take time and requires personal
information.

By participating in this study, you might gain a sense of how you think about food and how your
nutrition knowledge and attitudes possibly relates with your child and her or his childcare
provider. In addition, you will have the opportunity to receive some basic nutrition advice from
nutrition experts. This will be available at the conclusion of the study and not prior to avoid bias
in reporting during the study period or influence your responses to our interview questions. All
travel and childcare needed during your interviews will be reimbursed or paid for by the study.
Once you have completed your interview, you will receive a gift certificate for $10 to be used at a
local store. Your child along with the childcare center your child attends will also receive
compensation such as a gift or financial payment for your involvement in this study.

In order to maintain confidentiality, we will randomly select code numbers to represent your
questionnaires, your tapes, your interview transcripts, and any other notes we make that contains
your information or regards you. These numbers will only be attached to your name, address, and
contact information so that we can arrange interview times and locations. Your name will not be
connected with your data. Only a limited number of research staff will have access to your data.

Your signature demonstrates that you have read and understand the above information, that you
have been informed of the study’s purpose and what your participation in it requires, that you
have discussed this study with the principal investigator and/or her staff and during this time you
asked and received answers for any questions you had regarding this study and your involvement
in it, that you have decided to participate based on the information provided, and that a copy of this form has been given to you. If you have any further questions or concerns regarding the rights of research participants, please call the Pennsylvania State University Office for Research Protections at 814-865-1775.

Participant’s Signature___________________________________Date:______________
Witness’ Signature______________________________________Date:______________
APPENDIX E:

Informed Consent Form for Childcare Provider
You are invited to participate in a study to evaluate food and nutrition in young children as part of a Pennsylvania State University Department of Nutrition research project. In order to encourage healthy eating in tomorrow’s adult and reduce the risk of developing diseases related to diet such as heart disease and cancer that low-income and African American populations endure at a high rate, this project aims to understand what, when, where, and how our young children are learning about food and nutrition. The individuals transferring this knowledge and under what conditions they are capable of accomplishing it is also critical. By participating in one individual interview that will take approximately one hour, you will help our research team to conduct an in-depth analysis of what meanings about food and nutrition young children share with their respective primary care provider and childcare provider.

You are being recruited to participate in this study because you are a healthy childcare provider who is older than 18 years of age and has a child or children in your center participating in this study.

If you decide to participate, your participation in this study includes completing:

- this Informed Consent Form;
- three questionnaires. One of which asks for your basic background information such as where you grew up and how long you have worked at the childcare center. It also asks questions regarding food and nutrition. The second ask about your fruit and vegetable consumption. The third ask questions about your child feeding practices. All questionnaires will be completed within the one hour interview;
- one individual interview. This interview should take approximately one hour. The content of this interview will focus on basic food and nutrition questions. The interview will be tape-recorded. Your name will not be on the tape. The
tape will be labeled by a random code and stored in a locked cabinet in the Penn State University Nutrition Center. Only a limited number of researchers and a trained transcriber will hear these tapes. A transcriber is an individual that will listen to the tapes and transfer the information on the tape into a written document. Only the written form will be used in data analysis. Once the tapes have been transcribed and the data is analyzed, all of your tapes will be destroyed. This date should be by May 2005. The interviews will take place at the childcare center; unless your home or a local library is more convenient.

I understand that:

- my participation and role in any Head Start or government funded activities will not change in any way,
- no one, aside from the researcher and a limited number of research assistants will see my questionnaires and interview responses,
- I can decline to answer a specific question,
- my responses will remain confidential and reported only as part of a group,
- my participation is voluntary and I am free to withdraw my consent and stop participation at any time.

At the discretion of the principal investigator, your participation can end due to unexpected situations. Possible reasons for ending a subject’s participation in this study include failure to follow study instructions such as repeated absences from interviews. Ending your participation in this study can also occur if your child demonstrates repeated disinterest in the study or their primary care provider is taken out of the study.

Your involvement in this study will not affect your work status. However, if the research team observes issues such as child abuse or an eating disorder, this information will be shared with the appropriate parties. There are no known risks or discomforts associated with participating in this study but this study will take time and requires personal information.

By participating in this study, you might gain a sense of how you think about food and how your nutrition knowledge and attitudes possibly relates with your child and her or his primary care provider. In addition, you will have the opportunity to receive some basic nutrition advice from nutrition experts. This will be available at the conclusion of the study and not prior to avoid bias in reporting during the study period or influencing your responses to the study questions. All travel and childcare needed or work responsibilities you miss during your interviews will be reimbursed and/or taken care of by the study. Once you have completed your two interviews, you will receive a gift certificate for $10 to be used at a local store. Your childcare center will also be compensated or rewarded for your involvement in this study.

In order to maintain confidentiality, we will randomly select code numbers to represent your questionnaires, your tapes, your interview transcripts, and any other notes we make.
that contents your information or regards you. These numbers will only be attached to your name, address, and contact information so that we can arrange interview times and locations. Your name will not be connected with your data. Only a limited number of research staff will have access to your data.

Your signature indicates that you have read and understand the above information, that you have been informed of the study’s purpose and what your participation in it requires, that you have discussed this study with the principal investigator and/or her staff and during this time you asked and received answers for any questions you had regarding this study and your involvement in it, that you have decided to participate based on the information provided, and that a copy of this form has been given to you. If you have any other questions or concerns regarding rights of research participants, please contact the Pennsylvania State University Office for Research Protection at 814-865-1775.

Participant’s Signature___________________________________ Date:______________
Witness’ Signature______________________________________ Date:______________
APPENDIX F:

Pilot Study Materials
that were Subsequently Revised for Primary Data Collection
### Pilot Study Food Pictures
A list of the pictured food items that will be presented to each study participant for sorting and/or classification.

<table>
<thead>
<tr>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple (red delicious)</td>
<td>Fruit flavored drink (orange</td>
</tr>
<tr>
<td></td>
<td>flavored)</td>
</tr>
<tr>
<td>Apple sauce</td>
<td>Greens</td>
</tr>
<tr>
<td>Banana</td>
<td>Orange</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Orange juice</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>Peaches (canned)</td>
</tr>
<tr>
<td>Corn</td>
<td>Salad (garden salad)</td>
</tr>
<tr>
<td>French fries</td>
<td>Soda pop (orange flavored)</td>
</tr>
<tr>
<td></td>
<td>Sweet potatoes</td>
</tr>
<tr>
<td>Item</td>
<td>Basis for Selection as Interview Props</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Apple</td>
<td>Part of the fruit food group; low nutrient density; crisp texture; deep red color; plant food; low in calories; turns brown quickly.</td>
</tr>
<tr>
<td>Apple sauce</td>
<td>Part of the fruit group; high in sugar; brownish color; served in bowl or fruit snack cup.</td>
</tr>
<tr>
<td>Banana</td>
<td>Part of the fruit group; high in potassium. Can range in color from green to yellow to brown depending on ripeness.</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Part of the vegetable group. High in a number of vitamins and minerals. Green in color. Served either cooked or raw. Served occasionally at the childcare center.</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>Part of the vegetable food group; low nutrient density; crisp texture; deep orange color; plant food; low in calories.</td>
</tr>
<tr>
<td>Corn</td>
<td>Part of the vegetable food group. Very high in starch. Yellow in color. Can be served a variety of ways such as cream corn, corn on the cob, etc. or in or with a variety of foods such as cornbread.</td>
</tr>
<tr>
<td>French fries</td>
<td>Part of the vegetable group; high in fat; usually purchased at fast food restaurants; usually eaten with ketchup.</td>
</tr>
<tr>
<td>Fruit flavored drink (orange)</td>
<td>Part of the sugars and fat group; high in sugar; can be served in a glass or juice box.</td>
</tr>
<tr>
<td>Greens</td>
<td>Part of the vegetable group. Green in color. A common vegetable among African American populations.</td>
</tr>
<tr>
<td>Orange</td>
<td>Part of the fruit group; can also be juice; orange color; needs to be peeled first.</td>
</tr>
<tr>
<td>Orange juice</td>
<td>Part of the fruit group; orange; usually eaten at breakfast.</td>
</tr>
<tr>
<td>Peaches (canned)</td>
<td>Part of the fruit group; orange color; processed; high in sugar content; low in calories; unique shape.</td>
</tr>
</tbody>
</table>
Rationale for Selected Food Cards Used in Children’s Interviews for Pilot Study, Continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Basis for Selection as Interview Props</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salad (garden salad)</td>
<td>Lettuce is part of the vegetable group. It is dark green. Crispy. Tomato is part of the fruit group. Other vegetables such as cucumbers are in the picture. Salad is usually served with dressing. Wanted iceberg lettuce but used the picture available.</td>
</tr>
<tr>
<td>Soda pop (orange flavored)</td>
<td>Part of the sugar and fat group; can come in a variety of flavors; high in sugar; can be served in a glass, bottle, or can.</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>Part of grain group. Can be served with or without skin. It can be fresh or canned. It can be served in a variety of forms such as mashed or boiled. Common food in African American culture.</td>
</tr>
</tbody>
</table>
Pilot Questions for Children’s Interviews

Child’s #1

Date________________
Respondent__________
Code_______________

Intro

Questions 1 and 2 will be asked using about 20 pictures of animals, cars and toys.

1) Do you know what these are? What are things in the pictures? (one by one)
2) Do you know how to make groups? Can you sort these into any groups that make sense to you? What goes together? Can you put these pictures together?

*If the participant was unable to come up with groups, the interviewer will coach them on how to make groups of animals, things that are yellow, etc..

Now, we will put the pictures of that we used for question 1 and 2 away and pull out the pictures of the 15 food items

3) Using the pictures of the food, we will repeat question number one.
4) Using the pictures of the food, we will repeat question number two.
5) (if needed) Can you name these groups?

What’s your favorite thing to eat or drink?

Okay, let’s look at the cards again.
Which foods here are fruits?
What are fruits?
Where do fruits come from?
Do you eat fruit?
When do you eat fruits?
Where do you eat fruits?
Do you eat fruits with other foods? If so, which ones?
Are fruits healthy or not healthy for you?
What do fruits do for the body?
Which foods here are vegetables?
What are vegetables?

Where do vegetables come from?
Do you eat vegetables?
When do you eat vegetables?
Where do you eat vegetables?
Do you eat vegetables with other foods? If so, which ones?
Are vegetables healthy or not healthy for you?
What do vegetables do for the body?

Thank you.
Food preference will be determined at this time using a modified version of Birch (1979 and 1991). See Attached. The foods that we will assess are listed in the food section.

Thank you.
Pilot Questions for Primary Care Providers and Childcare Providers Interviews

Primary Care Provider/Childcare Provider #1

Date______________
Respondent_________
Code______________

First, the interviewer will read and fill out the following questionnaires with the study participants: 1) basic demographics, 2) NCI 5-A-Day Fruit and Vegetable FFQ, 3) Birch’s Children Feeding Questionnaire, 4) Availability of the 15 Food items (Primary care provider only).

What are fruits and vegetables?

Which foods here are fruits?
What are fruits?
Where do fruits come from?
Do you eat fruit?
When do you eat fruits?
Where do you eat fruits?
Do you eat fruits with other foods? If so, which ones?
Are fruits healthy or not healthy for you?
What do fruits do for the body?
Do you buy fruits? If so, where do you buy them? If not, what prevents you from buying fruits?

Which foods here are vegetables?
What are vegetables?
Where do vegetables come from?
Do you eat vegetables?
When do you eat vegetables?
Where do you eat vegetables?
Do you eat vegetables with other foods? If so, which ones?
Are vegetables healthy or not healthy for you?
What do vegetables do for the body?
Do you buy vegetables? If so, where do you buy them? If not, what prevents you from buying vegetables?

Which foods here are vegetables?

Thank you.
Intro

Do you cook? Do you like to eat?

What things are of greatest concern to you about your child’s eating? Why?

What things are of greatest concern about your child’s nutritional status? Why? (pickiness, food allergies, medical problems, “diets”)

When you have a problem, who do you turn to for help? What do you do?

Where do you learn about food and nutrition? Where do you learn about fruits and vegetables?

What do you think (your child) should be taught about food and nutrition? Who should teach him/her? How? When?

How do you think you child learns about food and nutrition? What is the child’s role? What is the parent’s role? What is the childcare center’s role?

During this interview, we will also conduct the food preference section of our study. For details refer to Methods section or Birch (1979,1991).

By the way, where are you from? How long have you been here? What brought you here? Education?
Concepts of Food in Young Children
Participant Information for Primary Care Provider

1. Age:_____

2. Ethnicity:__________________________________________________________

3. Martial Status:______________________________________________________

4. How many children do you have? ___ How old are they? __________________
________________________________________________________________________

5. Are you the primary care provider for ____________ (insert name)? ________
________________________________________________________________________

6. How many times does _______ (insert name) eat in a given day?_______

7. Typically, what times does _______ (insert name) eat?_____________________
________________________________________________________________________

8. Does _______ (insert name) tend to skip meals?  yes or no  If yes, which meal(s) does he/she skip, miss, etc.? 
________________________________________________________________________

9. Is ___________ (insert name) a vegetarian?  yes or no

10. When does _____________(insert name) eat her/his biggest meal of the day?___
________________________________________________________________________

11. Does __________(insert name) snack?  yes or no  If yes, when, how often and what kinds of foods?
________________________________________________________________________

12. Does ___________ (insert name) drink soda?  yes or no  If yes, how much, when and what kind ________________________________________________
________________________________________________________________________

13. Does ____________ (insert name) drink coffee?  yes or no  If yes, how much and when ________________________________________________
________________________________________________________________________

14. Is __________(insert name) “lactose intolerant”?  yes or no (probed as needed)
15. Does _______(insert name) help you prepare meals at all? yes or no  If yes, please describe______________________________________________________________
____________________________________________________________________
____________________________________________________________________
16. Do you modify or restrict ________(insert name) food intake in anyway? yes or no  If yes, please describe
____________________________________________________________________
17. Do you modify or restrict food intake in anyway of your other children? yes or no  If yes, please describe______________________________
____________________________________________________________________
18. How many hours do you work a week? _____________________________
19. What time of day and what days of the week do you work? Please describe________________________________________________________
____________________________________________________________________
20. Do you receive government assistance? Yes or no  If yes, please explain when you started to receive government assistance and which types of assistance you are currently receiving such as food stamps or welfare ________________________________________________________________
Concepts of Food in Young Children
Participant Information for Childcare Provider

1. Age:_____

2. Ethnicity:__________________________________________________________

3. What things would you like to learn about food and nutrition? ________________
   _____________________________________________________________________
   _____________________________________________________________________

4. What do you think are the best ways to learn about food and nutrition? _______
   _____________________________________________________________________

5. What do you think your children at the center should know or be taught at this point about food and nutrition? ____________________________
   _____________________________________________________________________

6. What do you think are the best ways to teach your children at the center about food and nutrition? ____________________________
   _____________________________________________________________________

7. Please describe your teaching style_____________________________________
   _____________________________________________________________________
APPENDIX G:

Food List and Rationale for Using These Foods
for the Primary Data Collection
**Primary Data Collection Food Pictures**

A list of the pictured food items that will be presented to each study participant for sorting and/or classification.

<table>
<thead>
<tr>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple (red delicious)</td>
<td>Greens</td>
</tr>
<tr>
<td>Banana</td>
<td>Orange</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Peas</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>Peaches (canned)</td>
</tr>
<tr>
<td>Corn</td>
<td>Salad (iceberg lettuce with carrot and cabbage)</td>
</tr>
<tr>
<td>French fries</td>
<td>Grapes (green)</td>
</tr>
</tbody>
</table>
Rationale for Selected Food Cards Used in Children’s Interviews for Primary Data Collection

<table>
<thead>
<tr>
<th>Item</th>
<th>Basis for Selection as Interview Props</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple (red)</td>
<td>Part of the fruit food group; low nutrient density; crisp texture; deep red color; plant food; low in calories; turns brown quickly.</td>
</tr>
<tr>
<td>Banana</td>
<td>Part of the fruit group; high in potassium. Can range in color from green to yellow to brown depending on ripeness.</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Part of the vegetable group. High in a number of vitamins and minerals. Green in color. Served either cooked or raw. Served occasionally at the childcare center.</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>Part of the vegetable food group; low nutrient density; crisp texture; deep orange color; plant food; low in calories.</td>
</tr>
<tr>
<td>Corn</td>
<td>Part of the vegetable food group. Very high in starch. Yellow in color. Can be served a variety of ways such as cream corn, corn on the cob, etc. or in or with a variety of foods such as cornbread.</td>
</tr>
<tr>
<td>French fries</td>
<td>Part of the vegetable group; high in fat; usually purchased at fast food restaurants; usually eaten with ketchup.</td>
</tr>
<tr>
<td>Greens</td>
<td>Part of the vegetable group. Green in color. A common vegetable among African American populations.</td>
</tr>
<tr>
<td>Grapes (green)</td>
<td>Part of the fruit group. Can be green or purple. Found to be a commonly eaten fruit among sample.</td>
</tr>
<tr>
<td>Orange</td>
<td>Part of the fruit group; can also be juice; orange color; needs to be peeled first.</td>
</tr>
<tr>
<td>Peas</td>
<td>Part of the vegetable group. High in starch. Can be canned, frozen or fresh. Green in color. Sometimes mixed with other vegetables or foods. Found to be a common vegetable among the sample.</td>
</tr>
</tbody>
</table>
### Rationale for Selected Food Cards Used in Children’s Interviews for Primary Data Collection, Continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Basis for Selection as Interview Props</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peaches (canned)</td>
<td>Part of the fruit group; orange color; processed; high in sugar content; low in calories; unique shape.</td>
</tr>
<tr>
<td>Salad (iceberg lettuce and tomato)</td>
<td>Iceberg lettuce is part of the vegetable group. It is light green. Crispy. Tomato is part of the fruit group. It can range in color depending on ripeness. Salad is usually served with dressing.</td>
</tr>
</tbody>
</table>
APPENDIX H:

Children’s Interview Questions for Primary Data Collection
Interview Questions

Child’s #1

Intro

Questions 1 will be asked using about 6-10 pictures of animals, cars and toys.
   6) Do you know what these are? What are things in the pictures? (one by one)

Now, we will put the pictures that we used for question number 1 away and pull out the pictures
    of the 12 food items
   7) Using the pictures of the food, we will repeat question number one.

If necessary, the child will be probed on whether they eat the foods or not and/or if someone they
know eats it.

What’s your favorite thing to eat or drink?

Thank You.
Interview Questions

Child’s #2

Date________________
Respondent_________
Code________________

Do you remember these cards? Would you like to play with them again?

Which foods here are fruits?
What are fruits?
Where do fruits come from?
Do you eat fruit?
Where do you eat fruits? At the center, home…
When do you eat fruits? At the center, home…
Do you eat fruits with other foods? If so, which ones?
Are fruits healthy or not healthy for you?
What does healthy mean?
What do fruits do for the body?

Which foods here are vegetables?
What are vegetables?
Where do vegetables come from?
Do you eat vegetables?
Where do you eat vegetables? At the center, home…
When do you eat vegetables? At the center, home…
Do you eat vegetables with other foods? If so, which ones?
Are vegetables healthy or not healthy for you?
What do vegetables do for the body?

Are fruits and vegetables different? If so, how are they different?

Can you tell me about what you do at breakfast? Can you tell me about what you do at lunch?
Can you tell me what you do at dinner?

Thank you.
Intro

Food preference will be determined at this time using a modified version of Birch (1979 and 1991). See Attached. The foods that we’ll assess are listed in the food section.

Thank you.
APPENDIX I:

Primary Care Providers and Childcare Providers’ Interview Questions
for Primary Data Collection
We will first conduct Birch’s Food Preference exercise with 12 foods.

Using the 12 food pictures, the participants will be asked the following questions:

Which foods here are fruits?
What are fruits?
Where do fruits come from?
Do you eat fruit?
Where do you eat fruits?
When do you eat fruits?
Do you eat fruits with other foods? If so, which ones?
What do fruits do for the body?
Are fruits healthy or not healthy for the body?
If they say fruits are healthy, I will ask where they heard this from and if it has influenced their eating behaviors.
Do you buy fruits? If so, where do you buy them? If not, what prevents you from buying fruits?

Which foods here are vegetables?
What are vegetables?
Where do vegetables come from?
Do you eat vegetables?
Where do you eat vegetables?
When do you eat vegetables?
Do you eat vegetables with other foods? If so, which ones?
What do vegetables do for the body?
Are vegetables healthy or not healthy for you?
If they say vegetables are healthy, I will ask where they heard this from and if it has influenced their eating behavior.
Do you buy vegetables? If so, where do you buy them? If not, what prevents you from buying vegetables? Which foods here are vegetables?

Are fruits and vegetables different? If so, how are they different?
Thank you.
Intro

Do you do the grocery shopping? If so, can you please describe your preparation for shopping—i.e. do you use coupons, write a list, plan meals, arrange a ride, shop at a particular time, etc. Where do you shop? How often? Can you describe any barriers or obstacles you encounter while shopping or what you do not like about shopping? What do you like about shopping for fruits and vegetables? What do you not like about shopping for fruits and vegetables?

Do you cook? How often? Does anyone else help with the cooking? If so, how? Can you please describe your kitchen and a typical meal—preparation, the meal, clean up?

Does your family have a common meal that they all eat together? If so, please draw the table setting (aka, who sits where)? Can you please describe the manner in which you eat (portion plates, family style, buffet, etc.)? What does your family tend to talk about? Does …. (child name’s) participate in the conversation? If so, how?

What things are of greatest concern to you about your child’s eating and health status? Why?

Can you please describe your support system—friends, family, church, neighborhood organization? The people you depend on or turn to for help.

Can you please describe your current living situation? Where do you live? Who do you live with?

Where do you learn about food and nutrition? Where do you learn about fruits and vegetables?

What do you think (your child) should be taught about food and nutrition? Who should teach him/her? How? When?
How do you think your child learns about food and nutrition? What is your child’s role? What is your role? What is the... (HS educator’s name) role? What is the role of the entire childcare center?

Do you talk with the teacher when you pick-up/drop-off your child? What do you talk about? Do you ever talk about the meals your child has participated in or your child’s eating or health status? If so, please describe the conversations.

Do you participate in the activities such as workshops, home visits, etc. that Head Start offers? If so, which ones? What do you like or not like about these activities? What can HS do to encourage more parental involvement in their activities? What types of activities regarding food and nutrition with special attention on fruits and vegetables can HS have that you would be interested in attending?

What do you suggest can be done to help bring your child’s home and school environment together regarding food and nutrition lessons?

The interviewer will now read and have the study participant complete the following questionnaires: 1) basic demographics, 2) NCI 5-A-Day Fruit and Vegetable Screener, 3) Birch’s Child Feeding Questionnaire, 4) Availability of the 12 food items.

By the way, where are you from? How long have you been here? What brought you here? Education? What do you like best about the center? What do you wish they could improve on? Did you like participating in the study? Are there any things regarding the study you think can be improved? If so, which ones.

During the interview, we will go over the child’s responses.

Thank You.
APPENDIX J:

Demographic Questionnaire for Primary Care Providers
(Completed verbally by the Primary Care Provider)
Concepts of Food in Young Children
Participant Information for Primary Care Provider

1. Age:_____

2. Ethnicity:________________________________________________________________________

1. Martial Status:___________________________________________________________

2. How many children do you have? ___ How old are they? __________________________

3. Are you the primary care provider for ____________ (insert name)? _________

________________________________________________________________________

6. How many times does ______(insert name) eat in a given day?_______

7. Typically, what times does ______(insert name) eat?______________________________

________________________________________________________________________

8. Does ______(insert name) tend to skip meals?  yes or no  If yes, which meal(s) does he/she skip, miss, etc.? 

________________________________________________________________________

9. When does _____________(insert name) eat her/his biggest meal of the day?___

________________________________________________________________________

10. Does ___________(insert name) snack?  yes or no  If yes, when, how often and what kinds of foods?

________________________________________________________________________

11. Does __________(insert name) drink soda?  yes or no  If yes, how much, when and what kind

________________________________________________________________________

12. Does ______(insert name) help you prepare meals at all?  yes or no  If yes, please describe______________________________________________________________

________________________________________________________________________
13. Do you modify or restrict __________(insert name) food intake in anyway? 
   yes or no  If yes, please describe

14. Do you modify or restrict food intake in anyway of your other children?  
   yes or no  If yes, please describe

15. How many hours do you work a week?______________________________

16. What time of day and what days of the week do you work?  Please describe

17. Do you receive government assistance? Yes or no If yes, please explain when you started to receive government assistance and which types of assistance you are currently receiving such as food stamps or welfare

__________________________________________________________________
__________________________________________________________________
APPENDIX K:

Demographic Questionnaire for Childcare Providers
(Completed verbally by the Childcare Provider)
Concepts of Food in Young Children
Participant Information for Childcare Provider

1. Age:_____

2. Ethnicity:__________________________________________________________

3. What things would you like to learn about food and nutrition? _______________
   ___________________________________________________________________
   ___________________________________________________________________

4. What do you think are the best ways to learn about food and nutrition?_________
   ___________________________________________________________________

5. What do you think are the best ways to teach your children at the center about
   food and nutrition?____________________________________________________
   ___________________________________________________________________

4. Please describe your teaching style_____________________________________
   ___________________________________________________________________
APPENDIX L:

National Cancer Institute Fruit and Vegetable Screener

(Completed verbally by the Primary Care Provider)
The person who completed the telephone interviews for the Eating at America's Table Study should fill out this questionnaire.

Use only a No. 2 pencil.

Be certain to completely blacken in each of the answers, and erase completely if you make any changes.

Do not make any stray marks on this form.

When you complete this questionnaire, please return it in the postage-paid envelope to:

National Cancer Institute
EPN, Room 313
6130 Executive Blvd., MSC 7344
Bethesda, MD 20892-7344

NOTIFICATION TO RESPONDENT OF ESTIMATED BURDEN

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: NIH, Project Clearance Office, 6701 Rockledge Drive, MSC 7730, Bethesda, MD 20892-7730; ATTN: PRA (0925-0450). Do not return the completed form to this address.
INSTRUCTIONS

Think about what you usually ate last month.

Please think about all the fruits and vegetables that you ate last month. Include those that were:

- raw and cooked,
- eaten as snacks and at meals,
- eaten at home and away from home (restaurants, friends, take-out), and
- eaten alone and mixed with other foods.

Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.

If you mark "Never" for a question, follow the "Go to" instruction.

Choose the best answer for each question. Mark only one response for each question.

1. Over the last month, how many times per month, week, or day did you drink 100% juice such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

<table>
<thead>
<tr>
<th>Never (Go to Question 2)</th>
<th>1-3 times per month</th>
<th>1-2 times per week</th>
<th>3-4 times per week</th>
<th>5-6 times per week</th>
<th>1 time per day</th>
<th>2 times per day</th>
<th>3 times per day</th>
<th>4 times per day</th>
<th>5 or more times per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2</td>
<td>1-3 times per month</td>
<td>1-2 times per week</td>
<td>3-4 times per week</td>
<td>5-6 times per week</td>
<td>1 time per day</td>
<td>2 times per day</td>
<td>3 times per day</td>
<td>4 times per day</td>
<td>5 or more times per day</td>
</tr>
</tbody>
</table>

1a. Each time you drank 100% juice, how much did you usually drink?

<table>
<thead>
<tr>
<th>Less than ½ cup (less than 6 ounces)</th>
<th>½ to 1½ cup (6 to 10 ounces)</th>
<th>1¼ to 2 cups (10 to 16 ounces)</th>
<th>More than 2 cups (more than 16 ounces)</th>
</tr>
</thead>
</table>

2. Over the last month, how many times per month, week, or day did you eat fruit? Count any kind of fruit—fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all mealtimes and for snacks.

<table>
<thead>
<tr>
<th>Never (Go to Question 3)</th>
<th>1-3 times per month</th>
<th>1-2 times per week</th>
<th>3-4 times per week</th>
<th>5-6 times per week</th>
<th>1 time per day</th>
<th>2 times per day</th>
<th>3 times per day</th>
<th>4 times per day</th>
<th>5 or more times per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 3</td>
<td>1-3 times per month</td>
<td>1-2 times per week</td>
<td>3-4 times per week</td>
<td>5-6 times per week</td>
<td>1 time per day</td>
<td>2 times per day</td>
<td>3 times per day</td>
<td>4 times per day</td>
<td>5 or more times per day</td>
</tr>
</tbody>
</table>

2a. Each time you ate fruit, how much did you usually eat?

<table>
<thead>
<tr>
<th>Less than ½ cup</th>
<th>About ½ cup</th>
<th>About 1 cup</th>
<th>More than 1 cup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 medium fruit</td>
<td>1 medium fruit</td>
<td>2 medium fruits</td>
<td>More than 2 medium fruits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OR</th>
<th>About 1 cup</th>
<th>More than 1 cup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than ½ cup</td>
<td>About ½ cup</td>
<td>About 1 cup</td>
</tr>
</tbody>
</table>
3. Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3 times</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5-6 times</th>
<th>1 time</th>
<th>2 times</th>
<th>3 times</th>
<th>4 times</th>
<th>5 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last month</td>
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</tr>
</tbody>
</table>

3a. Each time you ate **lettuce salad**, how much did you usually eat?

- About ½ cup
- About 1 cup
- About 2 cups
- More than 2 cups

4. Over the last month, how often did you eat **French fries or fried potatoes**?

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3 times</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5-6 times</th>
<th>1 time</th>
<th>2 times</th>
<th>3 times</th>
<th>4 times</th>
<th>5 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last month</td>
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</table>

4a. Each time you ate **French fries or fried potatoes**, how much did you usually eat?

- Small order or less (About 1 cup or less)
- Medium order (About 1 ½ cups)
- Large order (About 2 cups)
- Super Size order or more (About 3 cups or more)

5. Over the last month, how often did you eat **other white potatoes**? Count baked, boiled, and mashed potatoes, potato salad, and white potatoes that were not fried.

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3 times</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5-6 times</th>
<th>1 time</th>
<th>2 times</th>
<th>3 times</th>
<th>4 times</th>
<th>5 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last month</td>
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</tbody>
</table>

5a. Each time you ate **these potatoes**, how much did you usually eat?

- 1 small potato or less (½ cup or less)
- 1 medium potato (¾ to 1 cup)
- 1 large potato (1 to 1 ½ cups)
- 2 medium potatoes or more (1 ½ cups or more)

6. Over the last month, how often did you eat **cooked dried beans**? Count baked beans, bean soup, refried beans, pork and beans and other bean dishes.

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3 times</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5-6 times</th>
<th>1 time</th>
<th>2 times</th>
<th>3 times</th>
<th>4 times</th>
<th>5 or more times</th>
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</tr>
</tbody>
</table>

6a. Each time you ate **these beans**, how much did you usually eat?

- Less than ½ cup
- ½ to 1 cup
- 1 to 1 ½ cups
- More than 1 ½ cups
7. Over the last month, how often did you eat other vegetables?

**DO NOT COUNT:**
- Lettuce salads
- White potatoes
- Cooked dried beans
- Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
- Rice

**COUNT:**
- All other vegetables—raw, cooked, canned, and frozen

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>last month</td>
<td>times</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per day</td>
<td>times</td>
<td>per day</td>
<td>times</td>
</tr>
</tbody>
</table>

7a. Each of these times that you ate other vegetables, how much did you usually eat?

<table>
<thead>
<tr>
<th>Amount</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>cup(s)</td>
<td>Less than ½</td>
<td>cup</td>
<td>½ to 1 cup</td>
<td>1 to 2 cups</td>
<td>More than 2 cups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Over the last month, how often did you eat tomato sauce? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>last month</td>
<td>times</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per day</td>
<td>times</td>
<td>per day</td>
<td>times</td>
</tr>
</tbody>
</table>

8a. Each time you ate tomato sauce, how much did you usually eat?

<table>
<thead>
<tr>
<th>Amount</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>cup(s)</td>
<td>About ½</td>
<td>cup</td>
<td>About ½ cup</td>
<td>About 1 cup</td>
<td>More than 1 cup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Over the last month, how often did you eat vegetable soups? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>last month</td>
<td>times</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per day</td>
<td>times</td>
<td>per day</td>
<td>times</td>
</tr>
</tbody>
</table>

9a. Each time you ate vegetable soup, how much did you usually eat?

<table>
<thead>
<tr>
<th>Amount</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>cup(s)</td>
<td>Less than 1 cup</td>
<td>1 to 2 cups</td>
<td>2 to 3 cups</td>
<td>More than 3 cups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Over the last month, how often did you eat mixtures that included vegetables? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

<table>
<thead>
<tr>
<th>Times</th>
<th>Never</th>
<th>1-3</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>last month</td>
<td>times</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per week</td>
<td>times</td>
<td>per day</td>
<td>times</td>
<td>per day</td>
<td>times</td>
</tr>
</tbody>
</table>

Thank you very much for completing this questionnaire. Please return it in the enclosed, postage-paid envelope or to the address listed on the front page.
APPENDIX M:

Child-Feeding Questionnaire
(Completed verbally by the Primary Care Provider)
INSTRUCTIONS:
Using the scale below, please circle one number for each question, which best corresponds to your answer. Please answer about your child who is in our study.

<table>
<thead>
<tr>
<th></th>
<th>never</th>
<th>seldom</th>
<th>half of time</th>
<th>most of time</th>
<th>always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When your child is at home, how often are you responsible for feeding her?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. How often are you responsible for deciding what your child’s portion sizes are?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. How often are you responsible for deciding if your child has eaten the right kind of foods?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Using the scale below, please indicate how you would classify your own weight at each of these 4 time periods listed below (Please circle ONLY ONE number for each time period)

<table>
<thead>
<tr>
<th></th>
<th>markedly Underweight</th>
<th>Underweight</th>
<th>Average</th>
<th>Overweight</th>
<th>markedly Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Your Childhood (5 to 10 years old)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Your Adolescence</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Your 20's</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Currently</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Using the scale below, please indicate how you would classify your child’s weight at each of these 4 time periods listed below. (Please circle ONLY ONE number for each time period)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Markedly Underweight</th>
<th>Underweight</th>
<th>average</th>
<th>Overweight</th>
<th>Markedly Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Your child during the first year of life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Your child as a toddler</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Your child as a pre-schooler</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. Your child kindergarten through 2\textsuperscript{nd} grade</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. Your child from 3\textsuperscript{rd} through 5\textsuperscript{th} grade</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. Your child from 6\textsuperscript{th} through 8\textsuperscript{th} grade</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Using the scale below, please circle one number for each question, which best corresponds to your answer. Please answer about your child who is in our study.

<table>
<thead>
<tr>
<th>Question</th>
<th>Unconcerned</th>
<th>slightly Unconcerned</th>
<th>neutral</th>
<th>slightly Concerned</th>
<th>Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. How concerned are you about your child eating too much when you are not around her?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. How concerned are you about your child having to diet to maintain a desirable weight?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### INSTRUCTIONS:
Using the scale below, please circle one number for each question, which best corresponds to your answer. Please answer about your child who is in our study.

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. How concerned are you about your child becoming overweight?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I have to be sure that my child does not eat too many sweets (candy, ice cream, cake or pastries).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. I have to be sure that my child does not eat too many high fat foods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. I have to be sure that my child does not eat too much of her favorite foods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. I intentionally keep some foods out of my child’s reach.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. I offer my child her favorite foods in exchange for good behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. If I did not guide or regulate my child’s eating, she would eat too many junk foods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. If I did not guide or regulate my child’s eating, she would eat too much of her favorite foods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. My child should always eat all of the food on her plate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. I have to be especially careful to make sure my child eats enough.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. If my child says I am not hungry, I try</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
28. If I did not guide or regulate my child’s eating, she would eat much less than she should.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**INSTRUCTIONS:**
Using the scale below, please circle one number for each question, which best corresponds to your answer. **Please answer about your child who is in our study.**

<table>
<thead>
<tr>
<th></th>
<th>never</th>
<th>rarely</th>
<th>Sometimes</th>
<th>mostly</th>
<th>always</th>
</tr>
</thead>
<tbody>
<tr>
<td>29. How much do you keep track of the <em>sweets</em> (<em>candy, ice cream cake, pies, pastries</em>) that your child eats?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30. How much do you keep track of the <em>snack food</em> (<em>potato chips, Doritos, cheese puffs</em>) that your child eats?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31. How much do you keep track of the <em>high fat</em> foods that your child eats?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX N:

Further Fruit and Vegetable Availability Analyses
Table AN.1: Food Served for Breakfast in an Inner-City Head Start Childcare Center from January through June 20th, 2002 in the 77 Days Analyzed.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Frequency (# days served, % of days served out of 77 days analyzed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>Fruit</td>
<td></td>
</tr>
<tr>
<td>Canned fruit</td>
<td>59 (77%)</td>
</tr>
<tr>
<td>Canned peaches</td>
<td>44 (57%)</td>
</tr>
<tr>
<td>Canned apricots</td>
<td>13 (17%)</td>
</tr>
<tr>
<td>Canned pears</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Canned pineapples</td>
<td>9 (12%)</td>
</tr>
<tr>
<td>Canned mixed fruit</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>(peaches, pears, pineapples)</td>
<td></td>
</tr>
<tr>
<td>Fresh fruit</td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td>12 (16%)</td>
</tr>
<tr>
<td>Oranges</td>
<td>5 (6%)</td>
</tr>
<tr>
<td>Grapes</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Apple wedges</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Cantaloupe</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Packaged fruit</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Strawberries</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Juice</td>
<td>18 (23%)</td>
</tr>
<tr>
<td>Juicy Juice</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Orange Juice</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Apple Juice</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Grape Juice</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Pineapple Juice</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Cranberry Juice</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Cold Cereal</td>
<td>42 (55%)</td>
</tr>
<tr>
<td>Grain Products other than</td>
<td></td>
</tr>
<tr>
<td>Cold Cereal</td>
<td>35 (45%)</td>
</tr>
<tr>
<td>Hot Cereal with Butter</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Donuts</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>French Toast with Syrup</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Bagels with Cream Cheese or</td>
<td></td>
</tr>
<tr>
<td>Grape Jelly</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Cheese Bread</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Croissants with Butter and</td>
<td></td>
</tr>
<tr>
<td>Grape Jelly</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>English Muffin with Butter</td>
<td></td>
</tr>
<tr>
<td>and Grape Jelly</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Muffins</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Granola Bars</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Pancakes with Syrup</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Waffles with Syrup</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Wheat Toast w/ Butter and</td>
<td></td>
</tr>
<tr>
<td>Grape jelly</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>
Table AN.2: Food Served for Lunch in an Inner-City Head Start Childcare Center from January through June 20\textsuperscript{th}, 2002 in the 77 Days Analyzed.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Frequency (# days served, % of days served out of 77 days analyzed)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Milk</th>
<th>76 (99%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entrees</strong></td>
<td>79 (103%)</td>
</tr>
<tr>
<td>Beef</td>
<td></td>
</tr>
<tr>
<td>Chili</td>
<td>27 (35%)</td>
</tr>
<tr>
<td>Salisbury steak</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Spaghetti with Swedish meatballs</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Hamburger (one w/ cheese)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Meat loaf</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Beef low-mein</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Tacos</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Beef with Broccoli</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Beef Stew</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Meat Ravioli</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Roast Beef and Cheese Sandwich</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Sloppy Joes</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Chicken</td>
<td></td>
</tr>
<tr>
<td>Chicken soup</td>
<td>17 (22%)</td>
</tr>
<tr>
<td>Barbeque chicken</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Broiled chicken</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Chicken enchilada</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Chicken nuggets</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Chicken pasta salad</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Chicken ala king</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Chicken gyros</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Chicken salad</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Chicken with vegetables in broth</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
</tr>
<tr>
<td>Turkey Corn Dog</td>
<td>12 (16%)</td>
</tr>
<tr>
<td>Turkey Ham and Swiss Cheese Sandwich</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Turkey Hoagie with lettuce, tomatoes, cheese, mayo and mustard</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Turkey Hot Dog</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Turkey and Cheese Sandwich with mayo</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
</tr>
<tr>
<td>Fish sticks</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Fish (perch)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Tuna Salad with celery, tomatoes and olives</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Fried Fish Patty</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Salmon cakes</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Tuna on a bun</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Non-Meat</td>
<td></td>
</tr>
<tr>
<td>Grilled cheese sandwich</td>
<td>13 (17%)</td>
</tr>
<tr>
<td>Cheese pizza</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Peanut butter and jelly sandwich</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Baked ziti</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Food Item</td>
<td>Frequency (# days served, % of days served out of 77 days analyzed)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Carbohydrate/Starch not associated with the entrée</strong></td>
<td></td>
</tr>
<tr>
<td>Yellow rice</td>
<td>27 (35%)</td>
</tr>
<tr>
<td>Wheat bread</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Saltine crackers</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Macaroni-and-cheese</td>
<td>4 (5%)</td>
</tr>
<tr>
<td></td>
<td>3 (4%)</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td>35 (45%)</td>
</tr>
<tr>
<td>Canned fruit</td>
<td>31 (40%)</td>
</tr>
<tr>
<td>Canned peaches</td>
<td>12 (16%)</td>
</tr>
<tr>
<td>Canned mixed fruit (peaches, pears, pineapples)</td>
<td>9 (12%)</td>
</tr>
<tr>
<td>Canned pineapples</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Canned pears</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Canned fruit cocktail</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Canned apricots</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Fresh Fruit</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Apple</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Packaged Fruit</strong></td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Applesauce</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Mango</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Juice</strong></td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Orange Juice</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>
# Table AN.2 Lunch Food, Continued

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Frequency (# days served, % of days served out of 77 days analyzed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vegetable</strong></td>
<td>102 (132%)</td>
</tr>
<tr>
<td>Canned vegetables</td>
<td></td>
</tr>
<tr>
<td>Canned mixed vegetables (peas, corn, potatoes, carrots)</td>
<td>13 (17%)</td>
</tr>
<tr>
<td>String beans</td>
<td>7 (9%)</td>
</tr>
<tr>
<td>Carrots</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>Peas and carrots</td>
<td>5 (6%)</td>
</tr>
<tr>
<td>Corn</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Three bean salad</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Greens</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Green peas</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Vegetable soups</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Kidney beans</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Baked beans</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Lime beans and corn</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Saukeraut</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Fresh/Packaged Vegetables</strong></td>
<td>19 (24%)</td>
</tr>
<tr>
<td>Salad</td>
<td>10 (13%)</td>
</tr>
<tr>
<td>Broccoli</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Carrots and Celery</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Packaged Vegetables</strong></td>
<td>7 (9%)</td>
</tr>
<tr>
<td>Carrot Salad</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Cole Slaw</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Vegetable egg roll</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Potatoes</strong></td>
<td>22 (28%)</td>
</tr>
<tr>
<td>Mashed potatoes</td>
<td>7 (9%)</td>
</tr>
<tr>
<td>French fries</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Potato Salad</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Potato wedges</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Cheese potatoes</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Potato with onions</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>
Table AN.3: Food Served for Snack in an Inner-City Head Start Childcare Center from January through June 20th, 2002 in the 77 Days Analyzed.

<table>
<thead>
<tr>
<th>Food Item (food/beverage particular food item served with)</th>
<th>Frequency (# days served, % of days served out of 77 days analyzed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Snacks from the grain group</strong></td>
<td></td>
</tr>
<tr>
<td>Cookies (w/ milk (16), w/ juice (5))</td>
<td>53 (69%)</td>
</tr>
<tr>
<td>Cereal bar</td>
<td>21 (27%)</td>
</tr>
<tr>
<td>(w/out liquid (1), w/ yogurt w/o liquid (1), w/ milk(6), w/ juice (2), w/ water(1))</td>
<td></td>
</tr>
<tr>
<td>Cheese Curls</td>
<td>11 (15%)</td>
</tr>
<tr>
<td>(w/ milk (2), w/ juice (5), w/o liquid (1), w/ water (1))</td>
<td></td>
</tr>
<tr>
<td>Pretzels</td>
<td>9 (12%)</td>
</tr>
<tr>
<td>(Peanut butter and jelly pretzels w/ milk (1), cheese pretzels w/ juice (1), cheese pretzels w/ milk (1), pretzel w/ water ice (1))</td>
<td></td>
</tr>
<tr>
<td>Rice cakes</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>(w/ juice (3), w/ milk (1))</td>
<td></td>
</tr>
<tr>
<td>Donuts w/ Milk</td>
<td></td>
</tr>
<tr>
<td>Graham crackers w/ milk</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Rice Crispy w/o liquid</td>
<td></td>
</tr>
<tr>
<td>Pizza roll w/ milk</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td></td>
</tr>
<tr>
<td>Fresh Fruit</td>
<td>14 (18%)</td>
</tr>
<tr>
<td>Apple wedges</td>
<td>13 (17%)</td>
</tr>
<tr>
<td>(w/ juice (1), w/ milk (1), w/ yogurt (1), w/ water (1))</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Banana</td>
<td></td>
</tr>
<tr>
<td>(w/out Liquid (1), w/ milk (2))</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Grapes</td>
<td></td>
</tr>
<tr>
<td>(w/out Liquid (2), w/ juice (1))</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Orange wedges</td>
<td></td>
</tr>
<tr>
<td>(w/out Liquid (2))</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Packaged Fruit</td>
<td></td>
</tr>
<tr>
<td>Raisins</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>(w/ juice (2))</td>
<td></td>
</tr>
<tr>
<td>Food Item (food/beverage particular food item served with)</td>
<td>Frequency (# days served, % of days served out of 77 days analyzed)</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Juice</strong></td>
<td>28 (36%)</td>
</tr>
<tr>
<td>Grape juice</td>
<td>10</td>
</tr>
<tr>
<td>Juicy juice</td>
<td>9</td>
</tr>
<tr>
<td>Apple juice</td>
<td>5</td>
</tr>
<tr>
<td>Orange juice</td>
<td>3</td>
</tr>
<tr>
<td>Cranberry juice</td>
<td>1</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td>7 (9%)</td>
</tr>
<tr>
<td>Fresh Vegetables</td>
<td>7(9%)</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>Ants on a log</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Dairy</strong></td>
<td>39 (51%)</td>
</tr>
<tr>
<td>Milk</td>
<td>33 (43%)</td>
</tr>
<tr>
<td>Yogurt</td>
<td>5 (%)</td>
</tr>
<tr>
<td>(w/out Liquid (1), w/ apple wedges (1), w/ no liquid (1), w/ mango and water (1), w/ cereal bar(1))</td>
<td></td>
</tr>
<tr>
<td>Cheese cube</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>(w/ juice (1))</td>
<td></td>
</tr>
</tbody>
</table>
Table AN.4: Types of Fruit Served at an Inner-City Head Start Childcare Center from January through June 20\textsuperscript{th}, 2002 in the 77 Days Analyzed Out of the 155 Fruits Offered During this Time.

<table>
<thead>
<tr>
<th>Type of Fruit</th>
<th>Frequency (number of fruits offered, % of that type of fruit offered out of total fruits offered (n=155))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canned fruit</strong></td>
<td></td>
</tr>
<tr>
<td>Peaches</td>
<td>25 (16%)</td>
</tr>
<tr>
<td>Mixed fruit (peaches, pears, pineapples)</td>
<td>15 (10%)</td>
</tr>
<tr>
<td>Pears</td>
<td>12 (8%)</td>
</tr>
<tr>
<td>Apricots</td>
<td>11 (7%)</td>
</tr>
<tr>
<td>Pineapples</td>
<td>10 (6%)</td>
</tr>
<tr>
<td>Fruit cocktail</td>
<td>2 (1%)</td>
</tr>
<tr>
<td><strong>Fruit or fruit-flavored Juice</strong></td>
<td></td>
</tr>
<tr>
<td>Grape</td>
<td>13 (8%)</td>
</tr>
<tr>
<td>Juicy Juice</td>
<td>13 (8%)</td>
</tr>
<tr>
<td>Apple</td>
<td>8 (5%)</td>
</tr>
<tr>
<td>Orange</td>
<td>8 (5%)</td>
</tr>
<tr>
<td>Pineapple</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Cranberry</td>
<td>2 (1%)</td>
</tr>
<tr>
<td><strong>Fresh fruit</strong></td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td>8 (5%)</td>
</tr>
<tr>
<td>Apple wedges</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Grapes</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Oranges</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Cantaloupe</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Packaged fruit</strong></td>
<td></td>
</tr>
<tr>
<td>Strawberries</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Raisins</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Applesauce</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Mango</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>
Table AN.5: Types of Vegetables Served at an Inner-City Head Start Childcare Center from January through June 20^{th}, 2002 in the 77 Days Analyzed Out of the 141 Vegetables Offered During this Time.

<table>
<thead>
<tr>
<th>Type of Vegetable</th>
<th>Frequency (number of vegetables offered, % of that type of vegetable offered out of total vegetables offered (n=141))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canned vegetables (non-potatoes)</strong></td>
<td>53 (38%)</td>
</tr>
<tr>
<td>Canned mixed vegetables (peas, corn, potatoes, carrots)</td>
<td>13 (9%)</td>
</tr>
<tr>
<td>String beans</td>
<td>7 (5%)</td>
</tr>
<tr>
<td>Carrots</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Peas and carrots</td>
<td>5 (3.5%)</td>
</tr>
<tr>
<td>Corn</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Three bean salad</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Greens</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Green peas</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Vegetable soups</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Kidney beans</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Baked beans</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Lime beans and corn</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Saukeraut</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td><strong>In mixture (stews, marinara, soups, etc.)</strong></td>
<td>31 (22%)</td>
</tr>
<tr>
<td>Marinara</td>
<td>11 (8%)</td>
</tr>
<tr>
<td>Chicken soup with vegetables</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Chili</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Pasta salad (with chicken or tuna)</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Beef low mein</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Beef stew/beef with broccoli</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Chicken ala king</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Chicken salad</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Rice with vegetables</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Vegetable egg roll</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td><strong>Fresh vegetables</strong></td>
<td>32 (23%)</td>
</tr>
<tr>
<td>Carrot sticks</td>
<td>10 (7%)</td>
</tr>
<tr>
<td>Salad</td>
<td>10 (7%)</td>
</tr>
<tr>
<td>Lettuce and tomatoes</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Broccoli</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Ants on a log</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Carrots and Celery</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td><strong>Packaged Vegetables</strong></td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Cole Slaw</td>
<td>4 (3%)</td>
</tr>
<tr>
<td><strong>Potatoes (packaged or canned)</strong></td>
<td>22 (16%)</td>
</tr>
<tr>
<td>Mashed potatoes</td>
<td>7 (5%)</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>French fries</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Potato salad</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Potato wedges</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Potatoes with onions</td>
<td>1 (.7%)</td>
</tr>
<tr>
<td>Cheese potatoes</td>
<td>1 (.7%)</td>
</tr>
</tbody>
</table>
APPENDIX O:

Image used on Water Bottles Given as Compensation to all the Children
U
Water
Intake
Now!

A gift of thanks from the
Penn State University Nutrition Team.
APPENDIX P:

Signature of Receipt for Receiving a Gift Certificate as Compensation for Participation in Food Study as a Primary Care Provider
Penn State Food Study Participation Gift Receipt
I have received my $10 gift certificate to ..... Grocery Store for participating in the Penn State Food Study with Ms. Sheila at the Head Start ..... location.

<table>
<thead>
<tr>
<th>Child’s Name</th>
<th>Participant’s Name</th>
<th>Participant’s Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
APPENDIX Q:

Primary Care Providers’ Permission to Use Pictures
Taken at the Center of the Children for Study Purposes.
I give the Pennsylvania State University Nutrition Team permission to use the pictures taken of me and my child at the Head Start …… They will only be used for nutrition education material purposes. Your name or study responses will not be connected to your pictures. Copies will be sent to the Head Start ……… Thank you for your corporation.

1. ______________________________________________________
2. ______________________________________________________
3. ______________________________________________________
4. ______________________________________________________
5. ______________________________________________________
6. ______________________________________________________
7. ______________________________________________________
8. ______________________________________________________
9. ______________________________________________________
10. ______________________________________________________
11. ______________________________________________________
12. ______________________________________________________
13. ______________________________________________________
14. ______________________________________________________
15. ______________________________________________________
16. ______________________________________________________
17. ______________________________________________________
18. ______________________________________________________
19. ______________________________________________________
20. ______________________________________________________
21. ______________________________________________________
22. ______________________________________________________
23. ______________________________________________________
24. ______________________________________________________
25. ______________________________________________________
26. ______________________________________________________
27. ______________________________________________________
28. ______________________________________________________
29. ______________________________________________________
30. ______________________________________________________
APPENDIX R:

Thank You Letter to the Head Start Center
August 30, 2002

Head Start

Dear The Head Start .... Family,

I just wanted to take a moment to thank all of you for welcoming me into your family. I truly enjoyed my time in ....... especially working with and becoming friends with all of you. Although I am back in State College, all of you remain in my thoughts and prayers. Currently, I am working on my project and taking some classes. And, of course, cheering on Joe Pa’s team. Along with my fellow Pennsylvania State University Nutrition Team members, we are trying to develop future nutrition education efforts for the young children. I will also try to stop in and visit sometime in this Fall. I hope this letter finds all of you happy and healthy. Good luck with this coming school year.

Carpe Diem,

Sheila Fleischhacker

Sheila Fleischhacker
VITA-Sheila E. Fleischhacker

Starting her Big Ten career off at birth, Sheila Fleischhacker was born in 1978 as the ninth of her parent’s ten children at The Northwestern University Hospital in Chicago. Her educational path took her through Josephine Carson Locke Elementary School, a Chicago Public School, and then to Luther High School North. Her undergraduate studies were completed at Loyola University Chicago (LUC), where she majored in Food and Nutrition/Dietetics and minored in Biochemistry. She graduated Magna Cum Laude and competed on the university’s Cross Country and Track and Field teams. Her accomplishments as a student-athlete earned her a nomination as the National Collegiate Athletic Association Woman of the Year. During her time at LUC, she earned a Mulcahy Scholarship for undergraduate research and used this opportunity to study amenorrhea in athletes. She presented this work at university, state, and national conferences. In the fall of 2000, she began her graduate work in The Huck Institute of the Life Sciences at The Pennsylvania State University (Penn State) under the supervision of Cheryl Achterberg in the Nutrition Sciences Option.

Sheila identifies her seventh grade organic nutrient science fair project as her first taste of nutrition research. Since then, she has worked in various venues of nutrition including food service (Brothers of Holy Cross, IL), clinical (Rush St. Luke’s Presbyterian Hospital, IL), wellness, counseling, sports nutrition, nutrition education, marketing (PowerBar/Nestle, IL), community (Head Start), college teaching (Penn State), and research (LUC and Penn State). As part of one of her teaching experiences, she received the Nina Federoff Teaching Assistant Award and then the American Dietetic Association Sue Borra Nutrition Communication Scholarship. This scholarship supports Sheila’s work with a Penn State Architectural Engineering Service Learning course as well as the Northern Cheyenne in Lame Deer, Montana.

Besides Sheila’s academic pursuits, she works extensively in outreach including presentations and counseling for athletes in sports nutrition and lessons for grammar school children within schools and at Girl Scout meetings on nutrition and food science. She is part of Penn State’s Student Outreach Science Lions Club that aims to teach and inspire rural kindergarten through high school students on science and engineering. She assists Penn State’s Cross Country and Track and Field Teams as a United States Track and Field Association Certified Official and for this was honored as a Penn State Official. Sheila also serves as a Eucharist Minister for Penn State’s Catholic Community.

Sheila aspires to begin a career in policy and aims to start a law degree part-time in the fall of 2004.