

The Wisconsin Fresh Fruit and Vegetable Program

by

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ABSTRACT

Children and adolescents in the United States, overall, do not have healthy food habits. Previous studies indicate poor intakes of fruits and vegetables, with both genders failing to meet the fruit and vegetable recommendations set forth by both the Food Guide Pyramid (My Pyramid) and the Dietary Guidelines for Americans. These poor food habits can contribute to an undesirable body weight. It is estimated that 16% of children and adolescents aged 2 to 19 years are obese. Childhood obesity can predict adult obesity; therefore food habits learned early in life tend to persist into adulthood and are very important lessons to be learned early in life.

The main objective of this study was to examine the attitudes, behaviors and willingness to try new and different fruits and vegetables. The subjects included males and females in the 4th grade at both rural and urban schools within Wisconsin. A total of 127 students, 57 male and 70 female completed the survey designed specifically for this study.

The results of this study indicated that males and females had failed to meet the recommended five to nine servings of fruits and vegetables each day. The average overall intake of fruits and vegetables was less than a single serving per day. Males were found to eat more fruit than females, with an average of near three-fourths of a serving daily. Females were found to eat more vegetables than males, consuming an average of one serving per day. Males also appeared more willing to try new and different fruits and vegetables than females.

The results of this are of benefit to the many groups that are personally, as well as professionally, involved, specifically the USDA for future funding and expansion within the FFVP and the schools, nutrition professionals and other public health educators. It is recommended that further studies be conducted to determine the quantity of targeted fruits and vegetables consumed, individualize FFQ, and incorporate larger sample sizes for better generalization.

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Chapter I: Introduction

The Food and Nutrition Service, a division of the United States Department of Agriculture, administers the Fresh Fruit and Vegetable Program (FFVP) at the national and regional levels. The Fresh Fruit and Vegetable Program introduces new and different fruits and vegetables to school-aged children and adolescents, and provides them with the opportunities to learn healthy alternatives to the typical high-calorie, high-fat and high-sugar snacks consumed by these populations on a daily basis (USDA et al, 2005).

Eating habits that promote adequate nutrition are vital for all ages, but are especially important for proper growth and development during childhood and adolescence. Adequate nutrition is important in maintaining health and in preventing health-related conditions and diseases. Adequate nutrition is also a key factor in preventing obesity, an epidemic that is plaguing the nation's school-age populations. Obesity is caused by the energy imbalance which occurs with increased caloric consumption and decreased physical activity. Additionally, obesity is attributed to risk factors for developing certain chronic diseases and health-related conditions, including: cardiovascular disease (CVD), hypertension (HTN), dyslipidemia, type 2 diabetes mellitus (T2DM), osteoporosis, constipation, diverticular disease, iron-deficiency anemia, oral disease and certain cancers.

The occurrence of obesity within children and adolescents has increased. According to a survey conducted between the years 1999-2002, sixteen percent (16%) of children and adolescents aged six to nineteen are considered overweight (USDA et al, 2005). To reverse this statistic and the energy imbalance previously mentioned, nutrition officials recommend American children and adolescents eat fewer calories and increase

their daily physical activity. Nutrition officials have designed numerous and specific guidelines and recommendations in the areas of food, nutrition, and physical activity.

The United States Department of Agriculture's (USDA) Food Guide Pyramid (currently renamed My Pyramid as of January 2006) is one such nutrition (dietary) guideline designed to empower children and adolescents to follow a balanced diet by choosing a variety of foods, in the appropriate amounts, from each food group. The Dietary Guidelines for Americans (DGA) is another nutrition (dietary) guideline established to work in conjunction with the Food Guide Pyramid (My Pyramid). The DGA provides a framework to promote healthier lifestyles for all age groups through proper nutrition and daily physical activity. Specifically, the Dietary Guidelines for Americans suggests that the diets of children and adolescents be composed of foods from a variety of sources; with sixty percent of total daily needs from carbohydrates; ten to twenty percent from protein and protein sources; less than thirty percent of total calories from fat, and less than seven percent saturated fat from total fat calories. The DGA encourages children and adolescents to consume greater amounts of whole grains (six to eleven servings of grains daily, with the majority from whole grain sources) and fruits and vegetables (five to nine servings daily). The DGA also encourages children and adolescents to participate in thirty to sixty minutes of physical activity each day for better health. These general recommendations help ensure adequate growth and development, and decrease the risk factors for developing obesity, as well as the diseases and conditions associated with obesity.

As previously mentioned, both the FGP (My Pyramid) and the DGA recommend increased consumption of fruits and vegetables. As fruits and vegetables are the leading sources of many vitamins, minerals and nutrients, increasing fruit and vegetable consumption within the general population, but specifically within children and adolescents, has been a top priority for a number of federal agencies. The USDA, in partnering with other governmental agencies and private sector groups, has established specific programs to promote the health benefits of fruit and vegetable consumption. The Fresh Fruit and Vegetable Program (FFVP) is one such USDA-established program.

The Fresh Fruit and Vegetable Program was developed and began as a pilot project in 2002 to promote and increase fruit and vegetable consumption among the nation's school-aged children and adolescents. The Nutrition Title of the 2002 Farm Act made available free fresh and dried fruits and vegetables to students in the twenty-five elementary and secondary schools selected in each of the four pilot states and one Indian Tribal Organization (ITO) during the 2002-2003 school year (Buzby, Guthrie & Kantor, 2003). The Farm Act provided six million dollars to each of the twenty-five schools within Indiana, Iowa, Michigan, Ohio and the Zuni Indian Tribal Organization in New Mexico. Each selected school chose representative students from diverse ethnic backgrounds and socioeconomic classes to create a mixture of small and large, rural, suburban and urban elementary, middle and high school students. The average enrollment within the Fresh Fruit and Vegetable Program pilot states was six hundred and seven students, with participation ranging from sixty-six to two thousand students per school (Buzby, Guthrie, & Kantor, 2003). The total focus (purpose) of the Fresh Fruit and Vegetable Program is to determine the best practices for increasing students' daily intake

of fresh or dried fruits and vegetables. The intent of the Fresh Fruit and Vegetable Program pilot program is to establish the feasibility of carrying out a successful program, as measured by student interest and the number of participants within the program.

The success of the Fresh Fruit and Vegetable Program pilot program led to its inclusion within the National School Lunch Act. Its success also expanded the number of participating states and ITOs for future Fresh Fruit and Vegetable Programs. As a result of the success, the states of Mississippi, North Carolina, Pennsylvania and Washington were included in the second expansion of the FFVP, along with the Oglala ITO of South Dakota, and the Intertribal Council of Arizona.

The main goal of the Fresh Fruit and Vegetable Program is to continually include more states and more Indian Tribal Organizations within its program each successive year. To aid in these efforts, President George W. Bush signed the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2006, HR 2744, on November 10, 2005 to appropriate six million dollars to add six additional states – Wisconsin, Utah, New Mexico, Texas, Idaho, and Connecticut – to the Fresh Fruit and Vegetable Program, for its third expansion.

As important as fruits and vegetables are within a healthy diet, past research has been conducted mainly on the overall health, as determined by diet, physical activity and the development of chronic disease (Baur 2002) (Cruz, 2000) (Dietz & Robinson, 2005) (Herbold & Frates, 2000) (Videon & Manning, 2003). This past research that has been conducted was carried out using only convenience and community samples. As a result of such limited studies, there is a need for a more representative sample of childhood and adolescent dietary and physical activity patterns. These studies would aim to determine

whether children and adolescents are meeting both the FGP (My Pyramid) and DGA recommendations, and whether future nutrition education programs and policies need to be developed and incorporated into the current Wisconsin curriculum and graduation standards.

Statement of the Problem

As noted throughout the nation, school-aged children and adolescents do not consume the recommended amounts of fresh fruits and vegetables. Many research studies have been conducted to determine actual fruit and vegetable intake within these populations, but such research has focused on the intake patterns and the positive health benefits associated with heightened intakes. This research has determined that school-aged children and adolescents are consuming less than the recommended number of daily servings, and are participating in negative health behaviors. Furthermore this past research has not looked at the differences of consumption between genders, nor has the research aimed to determine students' knowledge, attitude, behaviors and overall willingness to incorporate new fruits and vegetables in their daily diets.

As this past research has been so limited in its investigation of school-aged children and adolescents' fresh fruit and vegetable consumption, this research project was developed to determine Wisconsin students' knowledge, attitude, behaviors, and their overall willingness to incorporate new and different fruits and vegetables within their daily diets.

Wisconsin students currently enrolled in the fourth, seventh, and ninth grades during the 2005-2006 school years were used to evaluate their knowledge, attitudes, and behaviors with respect to new and different fresh fruits and vegetables. The proposed data

will be collected in paper and pencil formatted surveys. Prior to the start of the evaluation, teachers will receive copies of the surveys, with instructions for administration. Surveys will be administered on three consecutive days; data will be collected to: determine students' current fruit and vegetable awareness and their willingness to try various fruits and vegetables; measure daily intakes of fruits and vegetables; and to quantify the quality, quantity and the frequency of fruit and vegetable consumption during the previous days. The first survey (Pre-Survey) will be completed during the month of March 2006; the second survey (Survey 2) will be completed in late May/early June 2006; and the third survey (Survey 3) will be completed in February/March 2007. After completion of the three-day surveys, the designated classroom teacher will return them to the research team in the provided pre-addressed, stamped envelopes. After the research team has collected the surveys, researchers will analyze the data, interpret findings, and give detailed recommendations for further improvement within the Fresh Fruit and Vegetable Program.

Purpose of the Study

The aim of the Wisconsin Fresh Fruit and Vegetable Program (FFVP) is to provide fresh fruits and vegetables throughout the school day to all school-aged children and adolescents in each participating experimental (funded) and control school. The program's goal is to increase students overall intake of fruits and vegetables by creating a healthier school environment and providing better food choices, as well as by expanding the variety of fruits and vegetables children are offered. The intent of the Wisconsin FFVP is to secure permanent and perhaps future additional funding within the state by

determining the program's success in increasing children and adolescent fruit and vegetable awareness and their willingness to try new and different fruits and vegetables.

Research Questions

1. Does demographic information have an effect on fourth graders' knowledge, attitudes, behaviors, and their willingness to incorporate fruits and vegetables into their diets?
2. Are fourth grader males and females able to visually identify specified fruits and vegetables among pictures of similar fruits and vegetables (knowledge)?
3. Are there differences in the type of fruits and vegetables consumed by males and females in the fourth grade (behavior)?
4. Does previous exposure to foods (specifically fruits and vegetables) enhance fourth graders' willingness to try new and different foods (attitude)?
5. Are fourth grade males and females willing to try unfamiliar fruits and vegetables (willingness to try)?
6. Are there differences in the overall dietary pattern/intake consumption between males and females in the fourth grade (behavior)?

Assumptions of the Study

Numerous assumptions have been made throughout the research investigation. From its creation to its conclusion, the investigation has assumed that all collected information provided by the literature is found to be valid, reliable, and accurate. The investigation has also assumed that all students within the selected experimental (funded) and volunteer control schools understood the intent of the Wisconsin Fresh Fruit and Vegetable Program, and the reasons for their involvement in the research. It was also assumed that students would participate in the completion of the survey; that the teachers had the same survey distribution methods and similar survey settings; and that each student provide all data honestly, willingly and accurately, to the best of their knowledge. Overall this research investigation has assumed that the data gathered will parallel data found within past research, stating students' intake of fruits and vegetables is low and continues to trend downward and away from the dietary recommendations set forth by the FGP (My Pyramid) and the Dietary Guidelines for Americans.

Definition of Terms

Attitude: A feeling or emotion toward a fact or state (Lee & Neiman, 214)

Behavior: How one acts, functions, or reacts in a particular way to particular situations/stimuli (Lee & Neiman, 222)

Body Mass Index (BMI): Indicator of obesity, using body weight (kg) and height (m) as measurements. $BMI = \text{weight in kg} \div (\text{height in m}^2)$ (Lee & Neiman, 555)

Dietary Guidelines for Americans (DGA): Recommendations set forth by the USDA to provide the framework for promoting healthy lifestyles and decreased

incidences of disease through proper nutrition and physical activity (Lee & Nieman, 556)

Food Frequency Questionnaire (FFQ): A questionnaire listing foods which indicates how often they are consumed during a certain time intervals-day, week, month; standard portion sizes are used and an estimate of nutrient intake is provided (Lee & Nieman, 557)

Fresh Fruit and Vegetable Program (FFVP): Program developed by the USDA to create healthier school environments by providing healthier food choices, expand the variety of fruits and vegetables, to increase children's fruit and vegetable consumption, and to positively impact present and future health of students

Fruit (F): The edible part of the plant containing the seeds (Lee & Nieman, 24)

Hypertension (HTN): Persistent elevated arterial blood pressure above the normal, accepted value of 120/80mg Hg (Lee & Nieman, 557)

Knowledge: The fact or condition of knowing something with familiarity gained through experience or association (Lee & Nieman, 34)

National Health and Examination Survey (NHANES): Continuous annual cross-sectional survey conducted by the U.S. Department of Health and Human Services that assesses food intake, height, weight, blood pressure, vitamin and mineral levels, and other health parameters in a statistically selected group of Americans (Lee & Nieman, 559)

Obesity: An excessive accumulation of body fat (Lee & Nieman, 560)

Overweight: Body weight in excess of a particular standard and sometimes used as an index of obesity (Lee & Nieman, 560)

Prevalence: The existing cases of a disease or another condition in a given population at a designated time (Lee & Nieman, 560)

Twenty-Four Hour Recall: A method of dietary recall in which a trained interviewer asks the subject to remember all foods and beverages eaten or drunk over the past 24 hours (Lee & Nieman, 562)

Type 2 Diabetes Mellitus (T2DM): a chronic condition in which beta-cells within the pancreas neither produce nor utilize glucose properly. Overweight and obesity serve as precursors to T2DM development (Lee & Nieman, 517)

United States Department of Agriculture (USDA): Department that sets the nutrition recommendations for the United States population; ex: the Dietary Guidelines for Americans 2005, Food Guide Pyramid (Lee & Nieman, 87)

Vegetable (V): The edible stems, leaves, and roots of a plant (Lee & Nieman, 26)

Limitations of the Study

Limitations have been determined before, during and throughout this research investigation. Two limitations were established prior to the start of the investigation. The first limitation stems from the research that has been conducted prior to the 1990s. Past data has been collected primarily through the use of FFQs in which participants typically underestimate the quantity and quality of food and beverage intakes. The use of FFQs also brings forth questions regarding the specificity of foods eaten and recorded – the type, quality, consistency, and preparatory methods of foods eaten. The second limitation of this research investigation is defined by the quantity of parental consent given, which ultimately influenced the number of students that participated in this research investigation.

Methodology

The remainder of this research paper will discuss the methodology behind the Wisconsin Fresh Fruit and Vegetable Program, subject selection and description, instrumentation, and the data collection procedures that include data entry, analysis, and interpretation of the twenty-five selected experimental (funded) and volunteer control schools. It will also provide future recommendations and suggestions of improvement for future researchers conducting similar investigations.

Chapter II: Literature Review

A discussion of childhood and adolescent fruit and vegetable consumption begins this second chapter, followed by typical intake patterns and dietary trends of these populations. The existing nutritional programs are discussed next, all of which aim to enhance the health of school-aged children and adolescents through the promotion of proper diet, adequate physical activity and healthy (healthier) lifestyle behaviors. The chapter also includes, and then concludes with a detailed discussion of one such nutritional program, the Fresh Fruit and Vegetable Program, whose main goal is to increase fruit and vegetable consumption among school-aged children and adolescents.

Diets influence all aspects of life – from physical and cognitive growth and development to overall health. Diets also reduce the risk factors for developing certain diseases and conditions. Despite the importance of proper nutrition, the diets of children and adolescents fall short of the recommended dietary standards set forth by both the Food Guide Pyramid (FGP, but as of January 2006 is currently known as My Pyramid) and the Dietary Guidelines for Americans (DGA). Since the late 1960s numerous studies have been conducted to identify child and adolescent nutritional inadequacies and deficiencies, with current research focusing on the prevention of childhood and adolescent obesity (Cruz, 2000).

As a complex multi-factorial chronic disease whose mechanisms are not fully understood, obesity is reaching epidemic proportions (Cruz, 2000). Various social, environmental, and lifestyle factors combine to influence the dietary preferences and physical activity habits of children and adolescents across the nation. Among the changing dietary trends and physical activity habits, three factors have been determined

to contribute to the triangulation of causes for the obesity epidemic – genetics, inadequate dietary intake, and decreased physical activity (Swallen et al, 2005).

With these incidences of obesity rising within the school-age populations, diet and physical activity have become the primary focus for a number of research studies. The third National Health and Examination Survey (NHANES III, 1988-1994) is one study in which two factors, diet and physical activity, are compared (Martin, 2005). In this national study, multiple twenty-four hour dietary recalls were collected, examined, and analyzed. Researchers formulated two major and concurrent conclusions. Sixteen percent (16%) of children and adolescents are presently obese and, with the excess weight, have increased risk factors for developing a variety of diseases and conditions such as: insulin resistance, hyperinsulinemia, type II Diabetes Mellitus (T2DM), glucose intolerance, coronary heart disease (CHD), hypertension (HTN), stroke, and certain cancers (NHANES III, 1988-1994, Nemet et al, 2005).

One postulation that has been provided for the rise in the body weights of children and adolescents is due to the increased number of calories students consumed each day. Students' caloric intake has steadily increased over the past two decades, and results from larger portion sizes, heightened consumption of both convenience and fast foods, and greater intakes of sugary, sweetened food and drink (Herbold & Frates, 2000). Children and adolescents who over-consume these non-nutrient dense foods typically fail to meet the Food Guide Pyramid (My Pyramid) and the Dietary Guidelines for Americans recommendations. Failure to meet the recommendations result in a large percentage of school-age children and adolescents to be deficient in vitamins A, B6, C, D, E, and folic acid (Herbold & Frates, 2000).

The preferences for sugary food and beverage intakes in childhood and adolescence lead to increased consumption of sugar, primarily in the form of carbonated beverages and sugared cereals. Over-consumption of such sugary foods and beverages has been found to inversely relate to poor quality diets, which in turn, contributes to childhood obesity (Martin, 2005). Also stated in Martin (2005), soft drink consumption for both children and adolescents have increased forty-eight percent in studies conducted between 1977-1978 and 1994-1995, with the mean soft drink consumption among eight to sixteen year olds increasing from five to twelve fluid ounces per day during those years, respectively (Martin, 2005). The increase in carbonated beverages contributes to an increase in daily calories, a decrease in protein intake and an overall decrease in nutrients; and an overall deficit of nutrients, largely in the form of fruits and vegetables (French, Lin, & Guthrie, 2003).

Fruits and vegetables are the foundation of a healthy diet. Packed with vitamins, minerals, fiber, and various phytochemicals, fruits and vegetables are essential to adequate growth and development during childhood and adolescence. Inadequate fruit and vegetable intake is an on-going problem among children and adolescents, as a majority consume less than the "5-a-Day" recommendation made by the United States Department of Agriculture, Food and Nutrition Services (USDA – FNS), the FGP (My Pyramid) and the DGA. Inadequate fruit and vegetable intake increases the risk factors for developing the myriad of chronic diseases previously mentioned (Reynolds et al, 1999).

Publicity has been given to the research that has been conducted over the past two decades. This research has regarded the health benefits of a diet rich in fruits and vegetables. These past studies first began with a focus on adults, but have recently focused on the children and adolescent populations, aiming to determine fruit and vegetable intake patterns within these populations. One study conducted by the Department of Health and Children (2003) proposed to reveal a correlation between the positive health benefits of a diet rich in fruits and vegetables among school-aged children and adolescents. The investigation determined thirty-six percent (36%) of school-aged girls and twenty-nine percent (29%) of boys reported eating one or more pieces of fruit per day, while forty-three percent (43%) of girls and thirty-seven percent (37%) of boys ate one or more servings of vegetables each day (Department of Health and Children, 2003). A similar longitudinal study conducted within the United Kingdom identified changes in both the consumption patterns and intake behaviors within children and adolescents. The study determined that although most children and adolescents were aware of their health benefits, intake levels of fruits and vegetables within both age groups failed to meet the recommended FGP (My Pyramid) and DGA guidelines, as evidenced by decreased self-reported intake levels (Department of Health and Children, 2003).

Fruits and vegetables are tasty, versatile, quick and easy to prepare, and loaded with vitamins and minerals. They are also low in calories, fat, sugar, and are full of fiber (Department of Health and Children, 2003). Fruits and vegetables are important for the prevention of coronary heart disease, high blood pressure, and certain cancers (Potter J, Finnegan J, & Gurnard J, 2000). A large portion (52%) of the nation's school-aged

children and adolescents fail to consume adequate quantities of fruit and vegetables each day, leading to the nutritional deficiencies of certain vitamins and minerals, and also increasing the risk factors for developing diseases and health conditions later in life, as mentioned earlier (USDA, 1993). According to the study, the average six to eleven year old eats only three and a half servings of fruits and vegetables each day, roughly half the amount recommended by the FGP (My Pyramid). Fewer than fifteen percent (15%) of elementary school-aged children and adolescents eat the recommended five or more fruit and vegetable servings each day (USDA, 1993).

As fruits and vegetables are proven to be protective against a gamut of diseases and health conditions, the Dietary Guidelines for Americans (2005) and the Food Guide Pyramid (My Pyramid) have set fruit and vegetable recommendations and developed nutritional programs. The "5-a-Day," "Eat a Rainbow of Colors Each Day," and the "Healthy Foods for Healthy Kids Initiative" are a few of the many nutritional programs developed to help increase fruit and vegetable consumption within the schools (USDA, 2005). These programs aim to increase daily fruit and vegetable consumption by implementing nutrition education curricula in the classroom (Potter, Finnegan, & Guinnard, 2000).

Previous research by the Minnesota Department of Health (2004) documents fruit and vegetable intake within children and adolescents to be a continuous and on-going problem. Several studies have been conducted to determine whether an association exists between gender and fruit and vegetable consumption. The Continuing Survey of Food Intakes by Individuals (CSFII) is one such study that was developed to determine intake levels in those students aged two to eighteen years. The CSFII demonstrated that the

average intake of fruits and vegetables increased with age. In this study, the average intake increased from zero servings per day in the younger years to almost four and a half servings (4 ½ servings) per day in boys and three and a half servings (3 ½ servings) for girls aged twelve and older, respectively. The CSFII also established that girls twelve to seventeen year old ate greater amounts of fruits and vegetables each day, whereas boys of the same age ate greater varieties of fruits and vegetables (MNHD, 2004).

The National Journal of Health Behavior, as cited in Martin (2005), conducted a study examining fruit and vegetable intake patterns in over sixteen thousand boys and girls in grades nine through twelve. This study determined that seventy-four percent (74%) of the boys and girls surveyed consumed less than the recommended five servings of fruits and vegetables each day. A similar study conducted by Baur (2002) evaluated the fruit and vegetable intake patterns of Australian boys and girls aged two to eighteen years. Over three thousand participants in this study were given twenty-four hour dietary recalls as part of the 1995 Australian National Nutrition Survey. Both the frequency and variety of fruits and vegetables consumed were the focus for this study. Each child and adolescent who ate at least one serving of fruit and vegetable on the day the survey was conducted was eligible to participate. Intake levels were compared with the recommendations set forth by the 2000 Australian Guide to Healthy Eating and the 1985 Australian National Dietary Survey. Results from the self-reported survey indicate that twenty-five percent (25%) and thirty-three percent (33%) of the survey's participants did not eat the recommended amounts of fruits or vegetables each day, respectively. Self-reporting results from this study also identified adolescents as less likely to include fruit, but more likely to include vegetables in their diets than younger children (Baur, 2002).

While some fruit and vegetable studies (Dietz & Robinson, 2005; French, Lin, & Guthrie, 2003) have focused on intake trends within children and adolescents, few have compared total intake with the overall health of the participants. A study by Reynolds et al (2005) specifically looked at the association between fruits, vegetables and overall health, and compared baseline intake levels with the recommendations set forth by the National Cancer Institutes' Five a Day for Better Health Program. Utilizing three, twenty-four hour dietary recalls from three distinct high schools, the study concluded that girls ate greater amounts of fruits and vegetables than boys of the same age. Another comparison study conducted in Scotland by French, Lin, & Guthrie (2003) discovered the specific fruit and vegetable intakes of over three thousand children and adolescents aged ten to eleven and fourteen to fifteen years. Research indicated that boys ate more beans and potatoes, while girls ate more salads and raw fruits each day (French, Lin, & Guthrie, 2003). Other comparative studies that have been conducted on children and adolescent populations have determined similar results to those above; that girls eat more raw fruits and vegetables than boys, while boys eat more variety of fruits and vegetables (Dietz & Robinson, 2005).

In an investigation of children and adolescents' fruit and vegetable intake, Michael Maloney of Bord Glas determined fruit and vegetable intakes to be low among younger populations. As a result of the findings, an intervention program, the *Bangor Programme*, was developed with the primary goal of increasing fruit and vegetable consumption in over three hundred schools. Increased consumption would be encouraged through the use of educational videos, peer modeling, integration at lunchtime, and by using fruits and vegetables as a reward for positive (good) behavior. Results of the

Bangor Programme indicate that children and adolescent's vegetable consumption increased from twenty-four percent (24%) to sixty-two percent (62%), while fruit consumption increased from fifty-seven percent (57%) to seventy-two percent (72%) during a ten year timeframe (Department of Health and Children, 2003).

The National Health and Lifestyle Survey (SLAN) is another study developed to determine whether a correlation exists between higher intakes of fruits and vegetables and positive health behaviors among selected children and adolescents (Department of Health and Children, 2003). The Health Behavior in School-Aged Children Study (HBSC) conducted a parallel study to determine fruit and vegetable intake levels among five thousand school-aged children and adolescents. Results of both studies were identical, indicating students with higher fruit and vegetable intakes reported better health and health-like behaviors than their non-complying peers. The study also found that those with higher fruit and vegetable intakes reported excellent levels of health, engaged in daily physically activity more often, brushed their teeth more frequently and tried alcohol and cigarettes less often (Department of Health and Children, 2003).

Dietary trends and intake patterns have been studied within both elementary and secondary schools. These studies have aimed, and continue to aim at determining the efficacy of school meal participation in regards to fruit and vegetable consumption. The Continuing Survey of Food Intakes by Individuals (CSFII) was one study that aimed to examine the changes in intake of five thousand school-aged children and adolescents aged six to eighteen years between 1989-1991 and 1994-1996. Results of the CSFII concluded that children and adolescents consume excessive amounts of dietary fat, sugar, and sodium (salt). Teenage girls were also found to be at heightened risk for nutritional

deficiencies, as female diets tend to be deficient in vitamins A and E, zinc, folate, and magnesium. Iron and phosphorus deficiencies were found to be more common among girls than boys of similar ages. The CSFII also determined thirty-three percent (33%) of children and adolescents met the recommended amounts of fruits, while forty-five percent (45%) met the vegetable recommendations. Adolescent girls were found to have lower intake of vegetables, consuming only three servings of vegetables a day, when compared with the almost four servings a day for adolescent boys (USDA, 1993). CSFII results also indicate that the overall caloric intake for both genders increased between the survey dates; roughly three-fourth of children and adolescent diets were found to be high in sugar, with added sugar (primarily in the form of sodas and fruit drinks) making up twenty percent (20%) of the total daily calories (USDA, 1993).

The previously mentioned studies have demonstrated that fruits and vegetables are a vital component of balanced diets within school-aged children and adolescents. The United States Department of Agriculture's Food and Nutrition Service division (USDA, FNS) promote higher intake in all forms of fruits and vegetables – fresh, frozen, canned, dried, and juices – among the nation's school-aged children and adolescents. In addition, the Food Guide Pyramid (My Pyramid) and the Dietary Guidelines for Americans are also used to promote heightened intakes of fruits and vegetables. These nutrition programs encourage greater consumption of fruits and vegetables by offering fruits and vegetables, of wider variety, throughout the school day (USDA et al, 2005).

The USDA developed the Fresh Fruit and Vegetable Program (FFVP) as one such nutrition program aiming to increase intakes of fruits and vegetables, in addition to examining students' knowledge, attitude, behavior, and willingness to try new and

different fruits and vegetables (USDA et al, 2005). The primary focus of the Fresh Fruit and Vegetable Program is to bring fresh produce (fruits and vegetables) into the schools for distribution among the students. By introducing children and adolescents to new and different fruits and vegetables, the FFVP attempts to demonstrate that fruits and vegetables are healthy and tasty alternatives to the high sugar, fat, and sodium (salt) snacks that are typically consumed (USDA et al, 2005). A goal of the Fresh Fruit and Vegetable Program is to expand the varieties of fruits and vegetables being consumed by its participants on a daily basis.

The Fresh Fruit and Vegetable Program designed a pilot program to operate during the 2002-2003 school year. One-half of the schools participating in the pilot began the program in October 2002, while the remainder launched their programs during the months of November and December 2002. Participating schools included students from diverse backgrounds, as assessed by the proportion of students certified as eligible for free and reduced school lunches. Enrollment within the FFVP pilot program ranged from sixty-six to two thousand students, with the average enrollment from each school was six hundred and seven students.

With acceptance into the pilot program, the Food and Nutrition Services distributed funds to the participating schools, based upon the school's individual enrollment (USDA et al, 2005). Roughly ninety-four dollars per student was made available to each pilot school site. The pilot sites had various strategies for distributing fruits and vegetables to their students, varying the: delivery mechanisms (kiosks, classrooms, or a combination of both); timing of delivery of fruit and vegetable (before, during, or after school/school activities); and educational and/or promotional activities

(nutrition education incorporated with fruit and vegetable classroom curriculum and activities). Under the Fresh Fruit and Vegetable Program agreement, each pilot school must offer their students fresh or dried fruits and vegetables at regular intervals before, during, or after each school day (USDA et al, 2005). Flexibility was given to each pilot site, and each site determined their own types of the fruits and vegetables offered; their own school's methods of program development and implementation; and the specific times and places for fruit and vegetable distribution. (USDA et al, 2005). Although flexibility was given to each pilot school regarding the nutrition education and promotional activities within the classrooms, they were not required. Though not required, sixty-five percent (65%) of the schools integrated nutrition education within the classroom; thirty-four percent (34%) offered nutrition education outside the classroom; sixty-three percent (63%) offered fruit and vegetable informational materials in the form of pamphlets and brochures; and sixty percent (60%) offered materials in the form of T-shirts and posters (USDA et al, 2005).

Each pilot school also selected their own method in which to deliver fruits and vegetables to their students. Classrooms, hallways, school and nurse's offices, foodservice areas, and buses were the most popular choice for fruit and vegetable offerings. Types of delivery systems each school used was dependent upon the age and grade of the students, availability of fruits and vegetables (in-season or out-of-season), and the availability and accessibility to areas set-up for delivery. Fifty percent (50%) of elementary schools used the classroom service methods while twenty-nine percent (29%) of elementary schools used a combination of the kiosks methods and the classroom methods. Middle schools and high schools mainly used a combination of classroom and

kiosk delivery methods (USDA et al, 2005). Pilot sites also selected their own time of when they would distribute fruits and vegetables to their students. Eighty-three pilot schools had multiple distribution times spread throughout the school day. Eighty-five schools offered fruits and vegetables during the morning; sixty-six offered fruits and vegetables during the afternoon; and twenty-nine offered fruits and vegetables before the beginning of the school day.

Based upon the flexibility each pilot school experienced, the specific types of fruit and vegetables that were offered were also studied (USDA et al, 2005). More variety of fruits was served than vegetables. Apples and bananas were the most popular; most frequently offered fruit, while carrots and celery were the most popular, most requested and most offered vegetable. Ready-to-eat trays were served in thirty-nine percent (39%) of schools. Fruits, vegetables, and/or a combination of juices were served in twenty-two percent (22%) of the participating schools. Ninety-six percent (96%) of the schools bought pre-cut fruits and vegetables, along with ready-to-eat items (salad dressings and assorted dips) that would accompany the fruits and vegetables (USDA et al, 2005).

At the year-long program's conclusion, the Fresh Fruit and Vegetable Program was evaluated by the Economic Research Service (ERS), a division of the USDA. The evaluation of the first pilot program of the FFVP comprised four detailed and specific components: monthly records of fruit and vegetable purchases; implementation and reception reports; site visits; and focus groups and structured interviews of managers, foodservice staff, teachers, principals, parents and students. The evaluation helped to determine program results and provided recommendations for future Fresh Fruit and Vegetable Programs. The findings identified during the evaluation process were those

concerned with the program management and implementation; the perceived value and the overall effect of the pilot program; sales information and relative data; the feasibility of the program's continuation; the expansion of the FFVP to include other states; and the overall cost and the overall acceptability of the Fresh Fruit and Vegetable Program (USDA et al, 2005).

Within the one hundred and five schools participating in the first FFVP pilot, twenty-nine schools experienced problems with fruit and vegetable availability; fifteen schools had problems with the quality of the fruits and vegetables made available; seven schools had problems with the fruits and vegetables they offered perishing prior to serving; two schools had problems with leftovers; and two schools had problems with excessive waste (USDA et al, 2005). Due to the problems the pilot school sites experienced, changes occurred from the program's initiation. Thirty-eight schools changed their delivery methods; fourteen schools did not maintain their original approach; eleven schools wanted to increase student involvement; three schools aimed to eliminate mess; two schools aimed to increase participation; and eight schools decreased the time students required to eat, along with improved various food hygiene methods (USDA et al, 2005).

Despite the problems encountered, the overall outcome of the first pilot program of the Fresh Fruit and Vegetable Program was thought to be a positive experience among all involved – students, parents, teachers, principals, foodservice staff, and managers. The pilot concluded that ninety-three percent of the fruit and vegetable servings offered were consumed during the week of November 18 to November 22, 2002; and ninety-two percent of the fruit and vegetable servings offered were consumed during the week of

December 9 to December 13, 2002 (USDA et al, 2005). The FFVP was thought to increase the overall consumption of fruits and vegetables, and decrease the number of unhealthy snacks students brought to school from home. An increased number of parents reported that their children and adolescents were less hungry upon returning from school, and had requested fruits and vegetables more frequently eaten at home (USDA et al, 2005).

Parents believed that the first FFVP pilot gave students the opportunity to try fruits and vegetables without pressure from outside sources. With the increased intake of fruits and vegetables, students report a better ability to recognize the health benefits of consuming a diet rich in fruits and vegetables. Overall, students reported they had positively changed their eating habits, increased their willingness to try fruits and vegetables and increased their consciousness of eating junk food due to the FFVP pilot program (USDA et al, 2005). Participating school staff members believe the long-term pilot program decreased the risk factors for and the incidence of childhood and adolescent obesity. Those school staff members also believe the program helped to encourage healthier food intake and increase the students' awareness and willingness to try a greater variety of new and different fruits and vegetables. The FFVP pilot was shown to provide food to those children and adolescents who would otherwise go hungry throughout the school day (USDA et al, 2005).

A majority of those involved in the first FFVP pilot suggest both a continuation and an expansion of the program to reach and include other states (USDA et al, 2005). Flexibility was one of the key successes of the Fresh Fruit and Vegetable Program's first pilot. Flexibility allowed each school to choose when, where, and how they implemented

the FFVP, in addition to the mixture and quantities of fruits and vegetables they offered to their students. Each school was allowed to determine its own implementation plan, and carry it out, resolving problems as necessary. The flexibility allows for varying the types of fruits and vegetables that are offered, the delivery methods, staff and student involvement, and the nutrition education/classroom activities that accompany fruits and vegetables offerings. These changes allowed for improvements to be made within the program, and allowed for a more safe, smooth, and successful pilot (USDA et al, 2005).

The results of the Fresh Fruit and Vegetable Program's pilot program call attention to the strengths and weaknesses within the nutritional quality within the diets of school-aged children and adolescents. From the first pilot program a number of successful approaches have been implemented in the schools across the country to obtain greater awareness and higher daily consumption of fruits and vegetables (Potter, Finnegan, & Guinnard, 2000). By increasing student awareness and willingness to try various fruits and vegetables, the incidence of chronic diseases and health conditions should inversely decrease, as students near the FGP (My Pyramid) and DGA recommendations for healthier eating and lifestyle behaviors (habits).

Although the Fresh Fruit and Vegetable Program is one of many successful approaches, additional research that utilizes a national representative random sample is needed to address the effects of nutrition education independent of free food. Further research is needed for comparing pilot schools to typical schools, as well as for continual improvement within the FFVP. Research that aids in determining overall diet quality and intake patterns within children and adolescents, along with their overall health implications, is needed for improved health and decreased incidences of obesity.

Chapter III: Methodology

This chapter will discuss the methodology behind the Wisconsin Fresh Fruit and Vegetable Program, the program's subject selection and description, program instrumentation, and data collection procedures that include data entry, data analysis and data interpretation.

Subject Selection and Description

Twenty-five schools (experimental and volunteer control schools) throughout Wisconsin were selected for participation within the FFVP, chosen to ensure a representative variety of demographics. Schools were chosen for their diversity in order to determine how well the Fresh Fruit and Vegetable Program operated in a variety of situations and settings, for example rural versus urban settings; elementary schools versus secondary schools; and low, free/reduced or full price lunch eligibility.

All students within the twenty-five experimental (funded) and volunteer control schools were asked to participate in the evaluation of the implementation of the Fresh Fruit and Vegetable Program within the state of Wisconsin. Students were not formally recruited, rather students in fourth, seventh, and ninth grades during the 2005-2006 school year who would be fifth, eighth, and tenth graders in the 2006-2007 school year were asked to voluntarily complete the evaluative measures for the Fresh Fruit and Vegetable Program. Food Service Directors from the twenty-five funded (experimental) schools were also asked to voluntarily complete the evaluative measures for the Fresh Fruit and Vegetable Program. All participating students from the twenty-five funded (experimental) and volunteer control schools were surveyed. Participating students represented a large mixture from diverse ethnic backgrounds, various income levels and

socioeconomic status, as assessed by the proportion certified as eligible for free and reduced-price school lunches.

Students in fourth, seventh, and ninth grades during the 2005-2006 school year from the twenty-five funded (experimental) schools in Wisconsin were asked to complete one pre-survey and two post-surveys between March 2006 and March 2007. Volunteer control schools, selected on similar characteristics, were included in the program and those students in the fourth, seventh, and ninth grades within those volunteer schools were surveyed in the same manner as those in the funded (experimental) schools. Student participation enabled the collection of pre and post-measures to determine the impact of the program; with the results used to secure future, more permanent funding of the Fresh Fruit and Vegetable Program within Wisconsin. The variables used in the evaluation are outlined below:

- *Dependent Variable:* Fruit and vegetable consumption (behavior); awareness of various fruits and vegetables (knowledge); willingness to try new and different fruits and vegetables (behavior); acceptance of fruits and vegetables as part of the school breakfast and lunch meals (behavior); and reported consumption of the less healthy foods (behavior).
- *Independent Variable:* Participation or non-participation within the Wisconsin Fresh Fruit and Vegetable Program
- *Other Variables:* Gender, age and ethnicity

Instrumentation

Those collaborating in the Wisconsin Fresh Fruit and Vegetable Program research, and interested in the results, developed a survey that was distributed to the

students in the twenty-five funded (experimental) and volunteer control schools. The survey measured students' behavior, attitude, and willingness to try a variety of fruits and vegetables over a twelve month period (March 2006 to March 2007). The survey collected student demographics, as well as students' awareness of various fruits and vegetables, and their willingness to try new and different fruits and vegetables. A Food Frequency Questionnaire (FFQ) was given to the students, and measured the frequency in which they reported consuming a specific food item in the past twenty-four hours, over a three-day timeframe.

Demographic data within the survey included questions regarding students' gender, ethnicity, age, grade level, the primary language spoken while at home and students' awareness and ability to purchase free or reduced school lunches. Other demographical information illustrated students' past seven day physical activity and meal patterns; frequency of fast food patronage; and television, computer, and video game limitations and usage. The final portion of demographical information summarized students' knowledge, acceptability, and willingness to try new and different fruits and vegetables alone or alongside the school breakfast or school lunch meals.

The fruit and vegetable "recognition questions" and subsequent "follow-up questions" comprise another portion of the FFVP survey and were based upon a variety of pictures of fruits and vegetables taken from Microsoft Word 2004's ClipArt selection. Pictures of the fruits and vegetables measured students' ability to recognize fruits and vegetables and, if they have not previously eaten the particular fruit or vegetable, determine whether they would try them based upon the picture provided.

Students were also asked to complete a Food Frequency Questionnaire (FFQ), in order to determine the frequency in which they ate or drank specific food/drink items within the past twenty-four hours. The students completed the same Food Frequency Questionnaire for three days, giving an overall picture of typical daily intake.

As this survey was developed specifically as a result of the Wisconsin Fresh Fruit and Vegetable Program, neither validity nor reliability tests were conducted.

Data Collection Procedures

A fifteen-page survey was distributed to fourth, seventh, and ninth grade elementary and secondary teachers in March 2006. The teachers distributed these surveys to their students, asking them to complete the surveys (ensuring participation), but allowing for students to decline participation within the Wisconsin FFVP.

Utilizing a paper and pencil formatted survey, a fifteen-page pre-survey measure was taken in all twenty-five funded (experimental) and volunteer control schools in March 2006, along with two post-survey measures at various times throughout the twelve month period. The pre-survey was administered to current fourth, seventh, and ninth graders during the 2005-2006 school year to gain demographical data, current knowledge and willingness to try new and different fruits and vegetables, specific fruit and vegetable acceptability and typical dietary intake. The same students will be surveyed as fifth, eighth, and tenth graders during the 2006-2007 school year. Volunteer control schools were selected based upon similar characteristics to the twenty-five experimental (funded) schools, as a 1:1 match was attempted. The proposed data collection for all schools included the following:

- March 2006: initial pre-survey measure with a full set of survey questions including measures for fruit and vegetable frequency and three consecutive days of a 24-hour FFQ
- May/June 2006: post-survey #1 measure with a full set of survey questions including measures for fruit and vegetable frequency and three consecutive days of a 24-hour FFQ
- March 2007: post-survey #2 measure with a full set of survey questions including measures for fruit and vegetable frequency and three consecutive days of a 24-hour FFQ

All surveys will be administered within a school setting. Completed surveys will be collected and sent to the University of Wisconsin-Eau Claire. Once the data is entered and analyzed, final results will be given to the Wisconsin Department of Health and Family Services in a data-sharing agreement between the them and their collaborative partnerships with the University of Wisconsin-Eau Claire, University of Wisconsin-Madison, University of Wisconsin-Stout, and the Marshfield Clinic Epidemiology Research Center.

Students will be tracked from each of the three evaluative points (pre-survey, post-survey #2 post-survey #3). Only the primary researchers will be aware of the student's identity, via the student's name, as names were matched at all three points during the course of the FFVP. The matching of names was solely for the use of data analysis purposes, and any future information released will be reported in aggregate and contain no personal identifiers.

Data Analysis

A number of statistical analyses were used in this study. The Statistical Program for Social Sciences, version 12.0 (SPSS, 2002) was used to analyze the data. *Descriptive and Frequency Statistics* were run on the demographic data to determine the overall frequency and percentage of participants' responses for each survey question. A *Cross-Tabulation Analysis* was created to determine the number and percentage of those students who first matched the correct name of the fruit or vegetable to the correct pictures, and then attempted to determine whether they "would try," "might try," or "would not try" if they have never eaten the particular fruit or vegetable. *Multivariate Testing* was conducted to determine whether statistical significance exists between consumption and the days of the dietary recall, and also between consumption, gender and the days of the dietary recall. Values for all statistical analyses were noted as significant at the 99.5% confidence level, with statistical significance at $p < .005$.

Limitations

Many limitations have been determined within the methodology portion of the Fresh Fruit and Vegetable Program study. These limitations include the students themselves, individual reading levels, personal interpretations of the questions, and students' ability to comprehend the questions, while providing an accurate and honest answer.

Students were limited by the survey in the areas of comprehension and understanding of both the content of the survey questions as well as the intent of the survey and the overall goal of the Fresh Fruit and Vegetable Program. One area in particular where it was assumed that students did not understand the questions was the

entire third portion of the survey (page eleven of the Fresh Fruit and Vegetable Program survey, see Appendix A for full FFVP survey). This third portion asked students to “put a check next to the fruits and vegetables they have ever tried” and also “circle the fruits and vegetables they like.” These questions appeared to pose difficulty for a majority of students, as answers varied and conflicted with reported responses among students. Some students failed to check or circle the listed fruits and vegetables, some only checked and others only circled, and many failed to answer the entire section of questions. These difficulties resulted in the data enterer making numerous assumptions regarding what the student “thought” or “meant” according to their interpretation of the question’s wording. For lack of reliability and accuracy in the students’ response and the researchers’ interpretation, this portion of the survey was considered invalid and neither statistically analyzed nor considered in the Wisconsin’s Fresh Fruit and Vegetable Program’s overall conclusion.

Another portion of the survey that posed limitations for the student was in the FFQ, as found on pages twelve through fourteen of the FFVP survey. The student circled the number of times they ate/drank the particular food/beverage, as values ranged from “zero times” to “more than five times.” In this line of questioning the correct serving size was not addressed. The absence of an appropriate listed serving size forced the data enterer to question whether the student had “more than five” servings of a food/beverage item or “just five” items. For example, when students circled that they ate “more than five servings of grapes” the data enterer had to determine whether they actually ate “more than five servings” (seventeen grapes is equal to one serving) or merely five grapes. As a result, this portion of the survey was interpreted based upon differences between a single

student's responses over the three days of the FFQ, in addition to differences between genders, and analyzed as such.

Chapter IV: Results

This chapter describes the statistical analysis conducted on the Wisconsin Fresh Fruit and Vegetable Program (FFVP) survey. Analysis of the Wisconsin FFVP divided the 14-page survey into three separate sections, which are described below along with the statistical analyses conducted to determine whether or not significant differences exist between the variables.

The *first section* of the survey included demographic questions, regarding lifestyle habits; students' willingness to try a new fruit or vegetable in different situations; and the frequency of students' consumption of fruits and vegetables accompanying the school breakfast or school lunch meal. The *second section* of the survey asked students to correctly identify and circle various fruit and vegetable pictures, with follow-up questions to determine if they have ever eaten the fruit/vegetable, and if they have never eaten that particular item, would they try it. The *third section* of the survey identified whether students have tried the listed fruit and vegetable, and if they have tried it, whether they liked it or not. The *fourth section* of the survey was the students' three-day dietary recall in which they circled the number of times they had eaten the specified fruit or vegetable over the past twenty-four hours.

Item Analysis

The *first section* of the FFVP survey attempted to gain information regarding participants' gender, age, grade level, ethnicity, whether English was spoken at home, the ability of the student to purchase free or reduced school lunches at their school, physical activity and fast food patronage habits, the frequency of family dinner/supper, student's willingness to try new or different fruit or vegetable in a variety of settings (home, school

as a snack), and the frequency of students' consumption of the fruit or vegetable accompanying the school lunch or school breakfast meal. The breakdown of the one hundred and twenty-seven students' responses is described below, in table and chart format. See Appendix A for the full Fresh Fruit and Vegetable Program survey.

Table 1: Participant Demographic Data

	Number of Participants (N)	Percentage (%)
Male	57	45%
Female	70	55%
Total (N)	127	100%

Age and Grade Level

One hundred and twenty-seven fourth grade students participated in the Wisconsin FFVP survey and all reported responses to questions: "Are you male or female?"; "What grade are you in?" and "How old are you now?" Of those surveyed, fifty-seven students were male (45%) and seventy students were female (55%). These fourth graders were between nine years and eleven years old. Twenty-nine students (22%) were nine years old; ninety students (68%) were ten years old; and six students (8%) were eleven years old. Two students (2%) failed to report their age.

Table 2: Age of FFVP Participants

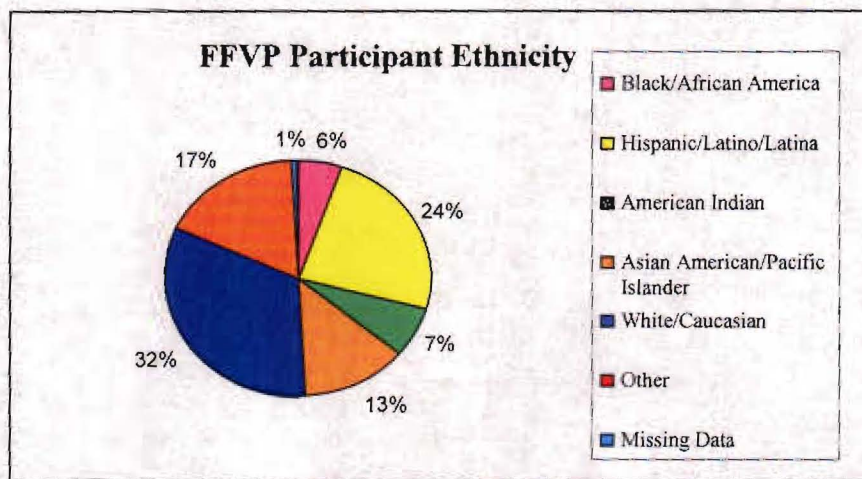
Age	Number of Participants (N)	Percentage (%)
9 years old	29	22%
10 years old	90	68%
11 years old	6	8%
Total (N)	125	98%
Missing	2	2%
Total (N)	127	100%

Ethnicity

One hundred and twenty-seven students were asked, and one hundred and twenty-six students reported answers to the question, "Which race or ethnicity describes you best?" Of those reporting, seven students (6%) stated they were Black, African American; thirty students (24%) reported being Hispanic, Latino/Latina; nine students (7%) confirmed being American Indian; sixteen students (13%) described themselves as Asian American, Pacific Islander; forty-two students (32%) declared themselves as White/Caucasian; and twenty-two students (17%) claimed themselves as "Other," not fitting into the categories identified. One student (1%) failed to respond to this question, and left their response blank.

Table 3: Ethnicity of FFVP Participants

Ethnicity	Number (N)	Percentage (%)
Black/African American	7	6%
Hispanic/Latino/Latina	30	24%
American Indian	9	7%
Asian American/Pacific Islander	16	13%
White/Caucasian	42	32%
Other	22	17%
Total (N)	126	99%
Missing	1	1%
Total (N)	127	100%

Graph 1: Ethnicity*English Spoken at Home*

One hundred and twenty-seven students were asked, and one hundred and twenty-six students answered the question, "Is English spoken as the primary language at home?" Seventy-four students (58%) reported always speaking English at home; forty-six students (36%) reported speaking English sometimes at home; and six students (5%) never spoke English in the home. One student (1%) failed to answer this question.

Table 4: Frequency of English Spoken as Primary Language at Home

	Number (N)	Percentage (%)
Always	74	58%
Sometimes	46	36%
Never	6	5%
Total (N)	126	99%
Missing	1	1%
<hr/>		
Total (N)	127	100%

Free or Reduced-Price Lunches

All 127 students were asked the question, "Are you able to buy free or reduced lunches at school?" Nine students (7%) reported paying full price for school lunches; ten students (8%) stated they met the qualifications for the reduced price lunch program; forty-seven students (37%) met the qualifications for the free school lunch program; sixty students (47%) were uncertain whether they were met the qualifications to purchase free or reduced school lunches. One student (<1%) failed to respond to this question.

Table 5: Free or Reduced-Price Lunches

	Number (N)	Percentage (%)
Full price school lunch	9	7%
Reduced-price school lunch	10	8%
Free school lunches	47	37%
Uncertain	60	47%
Total (N)	126	99%
Missing	1	1%
Total (N)	127	100%

Physical Activity

The 127 students were asked, "How often did you participate in physical activity during the last week?" Two students (<1%) reported participating in no physical activity during the last week. Four students (3%) reported participating in a physical activity one time within the past week. Thirty-eight students (30%) reported physical activity participation two to three times in the past week. Thirty-one students (25%) reported participating in a physical activity four to six times during the past week. Sixteen students (13%) reported participating in physical activity seven to ten times during the past week. Thirty-five students (28%) reported participating in physical activity more than ten times within the past week. One student (<1%) failed to report an answer the question.

Table 6: Physical activity participation within past week (7 days)

	Number (N)	Percentage (%)
0 Times	2	<1%
1 Time	4	3%
2-3 Times	38	30%
4-6 Times	31	25%
7-10 Times	16	13%
>10 Times	35	28%
Total (N)	126	99%
Missing	1	1%
Total (N)	127	100%

Fast Food Restaurant Patronage

All one hundred and twenty-seven students were asked the question and all reported responses to the question, "How often did you eat at a fast food restaurant during the past week?" Thirty-five students (28%) reported consuming no fast food within the past week; forty-one students (33%) reported consuming fast food once during the past week; thirty-five students (28%) reported eating fast food 2-3 times during the past week; six students (4%) ate fast food 4-6 times during the past week; one student (<1%) ate fast food 7-10 times during the past week; and eight students (6%) reported consuming fast food more than 10 times during the past week. One student (<1%) failed to report this question.

Table 7: Fast Food Restaurant Patronage

	Number (N)	Percentage (%)
0 Times	35	28%
1 Time	41	33%
2-3 Times	35	28%
4-6 Times	6	4%
7-10 Times	1	<1%
>10 Times	8	6%
Total (N)	126	99%
Missing	1	1%
Total (N)	127	100%

Family Dinners

One hundred and twenty-seven students were asked, "How often their family sat down and ate dinner together during the week?" Of those reporting answers to this question, thirty students (23%) reported eating dinner as a family zero times per week; sixteen students (13%) reported eating dinner as a family once per week; nineteen students (15%) reported eating dinner as a family two to three times per week; seventeen students (13%) reported eating dinner as a family four to six times per week; and forty-five students (35%) reported eating dinner as a family on all seven days of the week. All students answered this question.

Table 8: Family Dinners

	Number (N)	Percentage (%)
0 Times	30	23%
1 Time	16	13%
2-3 Times	19	15%
4-6 Times	17	13%
7 Times	45	35%
Total (N)	127	100%

Limited Television/Video Game Usage

All one hundred and twenty-seven students were asked the question, "My parents limit the amount of time I spend watching television or playing video games?" Twenty-six students (21%) reported that their parents always limit their television/video game time; seventy-one students (56%) responded their parents sometimes limited their screen time; and thirty students (23%) answered that their parents never limit their television/video game screen time. All 127 students reported responses to this question.

Table 9: Parents Limiting TV and Video Games

	Number (N)	Percentage (%)
Always	26	21%
Sometimes	71	56%
Never	30	23%
Total (N)	127	100%

Fruit at Home

One hundred and twenty-seven students were asked and all responded to the question, "How willing are you to try a new fruit at home?" Of the 127 students responding, fourteen students (11%) replied they would not try the new fruit at home; forty-nine students (39%) responded they might try the new fruit at home; and sixty-four students (50%) stated they would try the new fruit at home. All 127 students reported responses to this question.

Fruit at School

All one hundred and twenty-seven students were asked the question, "How willing are you to try a new fruit at school?" Ten students (8%) reported they would not try a new fruit at school. Fifty-five students (43%) replied they might try a new fruit at school. Fifty-nine students (46%) reported they would try the new fruit at school. Three students (2%) failed to answer this question.

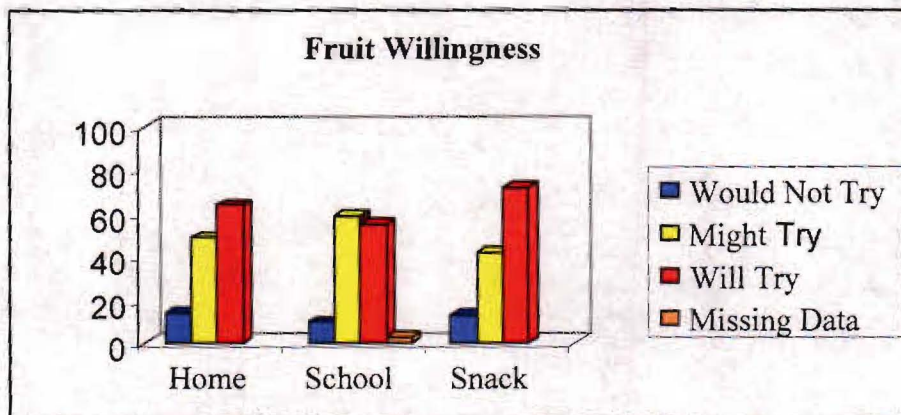
Fruit as Snack

One hundred and twenty-seven students were asked the question, "How willing are you to try a new fruit as a snack instead of chips or candy?" Thirteen students (10%) replied they would not take fruit instead of chips/candy; forty-two students (33%) stated they might try fruit over chips and candy; and seventy-two students (57%) reported they would choose fruit over snack foods like chips and candy. All 127 students reported responses to this question.

Table 10: Willingness to try Fruit in a Variety of Settings

	Number (N)	Percentage (%)
Home		
Would Not	14	11%
Might	49	39%
Would	64	50%
Total (N)	127	100%
School		
Would Not	10	8%
Might	55	43%
Would	59	46%
Total (N)	124	98%
Missing	3	2%
Total (N)	127	100%
Snack		
Would Not	13	10%
Might	42	33%
Would	72	57%
Total (N)	127	100%

Graph 2: Willingness to Try Fruit in a Variety of Settings



Vegetable at Home

All one hundred and twenty-seven students were asked the question, "How willing are you to try a new vegetable at home?" Twenty-three students (18%) reported that they would not try the new vegetable at home; sixty-four students (50%) replied they might try the new vegetable at home; and forty students (32%) stated that they would try a new vegetable at home. All students reported responses to this question.

Vegetable at School

All one hundred and twenty-seven students were asked, "How willing are you to try a new vegetable at school?" Twenty-eight students (22%) replied they would not try the new vegetable at school; sixty-three students (50%) reported they might try the new vegetable at school; and thirty-six students (28%) stated that they would try the new vegetable offered at school. All students reported responses to this question.

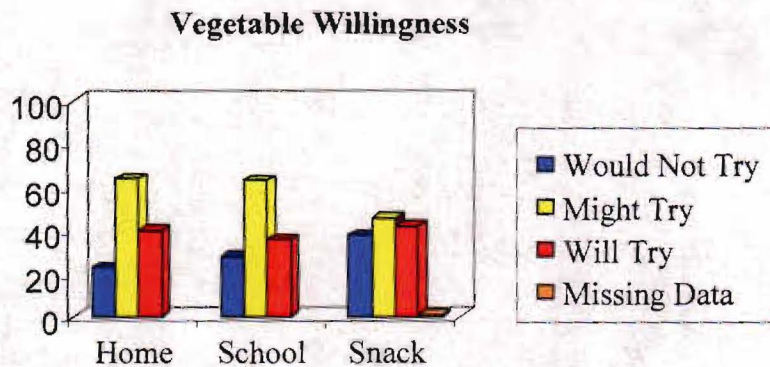
Vegetable as Snack

One hundred and twenty-seven students (n=127) were asked the question, "How willing are you to try a new vegetable as a snack?" Thirty-eight students (38%) stated that they would not try a new vegetable over chips and candy; forty-six students (36%)

reported that they might try a new vegetable instead of chips and candy; and forty-two students (33%) replied that they would try a new vegetable as a snack instead of the chips and candy. One student (<1%) failed to respond to this question.

Table 11: Willingness to Try Vegetables in a Variety of Settings

	Number (N)	Percentage (%)
Home		
Would Not	23	18%
Might	64	50%
Would	40	32%
Total (N)	127	100%
School		
Would Not	28	22%
Might	63	50%
Would	36	28%
Total (N)	127	100%
Snack		
Would Not	38	30%
Might	46	36%
Would	42	33%
Total (N)	126	99%
Missing	1	1%
Total (N)	127	100%

Graph 3: Willingness to Try Vegetables in a Variety of Settings*School Breakfast Frequency*

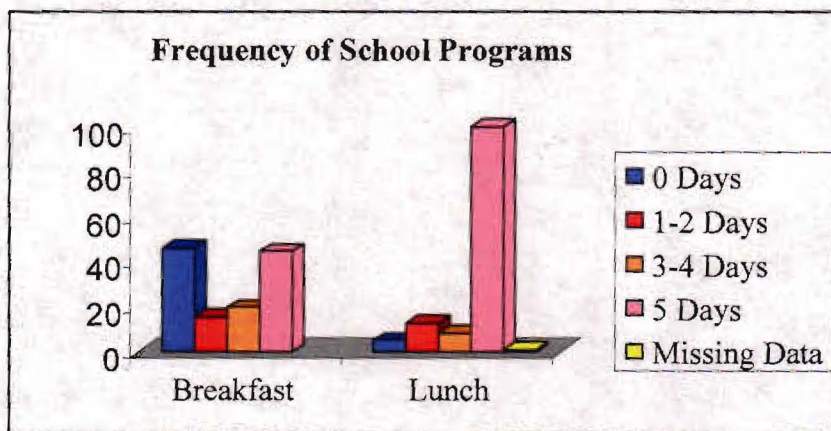
All one hundred and twenty-seven students were asked the question, “How often do you purchase the school breakfast meal?” Of those reporting answers, forty-six students (36%) stated that they have never purchased the school breakfast; sixteen students (13%) purchase the school breakfast 1-2 days per week; twenty students (16%) purchase the school breakfast 3-4 days per week; and forty-five students (35%) purchase the school breakfast all 5 days of the week. All 127 students reported responses to this question.

School Lunch Frequency

All 127 students were asked the question, “How often do you purchase the school lunch meal?” Of those reporting answers, five students (4%) stated they have never purchased the school lunch; thirteen students (10%) purchase the school lunch 1-2 days per week; eight students (6%) purchase the school lunch 3-4 days per week; and one hundred students (79%) purchased the school lunch all 5 days of the week. One student (<1%) failed to report a response to this question.

Table 12: Frequency of School Breakfast, Lunch Consumption

	<i>Breakfast</i>		<i>Lunch</i>	
	Number (N)	Percentage (%)	Number (N)	Percentage (%)
Never	46	36%	5	4%
1-2 Days	16	13%	13	10%
3-4 Days	20	16%	8	6%
5 Days	45	35%	100	79%
Total (N)	127		126	99%
Missing	0	0	1	1%
Total (N)	127	100%	127	100%

Graph 4: Frequency of School Breakfast, Lunch Consumption*Fruit Consumption with School Breakfast*

One hundred and twenty-seven students were asked the question, "How often do you eat the fruit that comes with the school breakfast meal?" Forty-one students (32%) reported that they do not receive the school breakfast meal; ten students (8%) replied they never eat the fruit; thirty-seven students (29%) stated that they sometimes eat the fruit; twenty students (16%) reported eating the fruit most of the time; and nineteen students

(15%) reported the school breakfast never has fruit. All students reported responses to the question.

Table 13: Fruit Consumption Frequency during School Breakfast

	Number (N)	Percentage (%)
Don't Get School Breakfast	41	32%
Never Eat Fruit	10	8%
Sometimes Eat Fruit	37	29%
Eat Fruit Most or All of the Time	20	16%
Meal Doesn't Come With Fruit	19	15%
Total (N)	127	100%

Fruit Consumption with School Lunch

One hundred and twenty-seven students were asked the question, "How often do you eat the fruit that comes with the school lunch meal?" Three students (2%) reported they don't get the school lunch meal; nine students (7%) responded that they never eat the fruit; sixty-four students (50%) replied they sometimes eat the fruit; and fifty-one students (41%) stated that they eat the fruit most of the time. All 127 students reported responses to this question.

Vegetable Consumption with School Lunch

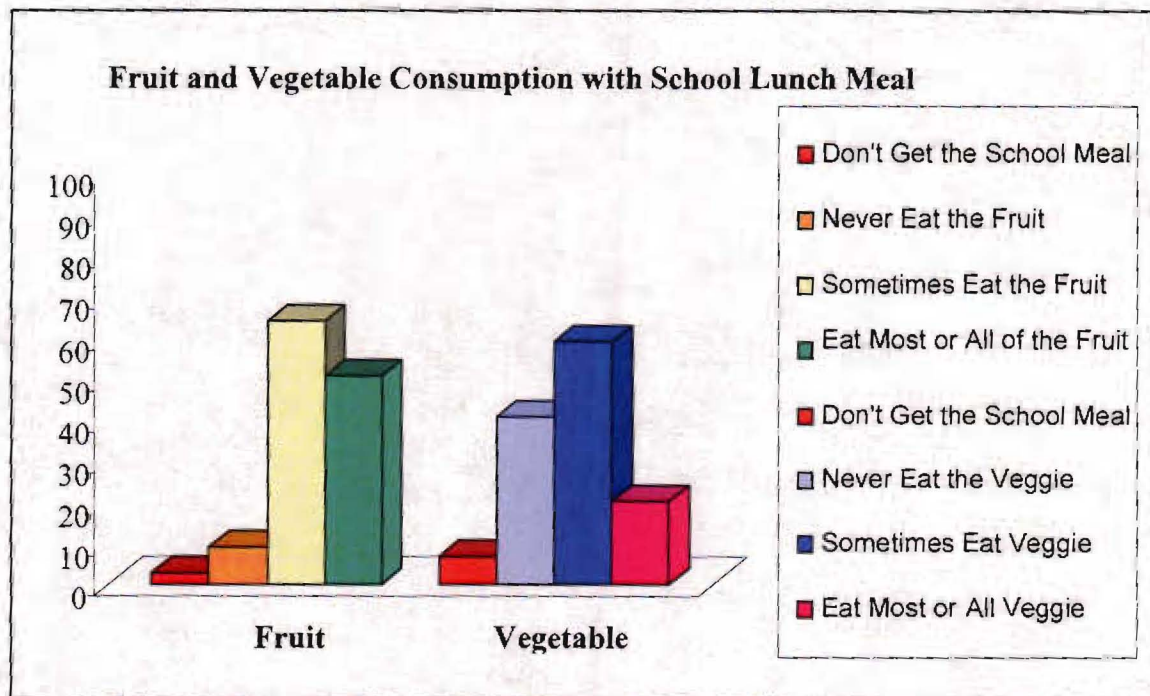
All one hundred and twenty-seven students were asked and all replied to the question of "How often do you eat the vegetable that comes with the school lunch meal?" Seven students (6%) reported that they don't get the school lunch meal; forty-one students (32%) responded that they never eat the vegetable; fifty-nine students (47%)

replied they sometimes eat the vegetable; and twenty students (15%) stated that they eat the vegetable most of the time. All 127 students reported responses to this question.

Table 14: Frequency of Fruit and Vegetable with the School Lunch

	Fruit		Vegetable	
	Number (N)	Percentage (%)	Number (N)	Percentage (%)
Don't Get Meal	3	3%	7	6%
Never Eat F,V	9	7%	41	32%
Sometimes Eat F,V	64	50%	59	46%
Eat Most F,V	51	40%	20	16%
Total (N)	127	100%	127	100%

Graph 5: Frequency of Fruit and Veggie Consumption with School Breakfast and the School Lunch Meal



This completes the first section of the Fresh Fruit and Vegetable Program (FFVP) survey, the demographic and the willingness to try a new fruit or vegetable in various settings. As described below, the next section coincides with the second section of the survey, the identification, whether they have ever eaten a specific fruit or vegetable, and their willingness to try new fruits and vegetables.

Item Analysis

All one hundred and twenty-seven students participating in the research survey were asked the same questions within this *second section* of the Fresh Fruit and Vegetable Survey. All students were asked questions regarding identification of a fruit or vegetable, whether they have ever eaten a particular fruit or vegetable, and their willingness to try a fruit or vegetable. Students were asked to “circle the picture of the listed fruit or vegetable” given a choice of five fruit/vegetable selections per question. Students were then asked to “check the box corresponding with their answer to the question of whether they had previously ever eaten that particular fruit or vegetable.” Responses included either “yes” or “no.” The students were asked if they would try the fruit or vegetable in question if they had never previously tried it. Response options included “I would try it,” “I might try it,” and “I would not try it.”

Apple Identification

All one hundred and twenty-seven students were asked to “Circle the picture of the apples given pictures of apples, pears, pomegranates, and turnips.” Of the 127 students asked, one hundred and twenty-three students (97%) circled the correct picture. One student (1%) circled the picture of the pear. One student (1%) circled the picture of

the pomegranate. One student (1%) circled the picture of the turnip. One student (1%) failed to answer this question.

Apple Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and twenty-four students (98%) reported "having previously eaten an apple," while three students (2%) stated they had "never previously eaten an apple."

Apple Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty six students (28%) reported they "would try" tasting an apple; five students (4%) stated they "might try" tasting an apple and eight students (6%) replied they "would not try" tasting an apple. Seventy-eight students (61%) failed to report answers to the question.

Orange Identification

One hundred and twenty-seven students were asked to "Circle the picture of oranges among pictures of cantaloupes, apricots, kiwis, and sweet potatoes." One hundred and twenty-one students (95%) correctly identified the picture of the oranges. One student (<1%) circled the picture of the cantaloupe. One student (<1%) circled the picture of the kiwi. Four students (3%) failed to respond.

Orange Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and twenty-two students (96%) reported "having previously eaten an orange." Two students (2%) reported having "never previously eaten an orange." Three students (2%) failed to answer this question.

Orange Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty-five students (28%) stated they “would try” tasting an orange. Seven students (5%) reported they “might try” tasting an orange. Five students (4%) replied they “would not try” tasting an orange. Eighty students (63%) failed to report a response to this question.

Banana Identification

One hundred and twenty-seven students were asked to “Circle the picture of bananas from pictures of yellow string beans, cucumbers, yellow squash and turnips.” One hundred and twenty-one students (95%) responded by circling the correct picture of the banana. Two students (2%) incorrectly circled the picture of the summer squash. Four students (3%) failed to answer this question.

Banana Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and twenty students (94%) reported “having previously eaten a banana.” Three students (2%) reported to having “never previously eaten a banana.” Four students (3%) failed to answer this question.

Banana Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty-six students (28%) stated they “would try” tasting a banana; five students (4%) reported that they “might try” tasting a banana; and six students (5%) answered they “would not try” tasting a banana. Eighty students (63%) neglected to answer this question.

Watermelon Identification

One hundred and twenty-seven students were asked to "Circle the picture of watermelons among pictures of cantaloupes, limes, eggplants and honeydew melons." One hundred and twenty students (94%) correctly circled the picture of the watermelons. Two students (2%) circled the picture of the cantaloupes. One student (<1%) circled the picture of the limes. Four students (3%) failed to report an answer to this question.

Watermelon Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and eighteen students (93%) reported "having previously eaten watermelon." Four students (3%) stated having "never previously eaten watermelon." Five students (4%) failed to report an answer to this question.

Watermelon Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty-five students (28%) "would try" tasting watermelon; five students (4%) "might try" tasting watermelon; and eight students (6%) "would not try" tasting watermelon. Seventy-nine students (62%) failed to respond to this question.

Pear Identification

One hundred and twenty-seven students were asked to "Circle the picture of pears amidst pictures of plums, butternut squash, peaches and radishes." One hundred and fifteen students (91%) correctly circled the picture of the pear. Three students (2%) circled the picture of the plums; one student (<1%) circled the picture of the squash and four students (3%) circled the picture of the peaches. Four students (3%) did not answer this question.

Pear Consumption History

Out of the one hundred and twenty-seven students surveyed, ninety-eight students (77%) reported "having previously eaten a pear." Twenty-eight students (22%) reported having "never previously eaten a pear." One student (<1%) failed to answer this question.

Pear Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty-two students (25%) "would try" tasting a pear; fifteen students (12%) "might try" tasting a pear; and twelve students (9%) "would not try" tasting a pear. Sixty-eight students (54%) neglected to answer this question.

Kiwi Identification

One hundred and twenty-seven students were asked to "Circle the picture of kiwis among pictures of avocados, papayas, pomegranates, and grapefruits. One hundred and eighteen students (92%) circled the correct picture of the kiwi. Five students (4%) circled the picture of the avocado; two students (1%) circled the picture of the pomegranate. Four students (3%) failed to report a response for this question.

Kiwi Consumption History

Out of the one hundred and twenty-seven students surveyed, 96 students (76%) reported "having previously eaten a kiwi." Twenty-four students (19%) reported to having "never previously eaten a kiwi." Seven students (5%) failed to respond to this question.

Kiwi Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty students (24%) “would try” tasting a kiwi; sixteen students (13%) “might try” tasting a kiwi; and fourteen students (11%) “would not try” tasting a kiwi. Sixty-seven students (53%) did not answer this question.

Strawberry Identification

One hundred and twenty-seven students were asked to “Circle the picture of strawberries from pictures of red grapes, raspberries, cherries, and blackberries.” One hundred and twenty-one students (96%) correctly circled the picture of the strawberries. One student (<1%) circled the picture of the grapes, while two students (1%) circled the picture corresponding to the raspberries. Three students (2%) failed to answer this question.

Strawberry Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and eleven students (87%) reported “having previously eaten strawberries,” while thirteen students (10%) reported to having “never previously eaten strawberries.” Three students (2%) neglected to answer this question.

Strawberry Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty-nine students (31%) “would try” tasting strawberries; four students (3%) “might try” tasting strawberries; and eleven students (9%) “would not try” tasting strawberries. Seventy-three students (57%) failed to report a response to this question.

Pineapple Identification

One hundred and twenty-seven students were asked to "Circle the picture of pineapples among pictures of honeydew melons, butternut squash, artichokes, and mangos. One hundred and twenty-two students (96%) correctly circled the picture identifying the pineapple. Five students (4%) students failed to answer the question.

Pineapple Consumption History

Out of the one hundred and twenty-seven students, ninety-seven students (76%) reported "having previously eaten pineapple," while and twenty-seven (21%) students reported having "never previously eaten pineapple." Three students (2%) neglected to answer the question.

Pineapple Willingness to Try

Among the one hundred and twenty-seven students surveyed, twenty-seven (21%) stated they "would try" tasting pineapple; ten students (8%) reported they "might try;" tasting pineapple; and thirteen students (10%) replied they "would not try" tasting pineapple. Seventy-seven students (61%) failed to answer this question.

Raisin Identification

One hundred and twenty-seven students were asked to "Circle the picture of raisins among pictures of blackberries, raspberries, black-eyed peas, and pinto beans." One hundred and eighteen students (93%) correctly circled the picture of the raisins. Four students (3%) circled the picture of the raspberries; and one student (1%) circled the picture of the pinto beans. Four students (3%) failed to answer this question.

Raisin Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and eleven students (87%) reported "having previously eaten raisins." Twelve students (9%) reported having "never previously eaten raisins." Four students (3%) did not answer the question.

Raisin Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-three students (18%) said they "would try" tasting raisins; twelve students (9%) stated they "might try" tasting raisins; and fourteen students (11%) reported they "would not try" tasting raisins. Seventy-eight students (61%) failed to answer this question.

Blueberry Identification

One hundred and twenty-seven students were asked to "Circle the picture of blueberries from pictures of raspberries, red grapes, cranberries, and blackberries." One hundred and fourteen students (90%) correctly circled the blueberry picture. Eight students (6%) circled the picture of the blackberries. Five students (4%) neglected to record a response to the question.

Blueberry Consumption History

Out of the one hundred and twenty-seven students surveyed, seventy-six students (60%) reported "having previously eaten blueberries." Fifty students (39%) reported to having "never previously eaten blueberries." One student (1%) did not answer this question.

Blueberry Willingness to Try

Among the one hundred and twenty-seven students assessed, forty-six students (36%) stated they “would try” tasting blueberries; fifteen students (12%) stated they “might try” tasting blueberries; and nineteen students (15%) stated they “would not try” tasting blueberries. Forty-seven students (37%) failed to record a response to the question.

Grape Identification

One hundred and twenty-seven students were asked to “Circle the picture of grapes from pictures shown of a tomato, cherries, cranberries, and blackberries.” One hundred and twenty-one students (95%) correctly circled the picture the grapes from the pictures shown. Six students (5%) neglected to respond to the question.

Grape Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and twenty students (94%) reported “having previously eaten grapes,” while four students (3%) responded to having “never previously eaten grapes.” Three students (2%) did not respond to this question.

Grape Willingness to Try

Among the one hundred and twenty-seven students assessed, thirty-six students (28%) stated they “would try” tasting grapes; two students (2%) stated they “might try” tasting grapes; and six students (5%) stated they “would not try” tasting grapes. Eighty-three students (65%) failed to report a response to this question.

Cantaloupe Identification

One hundred and twenty-seven students were asked to “Circle the picture of cantaloupes among pictures of grapefruits, avocados, butternut squash, and honey dew melons.” Eighty-nine students (70%) correctly circled the picture of the cantaloupes; twelve students (9%) circled the picture of the butternut squash; ten students (8%) circled the picture of the avocados; seven students (5%) circled the picture of the honeydew melons; and one student (1%) circled the picture of the grapefruits. Eight students (6%) did not respond to this question.

Cantaloupe Consumption History

Out of the one hundred and twenty-seven students surveyed, eighty-one students (64%) reported “having previously eaten cantaloupe.” Forty-one students (32%) reported having “never previously eaten cantaloupe.” Five students (4%) failed to report a response to the question.

Cantaloupe Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-four students (19%) said they “would try” tasting cantaloupe; twenty-two students (17%) reported they “might try” tasting cantaloupe; and eighteen students (14%) stated they “would not try” tasting cantaloupe. Sixty-three students (50%) did not respond to this question.

Honeydew Melon Identification

One hundred and twenty-seven students were asked to “Circle the picture of honeydew melons among pictures of papayas, watermelons, limes and cantaloupes. Sixty students (47%) correctly identified the honeydew melon. Twenty-two students (17%) circled the picture of the cantaloupe; eighteen students (14%) circled the picture of the

lime; and seventeen students (13%) circled picture of the papaya. Ten students (8%) did not answer the question.

Honeydew Melon Consumption History

Out of the one hundred and twenty-seven students surveyed, fifty-one students (40%) reported "having previously eaten honeydew melon." Seventy-one students (56%) reported to having "never previously eaten honeydew melon." Five students (4%) failed to answer the question.

Honeydew Melon Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-two students (17%) stated they "would try" tasting honeydew melon; twenty-eight students (22%) suggested they "might try" tasting honeydew melon; and twenty-nine students (23%) reported they "would not try" tasting honeydew melon. Forty-eight students (38%) neglected to answer this question.

Cranberry Identification

One hundred and twenty-seven students were asked to "Circle the picture of cranberries among pictures of strawberries, blueberries, raspberries and apricots." Seventy students (55%) correctly identified the cranberries; forty-eight students (38%) circled the picture of the raspberries; and three students (2%) circled the picture of the strawberries. Six students (5%) failed to report an answer to the question.

Cranberry Consumption History

Out of the one hundred and twenty-seven students surveyed, seventy-five students (59%) reported "having previously eaten cranberries." Forty-eight students (38%)

reported having “never previously eaten cranberries.” Four students (3%) did not answer the question.

Cranberry Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-two students (17%) reported they “would try” tasting cranberries; eighteen students (14%) stated they “might try” tasting cranberries; and twenty-five students (20%) said they “would not try” tasting cranberries. Sixty-two students (49%) failed to report a response for this question.

Graph 6: Fruit Identification

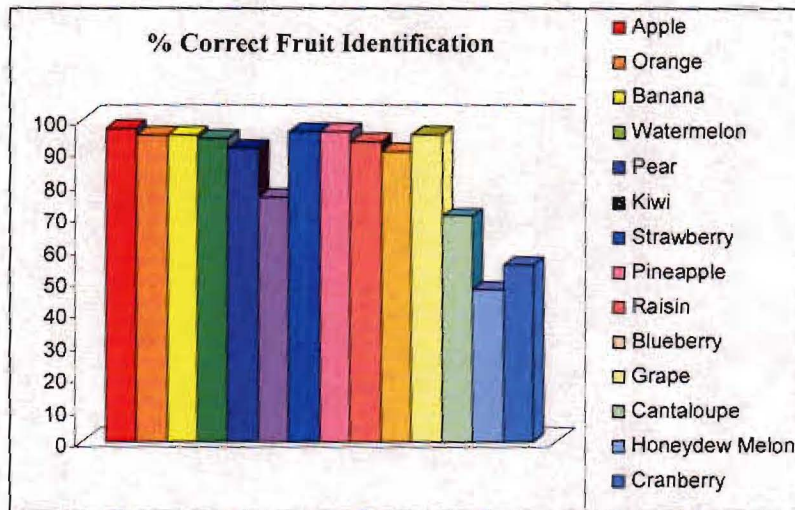


Table 15: Fruit Consumption History

	Previously Eaten	Never Eaten	Total	Missing Data	Total
Apple	124	3	127	0	127
Orange	122	2	124	3	127
Banana	120	3	123	4	127
Watermelon	118	4	122	5	127
Pear	98	28	126	1	127
Kiwi	96	24	120	7	127
Strawberry	111	13	124	3	127
Pineapple	97	27	3	3	127
Raisin	111	12	123	4	127
Blueberry	69	50	126	1	127
Grape	120	4	124	3	127
Cantaloupe	81	41	122	5	127
Honeydew					127
Melon	51	71	122	5	
Cranberry	75	48	123	4	127

Table 16: Fruit Willingness to Try

	Would Try	Might Try	Would Not Try	Total (N)	Missing Data	Total (N)
Apple	36	5	8	49	78	127
Orange	35	7	5	47	80	127
Banana	36	5	6	47	80	127
Watermelon	35	5	8	48	79	127
Pear	32	15	12	59	68	127
Kiwi	30	16	14	60	67	127
Strawberry	39	4	11	54	73	127
Pineapple	27	10	13	50	77	127
Raisin	33	12	14	59	68	127
Blueberry	46	15	19	80	47	127
Grape	36	2	6	44	83	127
Cantaloupe	24	22	18	64	63	127
Honeydew						
Melon	22	28	29	79	48	127
Cranberry	22	18	25	65	62	127

Tomato Identification

One hundred and twenty-seven students were asked to "Circle the picture of tomatoes from pictures of an apple, pomegranate, beets and onions." One hundred and nineteen students (94%) correctly identified the picture of the tomatoes; three students (2%) circled the picture of the pomegranate; and one student (1%) circled the picture of the beets. Four students (3%) did not answer the question.

Tomato Consumption History

Out of the one hundred and twenty-seven students surveyed, ninety-nine students (78%) reported "having previously eaten tomatoes." Twenty-five students (20%) reported having "never previously eaten tomatoes." Three students (2%) neglected to answer the question.

Tomato Willingness to Try

Among the one hundred and twenty-seven students assessed, nineteen students (15%) reported they "would try" tasting tomatoes; thirteen students (10%) stated they "might try" tasting tomatoes; and twenty-one students (16%) responded that they "would not try" tasting tomatoes. Seventy-four students (58%) did not answer this question.

Carrot Identification

One hundred and twenty-seven students were asked to "Circle the picture of carrots among yellow beans, radishes, asparagus, and sweet potato pictures." One hundred and twenty-three students (97%) correctly identified the picture of the carrots. One student (1%) circled the picture of the sweet potato. Three students (2%) did not answer the question.

Carrot Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and nineteen students (94%) reported "having previously eaten carrots." Five students (4%) reported having "never previously eaten carrots." Three students (2%) failed to respond to the question.

Carrot Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-five students (20%) reported they "would try" tasting carrots; eight students (6%) stated they "might try" tasting carrots; and eleven students (9%) responded they "would not try" tasting carrots. Eighty-two students (65%) neglected to report a response to this question.

Celery Identification

One hundred and twenty-seven students were asked to "Circle the picture of celery among pictures of asparagus, green beans, okra, and parsnips." One hundred and ten students (87%) correctly circled the picture of the celery; eight students (6%) circled the picture of the asparagus; one student (1%) circled the picture of the parsnip. Eight students (6%) did not respond to the question.

Celery Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and five students (83%) reported "having previously eaten celery." Twenty students (15%) reported having "never previously eaten celery." Two students (1%) did not report a response to the question.

Celery Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-two students (17%) reported they “would try” tasting celery; ten students (8%) stated they “might try” tasting celery; and twenty-three students (18%) said they “would not try” tasting celery. Seventy-two students (57%) failed to respond to the question.

Broccoli Identification

One hundred and twenty-seven students were asked to “Circle the picture of broccoli among pictures of Brussels sprouts, green peppers, artichokes, and kohlrabi.” One hundred and twenty-two students (96%) correctly circled the picture of the broccoli. Three students (2%) circled the picture of the Brussels sprouts. Two students (2%) did not answer the question.

Broccoli Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred and one students (80%) reported “having previously eaten broccoli.” Twenty-four students (18%) reported having “never previously eaten broccoli.” Two students (2%) did not report an answer to the question.

Broccoli Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty students (16%) stated they “would try” tasting broccoli; seven students (5%) reported they “might try” tasting broccoli and twenty-eight students (22%) said they “would not try” tasting broccoli. Seventy-two students (57%) did not answer this question.

Cauliflower Identification

One hundred and twenty-seven students were asked to “Circle the picture of the cauliflower among the pictures of potatoes, summer squash, pineapples and turnips.” One hundred and seventeen students (92%) correctly circled the picture of the cauliflower. One student (1%) circled the picture of the potatoes. Two students (2%) each circled the picture of the summer squash and turnips. Seven students (5%) did not answer this question.

Cauliflower Consumption History

Out of the one hundred and twenty-seven students surveyed, eighty-four students (66%) reported “having previously eaten cauliflower.” Thirty-nine students (31%) reported having “never previously eaten cauliflower.” Four students (3%) did not report a response to the question.

Cauliflower Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty students (16%) said they “would try” tasting cauliflower; thirteen students (10%) stated they “might try” tasting cauliflower; and thirty-one students (24%) reported they “would not try” tasting cauliflower. Sixty-three students (50%) did not answer this question.

Cucumber Identification

One hundred and twenty-seven students were asked to “Circle the picture of the cucumbers among pictures of okra, green beans, parsnips and eggplants.” One hundred and sixteen students (91%) correctly identified the picture of the cucumber. Three students (2%) circled the picture of the parsnips. Four students (3%) circled the picture of

the eggplant. Two students (2%) circled the picture of the okra. Two students (2%) failed to answer this question.

Cucumber Consumption History

Out of the one hundred and twenty-seven students surveyed, one hundred students (79%) reported "having previously eaten cucumbers." Twenty-three students (18%) reported having "never previously eaten cucumbers." Four students (3%) failed to respond to the question.

Cucumber Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-five students (20%) responded they "would try" tasting cucumbers; fourteen students (11%) stated they "might try" tasting cucumbers; and sixteen students (12%) reported they "would not try" tasting cucumbers. Seventy-two students (57%) did not respond to this question.

Green Pepper Identification

One hundred and twenty-seven students were asked to "Circle the picture of green peppers among the pictures of pears, kiwis, limes and avocados." One hundred and twenty students (94%) correctly circled the green peppers. Three students (2%) circled the picture of the pears. Five students (4%) failed to report a response to the question.

Green Pepper Consumption History

Out of the one hundred and twenty-seven students surveyed, eighty-two students (64%) reported "having previously eaten green peppers." Forty-two students (33%) reported having "never previously eaten green peppers." Three students (3%) neglected to answer the question.

Green Pepper Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-two students (17%) stated they “would try” tasting green peppers; thirteen students (10%) said they “might try” tasting green peppers; and twenty-seven students (21%) reported they “would not try” tasting green peppers. Sixty-five students (51%) failed to answer the question.

Sweet Potato Identification

One hundred and twenty-seven students were asked to “Circle the picture of sweet potatoes amidst pictures of papayas, white potatoes, turnips, and butternut squash.” Fifty-five students (43%) correctly circled the picture of the sweet potato. Fifty-nine students (46%) circled the picture of the white potato. Four students (3%) circled the picture of the butternut squash. Two students (1%) circled the picture of the turnips. One student (1%) circled the picture of the papaya. Seven students (6%) did not answer the question.

Sweet Potato Consumption History

Out of the one hundred and twenty-seven students surveyed, ninety students (71%) reported “having previously eaten sweet potatoes.” Thirty-four students (27%) reported having “never previously eaten sweet potatoes.” Three students (2%) failed to respond to the question.

Sweet Potato Willingness to Try

Among the one hundred and twenty-seven students assessed, eighty-seven students (69%) said they “would try” tasting sweet potatoes; thirteen students (10%) stated they “might try” tasting sweet potatoes; and twenty-four students (19%) reported they “would not try” tasting sweet potatoes. Three students (2%) neglected to report a response to this question.

Pod Pea Identification

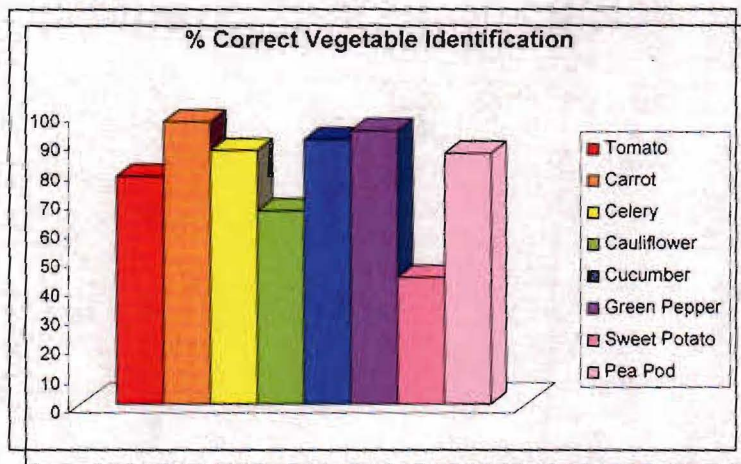
One hundred and twenty-seven students were asked to “Circle the picture of pea pods among pictures of okra, Brussels sprouts, yellow beans and green olives.” One hundred and nine students (86%) correctly circled the picture of the pea pods. Five students (4%) circled the picture of the okra. One student (1%) circled the picture of the Brussels sprouts. Three students (2%) each circled the pictures of green olives and yellow beans. Nine students (7%) did not answer the question.

Pod Pea Consumption History

Out of the one hundred and twenty-seven students surveyed, seventy-nine students (62%) reported “having previously eaten pea pods.” Forty-four students (35%) reported having “never previously eaten pea pods.” Four students (3%) failed to answer the question.

Pod Pea Willingness to Try

Among the one hundred and twenty-seven students assessed, twenty-two students (17%) said they “would try” tasting pea pods; eleven students (9%) reported they “might try” tasting pea pods; and thirty-two students (25%) stated they “would not try” tasting pea pods. Sixty-two students (49%) failed to answer this question.

Graph 7: Vegetable Identification**Table 17: Vegetable Consumption History**

	Previously	Never	Total	Missing	Total
	Eaten	Eaten		Data	
Tomato	99	25	124	3	127
Carrot	119	5	124	3	127
Celery	105	20	125	2	127
Broccoli	101	24	125	2	127
Cauliflower	84	39	123	4	127
Cucumber	100	23	123	4	127
Green Pepper	82	42	124	3	127
Sweet Potato	90	34	124	3	127
Pea Pod	79	44	123	4	127

Table 18: Vegetable Willingness to Try

	Would	Might	Would	Total	Missing	
	Try	Try	Not Try		Data	Total
Tomato	19	13	21	53	74	127
Carrot	25	8	11	45	82	127
Celery	22	10	23	55	72	127
Broccoli	20	7	28	55	72	127
Cauliflower	20	13	31	64	63	127
Cucumber	25	14	16	55	72	127
Green Pepper	22	13	27	62	65	127
Sweet Potato	87	13	24	124	3	127
Pea Pod	21	12	32	65	62	127

Item Analysis

The *third section* identified whether students have tried the listed fruit and vegetable, and if they have tried it, whether they liked it or not. Students were asked to "Put a check mark next to the fruits and vegetables listed that they have ever tried" and to also "Circle the fruits and vegetables they liked." This section was not analyzed as it proved to be too complicated for the fourth grade students, with too many extraneous variables which shall be discussed in the next chapter (Chapter 5).

Item Analysis

The *fourth section* collected information regarding students' dietary intake over a twenty-four hour period. This section focused on conducting a dietary recall in which students circled the total number of times they had eaten a specified food item over the past twenty-four hours. A rating system was used where students circled the correlating number with the number of times they ate the particular food within the past twenty-four hours. Students were able to circle the options of "0 times," "1 time," "2 times," "3

times," "4 times," and 5 or more times" for each food item listed. The dietary recall was completed twice more, for a total of three, twenty-four hour dietary recalls. All student responses were tallied and recorded. Descriptive statistics were run on the students' dietary recalls and the means of all three days were determined and reported below. The number of responses to the food listings was variable, with many students choosing to answer all or parts of the question for the three-day dietary recall. A table at the end of the chapter (and in Appendix B) depicts the various food items and the corresponding significance values.

Milk and Yogurt

Forty-nine males (38%) and sixty-three females (50%) responded to the question, "How often did you consume milk and yogurt within the past twenty-four hours?" The overall average for the three-day dietary recall decreased from a Day 1 total of 2.75 to a Day 3 total of 1.71. Male averages decreased from 2.73 on Day 1 to 1.73 on Day 3. Female averages decreased from 2.75 on Day 1 to 1.68 on Day 3. Females consumed more milk and yogurt on Days 1 and 2 than males, but males consumed more on Day 3. Significant differences were found between milk and yogurt consumption and the days the survey was conducted ($p=.000$). No significant differences were found between milk and yogurt consumption, gender and the days the survey was conducted ($p=.443$).

Soda

Forty-seven males (37%) and sixty-four females (50%) answered the question, "How often did you consume soda within the past twenty-four hours?" The overall average decreased from Day 1 to Day 3, with totals of 1.35 on Day 1 and 0.41 on Day 3. Male averages decreased from a Day 1 total of 1.96 to a Day 3 total of 0.57. Female

averages decreased from 0.91 on Day 1 to 0.28 on Day 3. Overall, males consumed less soda than females on all three days of the dietary recall. Significant differences were found between soda consumption and the days the survey was collected ($p=.000$).

Significant differences were found between soda consumption, gender and the days the survey was collected ($p=.000$).

Water

Forty-eight males (38%) and sixty-five females (51%) reported responses to the question, "How often did you consume water over the past twenty-four hours?" The overall average decreased from Day 1 to Day 3, with averages equaling 3.36 and 2.75, respectively. Male averages decreased from a Day 1 total of 3.08 to a Day 3 total of 2.35. Female averages decreased from 3.57 on Day 1 to 3.05 on Day 3. Females consumed more water on all three days of the dietary recall than males. Significant differences were found between water consumption and the days the survey was conducted ($p=.002$). No significant differences were found between water consumption, gender and the days the survey was conducted ($p=.734$).

Juice

Forty-nine males (39%) and sixty-five females (51%) responded to the question, "How often did you consume juice in the past twenty-four hours?" The overall average decreased from 2.15 on Day 1 to 0.92 on Day 3. The male average decreased from 2.24 on Day 1 to 0.90 on Day 3. The female average decreased from 2.08 on Day 1 to 0.94 on Day 3. Males consumed more juice on Day 1 than females, but females consumed more on Days 2 and 3. Significant differences were found between juice consumption and the

days the survey was conducted ($p=.000$). No significant differences were found between juice consumption, gender and the days the survey was conducted ($p=.642$).

Fried Potatoes

Forty-seven males (37%) and sixty-five females (51%) reported responses to the question, "How often did you consume fried potatoes within the past twenty-four hour?" The overall average decreased from a Day 1 total of 1.20 to a Day 3 total of 0.33. Male averages decreased from a Day 1 total of 1.34 to a Day 3 total of 0.45. Female averages decreased from a Day 1 total of 1.09 to a Day 3 total of 0.25. Males consumed more fried potatoes on all three days of the dietary recall than females. Significant differences were found between fried potato consumption and the days the survey was conducted ($p=.000$). No significant differences were found between fried potato consumption, gender and the days the survey was conducted ($p=.944$).

Chips, Crackers and Pretzels

Forty-eight males (38%) and sixty-four females (50%) answered the question, "How often did you consume chips, crackers and pretzels within the past twenty-four hours?" The overall average decreased over the three days, from a Day 1 total of 1.15 to a Day 3 total of 0.62. The male average decreased from a Day 1 total of 1.38 to a Day 3 total of 0.67. Female averages decreased from a Day 1 total of 0.98 to a Day 3 total of 0.58. Males consumed more chips, crackers and pretzels than females on Days 1 and 3, whereas females consumed more chips, crackers and pretzels than males on Day 2. Significant differences were found between chip, cracker and pretzel consumption and the days the survey was conducted ($p=.003$). No significant differences were found

between chip, cracker and pretzel consumption, gender and the days the survey was conducted ($p=.362$).

Cookies and Cakes

Forty-eight males (38%) and sixty-five females (51%) answered the question, "How often did you consume cookies and cakes within the past twenty-four hours?" The overall average decreased from 1.20 on Day 1 to 0.50 on Day 3. Male averages decreased over the three-day recall, from 1.15 on Day 1 to 0.54 on Day 3. Female averages decreased over the three days, from a Day 1 average of 1.25 to a Day 3 average of 0.46. Females consumed more cookies and cake on Day 1 than males, but less on Days 2 and 3. Significant differences were found between cookie and cake consumption and the days the survey was conducted ($p=.000$). No significant differences were found between cookie and cake consumption, gender and the days the survey was conducted ($p=.546$).

Candy

Forty-nine males (39%) and sixty-four females (50%) answered the question, "How often did you consume candy within the past twenty-four hours?" The overall average decreased from a Day 1 total of 1.15 to a Day 3 total of 0.59. The male average decreased over the three-day period from 1.53 on Day 1 to 0.59 on Day 3. The female average decreased from 0.86 on Day 1 to 0.59 on Day 3. Males consumed more candy on Days 1 and 2 than females, but both averages became equal on Day 3. Significant differences were found between candy consumption and the days the survey was conducted ($p=.000$). No significant differences were found between candy consumption, gender, and the days the survey was conducted ($p=.035$).

Ice Cream

Forty-six males (36%) and sixty-four females (50%) reported responses to the question, "How often did you consume ice cream over the past twenty-four hours?" The overall average decreased from 0.68 on Day 1 to 0.27 on Day 3. Male averages decreased over the three days, from a Day 1 total of 0.74 to a Day 3 total of 0.30. Female averages decreased over the three days, from 0.64 to 0.25 between Days 1 and 3. Males consumed more ice cream on the days of the survey than females. Significant differences were found between ice cream consumption and the days the survey was conducted ($p=.002$). No significant differences were found between ice cream consumption, gender and the days the survey was conducted ($p=.760$).

Bananas

Forty-four males (35%) and sixty-five females (51%) responded to the question, "How often did you consume apples within the past twenty-four hours?" Overall averages for the three-day dietary recall decreased from 1.39 on Day 1 to 0.43 on Day 3. Male averages over the three-day period decreased from 1.50 on Day 1 to 0.45 on Day 3. Female averages over the three-day periods decreased from 1.32 on Day 1 to 0.42 on Day 3. Males consumed more bananas than females during the three-day time period. Overall averages were lower for females than males on all three days of the survey. Significant differences were found between banana consumption and the days the survey was conducted ($p=.000$). No significant differences were found between banana consumption, gender and the days the survey was conducted ($p=.292$).

Apples

Forty-six males (36%) and sixty-five (51%) responded to the question, "How often did you consume apples within the past twenty-four hours?" Overall averages for the three-day period decreased from 1.16 on Day 1 to 0.57 on Day 3. Male averages decreased from a Day 1 total of 1.33 to a Day 3 total of 0.65. Female averages decreased from 1.05 on Day 1 to 0.51 on Day 3. Males consumed more apples over the three-day period than females. Significant differences were found between apple consumption and the days the survey was conducted ($p=.000$). No significant differences were found between apple consumption, gender and the days the survey was conducted ($p=.661$).

Plums

Forty-two males (33%) and sixty-four females (50%) answered the question, "How often did you consume plums over the past twenty-four hours?" The overall average for both males and females decreased from an average of 0.56 on Day 1 to an average of 0.11 on Day 3. The average for the males decreased over the three-day period from a total of 0.62 on Day 1 to a total of 0.12 on Day 3. The female average over the three-day period decreased from 0.52 on Day 1 to 0.11 on Day 3. Males consumed more plums than females. Significant differences were found between plum consumption and the days the survey was conducted ($p=.002$). No significant differences were found between plum consumption, gender and the days the survey was conducted ($p=.259$).

Peaches

Forty-one males (32%) and sixty-four (50%) of females responded to the question, "How often did you consume peaches over the past twenty-four hours?" Overall averages for the three-day dietary recall decreased from 0.70 on Day 1 to 0.23 on

Day 3. Male averages decreased from 1.00 on Day 1 to 0.34 on Day 3. Female averages decreased from 0.52 on Day 1 to 0.16 on Day 3. Males consumed more peaches than females over the three-day period. Significant differences were found between peach consumption and the days the survey was conducted ($p=.002$). No significant differences were found between peach consumption, gender, and the days the survey was conducted ($p=.468$).

Oranges

Forty-six males (36%) and sixty-four females (50%) reported responses to the question, "How often did you consume oranges within the past twenty-four hours?" The overall average for the three-day recall decreased, with totals of 1.30 on Day 1 to 0.61 on Day 3. Male averages decreased from 1.61 on Day 1 to 0.91 on Day 3. Female averages decreased from 1.08 on Day 1 to 0.39 on Day 3. Males consumed more oranges than females over the three-day period. Significant differences were found between orange consumption and the days the survey was conducted ($p=.000$). No significant differences were found between orange consumption, gender and the days the survey was conducted ($p=.224$).

Tangerines

Forty-seven males (37%) and sixty females (47%) answered the question, "How often did you consume tangerines over the past twenty-four hours?" The overall average for the three-day recall decreased from a Day 1 total of 0.27 to a Day 3 total of 0.11. Male averages over the three days decreased from a mean of 0.32 on Day 1 to an average of 0.13 on Day 3. Female averages decreased over the three-day dietary recall from 0.23 on Day 1 to 0.10 on Day 3. Male consumption of tangerines was higher on all three days

than female consumption of tangerines. No significance differences were found between tangerine consumption and the days the survey was conducted ($p=.090$). No significance differences were found between tangerine consumption, gender and the days the survey was conducted ($p=.949$).

Grapes

Forty-eight males (38%) and sixty-two females (49%) responded to the question, "How often did you consume grapes over the past twenty-four hours?" The overall average decreased from Day 1 to Day 3 by 0.43, with averages of 0.90 on Day 1 to 0.47 on Day 3. Male averages decreased from Day 1 to Day 3, from 1.19 to 0.29, respectively. Female averages decreased from 0.68 on Day 1 to 0.61 on Day 3. Male consumption of grapes was higher on Day 1, but female intake averages increased and were higher than male averages on Days 2 and 3. Significant differences were found between grape consumption and the days the survey was conducted ($p=.001$). Significant differences were found between grape consumption, gender and the days the survey was conducted ($p=.004$).

Kiwi

Forty-nine males (39%) and sixty-four females (50%) reported responses to the question, "How often did you consume kiwi over the past twenty-four hours?" Overall averages for the three days decreased from 0.63 on Day 1 to 0.28 on Day 3. Male averages decreased from 0.78 on Day 1 to 0.33 on Day 3. Female averages decreased from 0.52 on Day 1 to 0.25 on Day 3. Males consumed more kiwis on all three days than females. Significant differences were found between kiwi consumption and the days the

survey was conducted ($p=.000$). No significant differences were found between kiwi consumption, gender and the days the survey was conducted ($p=.636$).

Watermelon

Forty-nine males (39%) and sixty-four females (50%) reported responses to the question, "How often did you consume watermelon over the past twenty-four hours?" The overall averages for the three-day dietary recall decreased from 0.83 on Day 1 to 0.12 on Day 3. Male averages decreased from 0.92 on Day 1 to 0.10 on Day 3. Female averages decreased from 0.77 on Day 1 to 0.14 on Day 3. Males consumed more watermelon than females on Day 1, but females ate more watermelon on Days 2 and 3. Significant differences were found between watermelon consumption and the days the survey was conducted ($p=.000$). No significant differences were found between watermelon consumption, gender and the days the survey was conducted ($p=.471$).

Pear

Forty-six males (36%) and sixty-two females (49%) answered the question, "How often did you consume pears over the past twenty-four hours?" Overall averages for the three days decreased from 0.47 on Day 1 to 0.16 on Day 3. Male averages decreased from 0.57 on Day 1 to 0.13 on Day 3. Female averages decreased from 0.40 on Day 1 to 0.18 on Day 3. Males consumed more pears on Day 1 than females, but females consumed more pears on Days 2 and 3 than males. Significant differences were found between pear consumption and the days the survey was conducted ($p=.001$). No significant differences were found between pear consumption, gender and the days the survey was conducted ($p=.607$).

Strawberry

Forty-seven males (37%) and sixty-four females (50%) reported responses to the question, "How often did you consume strawberries over the past twenty-four hours?" The averages for the three-day dietary recall decreased from 0.80 on Day 1 to 0.15 on Day 3. Male averages for all three days decreased from 1.04 on Day 1 to 0.21 on Day 3. Female averages for all three days increased from 0.62 on Day 1 to 0.69 on Day 2, and then decreased to 0.11 on Day 3. Males consumed more strawberries on Days 1 and 3 than females, but females ate more strawberries on Day 2. Significant differences were found between strawberry consumption and the days the survey was conducted ($p=.000$). No significant differences were found between strawberry consumption, gender and the days the survey was conducted ($p=.005$).

Pineapple

Forty-eight males (38%) and sixty-three females (50%) answered the question, "How often did you consume pineapple over the past twenty-four hours?" Overall averages decreased from 0.46 on Day 1 to 0.14 on Day 3. Male averages decreased from 0.50 on Day 1 to 0.21 on Day 3. Female averages decreased from 0.43 on Day 1 to 0.08 on Day 3. Males consumed more pineapple on Days 1 and 3 than females. Females consumed more pineapple than males on Day 2. Significant differences were found between pineapple consumption and the days the survey was conducted ($p=.005$). No significant differences were found between pineapple consumption, gender and the days the survey was conducted ($p=.302$).

Cantaloupe

Forty-eight males (38%) and sixty-four females (50%) responded to the question, "How often did you consume cantaloupe over the past twenty-four hours?" Overall averages decreased over the three-day period, from 0.28 on Day 1 to 0.04 on Day 3. Male averages decreased throughout the three days, from 0.29 on Day 1 to 0.04 on Day 3. Female averages decreased from Day 1 to Day 3, with an average of 0.27 on Day 1 to an average of 0.03 on Day 3. Males consumed more cantaloupe than females on all three days. Significant differences were found between cantaloupe consumption and the days the survey was conducted ($p=.001$). No significant differences were found between cantaloupe consumption, gender and the days the survey was conducted ($p=.890$).

Honeydew Melon

Forty-eight males (38%) and sixty-two females (49%) answered the question, "How often did you consume honeydew melon over the past twenty-four hours?" Overall averages for the three-day period decreased from 0.22 on Day 1 to 0.04 on Day 3. Male averages increased from 0.10 on Day 1 to 0.12 on Day 2, before decreasing to 0.06 on Day 3. Female averages decreased over the three days, from 0.31 on Day 1 to 0.02 on Day 3. Females consumed more honeydew melon on Day 1 than males, but less on Days 2 and 3. No significant differences were found between honeydew melon consumption and the days the survey was conducted ($p=.019$). No significant differences were found between honeydew melon consumption, gender and the days the survey was conducted ($p=.109$).

Raisins

Forty-nine males (39%) and sixty females (47%) answered the question, "How often did you consume raisins over the past twenty-four hours?" Overall averages for the three-day dietary recall decreased from a Day 1 total of 0.79 to a Day 3 total of 0.06. The male average decreased from a Day 1 total of 1.00 to a Day 3 total of 0.06. The female average decreased from 0.62 on Day 1 to 0.05 on Day 3. For the three-day period, males consumed more raisins than females. Significant differences were found between raisin consumption and the days the survey was conducted ($p=.000$). No significant differences were found between raisin consumption, gender and the days the survey was conducted ($p=.275$).

Cranberry

Forty-eight males (38%) and sixty females (47%) responded to the question, "How often did you consume cranberries over the past twenty-four hours?" The overall averages decreased from a Day 1 total of 0.20 to a Day 3 total of 0.04. Male averages decreased over the three days, from a Day 1 total of 0.13 to a Day 3 total of 0.04. Female averages also decreased for the three days, with a Day 1 total of 0.27 to a Day 3 total of 0.03. Females consumed more cranberries than males on Days 1 and 2, but less on Day 3. No significant differences were found between cranberry consumption and the days the survey was conducted ($p=.060$). No significant differences were found between cranberry consumption, gender and the days the survey was conducted ($p=.519$).

Blueberry

Forty-six males (36%) and fifty-eight females (46%) answered the question, "How often did you consume blueberries over the past twenty-four hours?" The overall

averages for the three days decreased from 0.24 on Day 1 to 0.09 on Day 3. Male averages decreased from a total of 0.20 on Day 1 to a total of 0.13 on Day 2, before increasing to 0.20 on Day 3. Female averages decreased from a Day 1 total of 0.28 to a Day 3 total of 0.00. Females consumed more blueberries than males on Day 1, but males consumed more on Days 2 and 3. No significant differences were found between blueberry consumption and the days the survey was conducted ($p=.132$). No significant differences were found between blueberry consumption, gender, and the days the survey was conducted ($p=.242$).

Winter Squash

Forty-six males (36%) and fifty-six females (44%) answered the question, "How often did you consume winter squash over the past twenty-four hours?" Overall averages for the three-day period decreased from a Day 1 total of 0.13 to a Day 3 total of 0.02. The male average decreased during Days 1 and 2, from 0.15 on Day 1 to 0.02 on Day 2, before increasing to 0.04 on Day 3. The female average decreased over the three days, decreasing from 0.11 on Day 1 to 0.00 on Day 3. Males ate more winter squash on Days 1 and 3 than females. Females ate more winter squash on Day 2. No significant differences were found between winter squash consumption and the days the survey was conducted ($p=.211$). No significance differences were found between winter squash consumption, gender and the days the survey was conducted ($p=.485$).

Potato

Forty-eight males (38%) and fifty-eight females (46%) reported responses to the question, "How often did you consume potatoes over the past twenty-four hours?" The overall average decreased from 0.67 on Day 1 to 0.16 on Day 3. The male average

decreased from 0.77 on Day 1 to 0.17 on Day 3. The female average decreased from 0.59 on Day 1 to 0.16 on Day 3. Males consumed more potatoes on Days 1 and 3 than females. Females consumed more potatoes on Day 2. Significant differences were found between potato consumption and the days the survey was conducted ($p=.000$). No significant differences were found between potato consumption, gender and the days the survey was conducted ($p=.324$).

Corn

Forty-nine males (39%) and sixty-three females (50%) answered the question, "How often did you consume corn over the past twenty-four hours?" The overall average decreased from Day 1 to Day 2, with totals of 0.89 and 0.55, respectively, before increasing to 0.56 on Day 3. The male average decreased from Day 1 to Day 2, 0.88 to 0.49, respectively, and then increased to 0.71 on Day 3. The female average decreased on all three days, from 0.90 on Day 1 to 0.44 on Day 3. Females consumed more corn than males on Days 1 and 2, but males ate more corn on Day 3. No significant differences were found between corn consumption and the days the survey was conducted ($p=.021$). No significant differences were found between corn consumption, gender and the days the survey was conducted ($p=.128$).

Lettuce

Forty-four males (35%) and sixty-one females (48%) responded to the question, "How often did you consume lettuce over the past twenty-four hours?" Overall averages decreased from a Day 1 total of 0.57 to a Day 3 total of 0.11. Male averages for the three days decreased from a total of 0.45 on Day 1 to a total of 0.07 on Day 3. Female averages decreased from 0.66 on Day 1 to 0.15 on Day 3. Females consumed more lettuce than

males on all three dietary recalls. Significant differences were found between lettuce consumption and the days the survey was conducted ($p=0.001$). No significant differences were found between lettuce consumption, gender and the days the survey was conducted ($p=0.843$).

Carrots

Forty-seven males (37%) and sixty-two females (49%) answered the question, "How often did you consume carrots over the past twenty-four hours?" The overall average for the three-day period decreased from 0.62 on Day 1 to 0.19 on Day 3. The male average decreased from 0.57 on Day 1 to 0.11 on Day 3. The female average decreased from 0.66 on Day 1 to 0.26 on Day 3. On all three days of the survey, females consumed more carrots than males. Significant differences were found between carrot consumption and the days the survey was conducted ($p=0.001$). No significant differences were found between carrot consumption, gender and the days the survey was conducted ($p=0.880$).

Celery

Forty-four males (35%) and sixty-three females (50%) responded to the question, "How often did you consume celery over the past twenty-four hours?" The overall average for the three-day dietary recall decreased from 0.34 on Day 1 to 0.18 on Day 3. The average for the males decreased from 0.30 on Day 1 to 0.18 on Day 3. The average for the females decreased from 0.37 on Day 1 to 0.17 on Day 3. Females consumed more celery than males on Day 1, but less on Days 2 and 3, when the male averages increased. No significant differences were found between celery consumption and the days the

survey was conducted ($p=.241$). No significant differences were found between celery consumption, gender and the days the survey was conducted ($p=.892$).

Tomato

Forty-five males (35%) and sixty-two females (49%) answered the question, "How often did you consume tomatoes over the past twenty-four hours?" The three-day overall average for male and female tomato consumption decreased, from a Day 1 total of 0.48 to a Day 3 total of 0.25. Male averages for the three days decreased from 0.56 on Day 1 to 0.31 on Day 3. Female averages over the three days decreased from 0.42 on Day 1 to 0.21 on Day 3. Males consumed more tomatoes on all three days than females. No significant differences were found between tomato consumption and the days the survey was conducted ($p=.068$). No significant differences were found between tomato consumption, gender and the days the survey was conducted ($p=.748$).

Cabbage

Forty-six males (36%) and sixty females (47%) reported responses to the question, "How often did you consume cabbage over the past twenty-four hours?" The overall average for the three-day dietary recalls increased from 0.09 on Day 1 to 0.11 on Day 3. Male averages increased between Days 1 and 3, with totals of 0.04 on Day 1 to 0.11 on Day 3. Female averages decreased from Day 1 to Day 2, with totals of 0.13 on Day 1 and 0.12 on Day 2, but remained stable from Day 2 to Day 3 at 0.12. Females consumed more cabbage than males on all three days. No significant differences were found between cabbage consumption and the days the survey was conducted ($p=.889$). No significant differences were found between cabbage consumption, gender and the days the survey was conducted ($p=.688$).

Cucumber

Forty-six males (36%) and fifty-nine females (46%) answered the question, "How often did you consume cucumbers over the past twenty-four hours?" The overall average for the three-day period increased between Days 1 and 2, with a Day 1 total of 0.30 and a Day 2 total of 0.32, before decreasing to 0.12 on Day 3. The average for the males over the three-day period remained stable at 0.24 from Day 1 to Day 2, before decreasing to 0.09 on Day 3. The three-day average for the females increased between Day 1 to Day 2, with a Day 1 total of 0.36 and a Day 2 total of 0.39, before decreasing to 0.15 on Day 3. Females consumed more cucumbers over the three days than males. No significant differences were found between cucumber consumption and the days the survey was conducted ($p=.011$). No significant differences were found between cucumber consumption, gender and the days the survey was conducted ($p=.849$).

Peas

Forty-eight males (38%) and sixty-four females (50%) answered the question, "How often did you consume peas over the past twenty-four hours?" Overall three-day averages decreased from 0.36 on Day 1 to 0.15 on Day 3. Male averages for pea consumption decreased from 0.38 on Day 1 to 0.21 on Day 3. Female averages decreased from 0.34 on Day 1 to 0.11 on Day 3. Males consumed more peas than females on all three days. No significant differences were found between pea consumption and the days the survey was conducted ($p<.125$). No significant differences were found between pea consumption, gender and the days the survey was conducted ($p=.688$).

Red, Yellow, and Orange Peppers

Forty-eight males (38%) and sixty-five females (51%) reported responses to the question, "How often did you consume red, yellow and orange peppers over the past twenty-four hours?" The overall three-day average decreased from 0.26 to 0.05 for Day 1 to Day 3, respectively. The average for the males increased from 0.25 on Day 1 to 0.31 on Day 2 before decreasing to 0.06 on Day 3. The average for the females decreased throughout the three days, from 0.26 on Day 1 to 0.05 on Day 3. Males consumed more red, yellow and orange peppers than females on all three days of the survey. No significant differences were found between red, yellow and orange pepper consumption and the days the survey was conducted ($p=.025$). No significant differences were found between red, yellow and orange pepper consumption, gender and the days the survey was conducted ($p=.194$).

Broccoli

Forty-eight males (38%) and sixty-four (50%) females answered the question, "How often did you consume broccoli over the past twenty-four hours?" The overall average for the three days decreased from 0.44 on Day 1 to 0.12 on Day 3. The male average decreased over the three-day period, from a Day 1 total of 0.31 to a Day 3 total of 0.15. The female average decreased over the three-day period, from 0.53 on Day 1 to 0.09 on Day 3. Females consumed more broccoli on Days 1 and 2 than males, but males consumed more on Day 3. No significant differences were found between broccoli consumption and the days the survey was conducted ($p=.007$). No significant differences were found between broccoli consumption, gender and the days the survey was conducted ($p=.366$).

Cauliflower

Forty-eight males (38%) and sixty-five females (51%) reported responses to the question, "How often did you consume cauliflower over the past twenty-four hours?" The overall average decreased from Day 1 to Day 3, with totals of 0.31 on Day 1 and 0.10 on Day 3. The average for the males over the three-day period decreased from 0.23 on Day 1 to 0.08 on Day 3. The average for the females over the three-day period decreased from 0.37 on Day 1 to 0.11 on Day 3. Females consumed more cauliflower than males on all three days of the dietary recall. Significant differences were found between cauliflower consumption and the days the survey was conducted ($p=.003$). No significant differences were found between cauliflower consumption, gender and the days the survey was conducted ($p=.614$).

Sweet Potato

Forty-seven males (37%) and sixty-five females (51%) answered the question, "How often did you consume sweet potatoes over the past twenty-four hours?" The overall average for both males and females over the three-day dietary recall decreased from 0.28 on Day 1 to 0.10 on Day 3. The male average decreased from a Day 1 total of 0.21 to Day 3 total of 0.13. The female average decreased from 0.32 on Day 1 to 0.08 on Day 3. Females consumed more sweet potatoes than males on Day 1, but less on Days 2 and 3. No significant differences were found between sweet potato consumption and the days the survey was conducted ($p=.159$). No significant differences were found between sweet potato consumption, gender and the days the survey was conducted ($p=.644$).

Rutabaga

Forty-seven males (37%) and sixty-five females (51%) responded to the question, "How often did you consume rutabagas within the past twenty-four hours?" The overall average decreased over the three-day recall, from a Day 1 total of 0.05 to a Day 3 total of 0.01. The male average decreased over the three days, from an average of 0.11 on Day 1 to an average of 0.02 on Day 3. The female average remained stable from Day 1 to Day 2, with a mean total of 0.02 for both days, before decreasing to 0.00 on Day 3. No significant differences were found between rutabaga consumption and the days the survey was conducted ($p=.176$). No significant differences were found between rutabaga consumption, gender and the days the survey was conducted ($p=.435$).

Asparagus

Forty-eight males (38%) and sixty-five females (51%) reported responses to the question, "How often did you consume asparagus over the past twenty-four hours?" Overall averages for the three-day dietary recall increased from Day 1 to Day 2, with a Day 1 total of 0.05 and a Day 2 total of 0.06, and then decreased to 0.02 on Day 3. The average for the males increased from 0.08 on Day 1 to 0.10 on Day 2, before decreasing to 0.04 on Day 3. The female average remained stable from Day 1 to Day 2, with a total of 0.03 for both days, before decreasing to 0.00 on Day 3. Males consumed more asparagus on all three days than females. No significant differences were found between asparagus consumption and the days the survey was conducted ($p=.081$). No significant differences were found between asparagus consumption, gender and the days the survey was conducted ($p=.786$).

Kohlrabi

Forty-six males (36%) and sixty-five females (51%) responded to the question, "How often did you consume kohlrabi over the past twenty-four hours?" The overall average intake increased on all three days of the dietary recall, from a total of 0.00 on Day 1 to a total of 0.03 on Day 3. Male averages increased from 0.00 on Day 1 to 0.07 on Day 3. Female averages remained steady at 0.00 among all three days (Day 1, Day 2 and Day 3). Similar intakes were noted between genders on Day 1, but for Days 2 and 3 males consumed more kohlrabi than females. No significant differences were found between kohlrabi consumption and the days the survey was conducted ($p=.073$). No significant differences were found between kohlrabi consumption, gender and the days the survey was conducted ($p=.073$).

Zucchini

Forty-seven males (37%) and sixty-four females (50%) answered the question, "How often did you consume zucchini over the past twenty-four hours?" The overall average intake among both males and females remained steady from Day 1 to Day 2, with totals of 0.11 on both Days 1 and 2, before decreasing to 0.04 on Day 3. The male average decreased from 0.15 on Day 1 to 0.02 on Day 3. The female average increased from Day 1 to Day 2, with a total of 0.08 on Day 1 and a total of 0.16 on Day 2, before decreasing to 0.05 on Day 3. Males consumed more zucchini on Day 1, but females consumed more on Days 2 and 3. No significant differences were found between zucchini consumption and the days the survey was conducted ($p=.073$). No significant differences were found between zucchini consumption, gender and the days the survey was conducted ($p=.241$).

Multivariate testing was also conducted to determine whether significance exists between the days of the dietary recall and/or between the days of the recall and gender. A confidence level of 99.5% ($p < .005$) was designated as a determination of statistical significance of the specific food and drink item. The table, as seen in Appendix B, depicts results of the Multivariate Test, determining the levels of significance for the specified food item. The red highlighted items were found to be significant between consumption and the days the survey was conducted ($p < .005$), whereas the blue highlighted items were found to be significant between consumption, gender and the days the survey was conducted ($p < .005$).

Research Objectives and Interpretation

The overall objective of this study was to examine Wisconsin students' dietary patterns in order to determine their knowledge, attitude, behaviors, and overall willingness to incorporate new and different fruits and vegetables into their daily diet.

Research Objective #1 – Does demographic information have an effect on fourth graders knowledge, attitude, behavior and willingness to incorporate new and different fruits and vegetables into their daily diet and lifestyle habits? Survey items 1-24 in the first section of the survey, pages 2-4, (see Appendix A for the complete Fresh Fruit and Vegetable survey) dealt with this objective. Descriptive statistics, including frequencies and percentages, were used to determine whether lifestyle and dietary habits affect fruit and vegetable intake. The majority of Fresh Fruit and Vegetable Program participants were female ($n=70$, 55%). Caucasian was the major ethnic group of male and female participants ($n=42$, 33%). English was the language primarily spoken at home ($n=74$, 58%). The majority of participants ($n=38$, 30%) engaged in physical activity 2-3 times

per week. Less than half the participants (n=47, 32%) were aware that they are able to purchase free or reduced lunches at school. Forty-one students (32%) reported that they visited fast food restaurants at least once per week. Forty-five students (35%) ate dinner as a family seven days a week. Seventy-one students (56%) stated that their parents limited their television, computer and/or video game usage. Forty-six students (36%) never took the school breakfast during the week, while thirteen students (10%) stated they took the school lunch 1-2 times per week. A majority of students stated they would be willing to try fruit in a variety of settings, reporting: more willing to try fruit at home (n=64, 50%), school (n=59, 46%) and for a snack (n=72, 57%). A majority of students stated they might be willing to try vegetables in a variety of settings, reporting: more willing to try vegetables at home (n=64, 50%), school (n=63, 49%) and for a snack (n=46, 36%). Students reported they sometimes eat the fruit (n=64, 50%) and sometimes eat the vegetable (n=59, 46%) that comes with the school lunch meal. Statistical testing was not run on any demographic data.

Research Objective #2 –Are fourth graders able to visually identify specified fruits and vegetables among similar pictures of fruits and vegetables? Survey item 1 in the second section of the survey, pages 5-10, (see Appendix A for the complete Fresh Fruit and Vegetable survey) dealt with this objective. Apples were the most identifiable fruit (n=123, 97%), followed by: strawberries (n=122, 96%), pineapples (n=122, 96%), grapes (n=121, 95%), oranges (n=121, 91%), bananas (n=121, 95%), watermelon (n=121, 95%), raisins (n=118, 93%), kiwi (n=118, 93%), pears (n=115, 91%), blueberries (n=114, 90%), cantaloupe (n=89, 70%), cranberries (n=70, 55%), and honeydew melon (n=60, 47%).

Carrots were the most identifiable vegetable (n=123, 97%), followed by: green peppers (n=120, 94%), tomatoes (n=120, 94%), cauliflower (n=117, 92%), cucumbers (n=116, 91%), celery (n=110, 87%), pea pods (n=109, 86%), broccoli (n=101, 80%), and sweet potatoes (n=55, 43%). Statistical testing was not run on any demographic data.

Research Objective #3 –To determine the fruit and vegetable consumption breakdown of fourth grade males and females? Survey item 2 in the second section of the survey, pages 5-10, (see Appendix A for the complete Fresh Fruit and Vegetable survey) dealt with this objective. Blueberries (n=46, 36%) were the most consumed fruit by fourth grade males and females, followed by: strawberry (n=39, 31%), apple (n=36, 28%), banana (n=36, 28%), grape(n=36, 28%), orange (n=35, 27%), watermelon (n=35, 27%), raisin (n=33, 26%), pear (n=32, 25%), kiwi (n=30, 24%), pineapple (n=27, 21%), cantaloupe (n=24, 18%), honeydew melon (n=22, 17%), and cranberries (n=22, 17%). Carrots (n=119, 94%) were the most consumed vegetable by fourth grade males and females, followed by: celery (n=105, 83 %), broccoli (n=101, 80%), cucumber (n=100, 79%), tomato (n=99, 78%), sweet potato (n=90, 71%), cauliflower (n=84, 66%) green pepper (n=82, 65%), and pea pods (n=79, 62%). Statistical testing was not run on any demographic data.

Research Objective #4 –To determine whether previous exposure to foods enhances fourth graders' willingness to try fruits and vegetables? Survey items 2 and 3 in the second section of the survey, pages 5-10, (see Appendix A for the complete Fresh Fruit and Vegetable survey) dealt with this objective. Apples (n=124, %) were the most previously eaten fruit, followed by: orange (n=122, 97%), banana (n=120, 94%), grape (n=120, 94%), watermelon (n=118, 93%) strawberry (n=111, 87%), raisin (n=111, 87%),

pear (n=98, 77%), pineapple (n=97, 76%), kiwi (n=96, 75%), cantaloupe (n=81, 64%), cranberry (n=75, 59%), blueberry (n=69, 54%) and honeydew melon (n=51, 40%).

Carrots (n=119, 94%) were the most previously eaten vegetable, followed by: celery (n=105, 83%), broccoli (n=101, 80%), cucumber (n=100, 79%), tomato (n=99, 78%), sweet potato (n=90, 71%), cauliflower (n=84, 66%), green pepper (n=82, 65%), and pea pods (n=79, 62%). Statistical testing was not run on any demographic data.

Research Objective #5 –Are fourth grade males and females willing to try unfamiliar fruits and vegetables? Survey item 3 in the second section of the survey, pages 5-10, (see Appendix A for the complete Fresh Fruit and Vegetable survey) dealt with this objective. Based solely on the pictures of specific fruits, those students never having eaten the aforementioned fruit, students would be most willing to try honeydew melon (n=71, 56%) having never eaten them before, followed by: blueberry (n=50, 39%), cranberry (n=48, 38%), cantaloupe (n=41, 32%), pear (n=28, 22%), pineapple (n=27, 21%), kiwi (n=24, 19%), strawberry (n=13, 10%), raisin (n=12, 9%), watermelon (n=4, 3%), grape (n=4, 3%), banana (n=3, %), apple (n=3, 2%), and oranges (n=2, 1%). Based solely on the pictures of specific vegetables, those students never having eaten the aforementioned vegetables students would be most willing to try pea pod (n=44, 35%) having never eaten them before, followed by: green pepper (n=42, 33%), cauliflower (n=39, 31%), sweet potato (n=34, 27%), tomato (n=25, 20%), broccoli (n=24, 19%), cucumber (n=23, 18%), celery (n=20, 16%), and carrots (n=5, 4%). Statistical testing was not run on any demographic data.

Research Objective #6 – Are there differences in the overall dietary pattern/intake consumption between males and females in fourth grade? Survey items 1-11 in the fourth section of the survey, pages 12-14, (see Appendix A for the complete Fresh Fruit and Vegetable survey) dealt with this objective. Multivariate testing was conducted to determine whether significance exists between consumption and the days of the dietary recall, and also between consumption, gender and the days of the dietary recall. A confidence levels of ($p < .005$) was designated as a determination of statistical significance. Significant differences were found between consumption of the food items and the days of the survey for: milk and yogurt, soda, water, juice, fried potatoes, chips, crackers and pretzels, cookies and cake, candy, ice cream, bananas, apples, plums, peaches, oranges, grapes, kiwi, watermelon, pears, strawberries, pineapple, cantaloupe, raisins, potatoes, lettuce, carrots and cauliflower. Significant differences were found between consumption of the food item, gender and days of the survey for: soda, grapes and strawberries.

Chapter V: Discussion

This chapter includes a discussion comparing and contrasting the results of this study with the results of relevant previous studies. Conclusions were formed to summarize the results of this study. Finally, recommendations were made.

Discussion

This study found that the fourth grade males and females participating in the Wisconsin Fresh Fruit and Vegetable Program have similar fruit and vegetable identification abilities, different previous exposure and consumption habits, as well as similar but varied willingness to try new and different fruits and vegetables.

Identification of Fruits and Vegetables

In the Wisconsin FFVP study, apples were the most correctly identified fruit among the fourth graders, with 97% of students correctly identifying the picture of the apples. Carrots were the most identifiable vegetable among the fourth graders, with the majority of students, 97%, correctly identifying their picture. Results from the FFVP pilot program study coincide with the results from the Wisconsin FFVP, with 97% and 94% of participating students correctly identifying apples and carrots, respectively. The reason for the correct identification of both apples and carrots can be explained by the fact that apples and carrots are the most common, most frequent fruit and vegetable eaten among children and adolescents, and each has a recognizable shape that is taught early on in childhood (Buzby, Guthrie & Kantor, 2003).

Previous Exposure and Willingness to try Fruits and Vegetables

In this study, previous exposure to fruits and vegetables enhanced all participating fourth graders' willingness to try new and different fruits and vegetables. The more often children and adolescents are given the opportunity to try new and different fruits and vegetables, the better their overall consumption of fruits and vegetables, as well as their willingness to try new and different fruits and vegetables. This study determined that those fourth graders who had no previous exposure were less likely to try a specific fruit and vegetable, and even less willing to try other fruits and vegetables. This fact can be demonstrated by the fact that nearly all students reported having previously eaten an apple (98%) and a carrot (96%). Of those students with previous apple and carrot exposure, 84% reported being more willing to try honeydew melon and pea pods, the fruit and vegetable most frequently reported as not previously eaten (18% and 22%, respectively) than those few who had never seen an apple or carrot. As established above, previous exposure to the specific fruits and vegetables listed within the FFVP survey greatly enhanced participating fourth graders to try new and different fruits and vegetables.

Fruit and Vegetable Statistics

The Fresh Fruit and Vegetable Study determined the average fruit and vegetable consumption decreased from Day 1 to Day 3 of the three-day dietary recall for all fruits and vegetables identified. Results from the Wisconsin Fresh Fruit and Vegetable Program survey indicate that males ate more fruits than females, while females ate more vegetables than males. The survey also concluded that males were more willing to try new and different fruits and vegetables than females. These results coincide with past

research in concluding that consumption of fruits and vegetables among children (namely fourth graders) is below the recommended amounts set forth by the FGP (My Pyramid) and DGA. These results also correspond with the past research, which states that girls eat more raw fruits and vegetables than boys, while boys eat more variety of fruits and vegetables (Dietz & Robinson, 2005). The Wisconsin FFVP study found the same to be true, that males ate more fruits than females, while females ate more vegetables than males. Multivariate testing determined significant differences between consumption of the food items and the days of the survey for: milk and yogurt, soda, water, juice, fried potatoes, chips, crackers and pretzels, cookies and cake, candy, ice cream, bananas, apples, plums, peaches, oranges, grapes, kiwi, watermelon, pears, strawberries, pineapple, cantaloupe, raisins, potatoes, lettuce, carrots and cauliflower. Significant differences were also found between consumption of the food item, gender and days of the survey for: soda, grapes and strawberries.

Summary

Nearly everyone involved in the Wisconsin FFVP was able to recognize the health benefits from the program, as well as from the results of the first FFVP pilot. School staff members believed the pilot did many things, including: helping to decrease the risk factors leading to obesity; helping to increase the attention-span of students; helping to reduce the consumption of less healthy foods and also helping to increase students' awareness and preferences for new and different fruits and vegetables.

Children and adolescents liked the Wisconsin FFVP because they were able to eat their favorite fruits and vegetables more often, they enjoyed eating these foods and liked their concurrent health benefits, and the fact that the snacks provided by the Wisconsin

FFVP were a welcome break from normal, everyday classroom activities. Students participating in the Wisconsin Fresh Fruit and Vegetable Program described improvement in their eating habits, a greater willingness to try new and different fruits and vegetables and also had increased consciousness of eating too much junk food.

All the objectives of this study were met.

Objective 1: To examine whether demographic information plays a role in the food habits of fourth graders by determining knowledge, attitude, behavior and willingness to eat fruits and vegetables.

Outcome: Frequencies for participating students' grade, age, ethnicity, primary language, parental control over television and video game usage, physical activity patterns, fast food restaurant usage and family dinners were determined, though comparisons between genders was not made. Statistical analysis were not run, therefore statistical differences were not determined for this portion of the FFVP survey.

Objective 2: To examine whether students were able to correctly identify fruits and vegetables among pictures of similar fruits and vegetables.

Outcome: Frequencies for the number of times students correctly identified specified fruits and vegetables were determined, though comparisons between genders was not made. Statistical analysis were not run, therefore statistical differences were not determined for this portion of the FFVP survey.

Objective 3: To examine the fruit and vegetable consumption of fourth grade males and females by a determination of consumption history.

Outcome: Frequencies for the number of times students correctly identified specified fruits and vegetables were determined, though comparisons between genders

was not made. Statistical analysis were not run, therefore statistical differences were not determined for this portion of the FFVP survey.

Objective 4: Does previous exposure to foods enhance fourth graders' willingness to try fruits and vegetables?

Outcome: Frequencies for the number of times students have previously eaten specified fruits and vegetables were determined, and comparisons between genders were made. Statistical analysis were not run, therefore statistical differences were not determined for this portion of the FFVP survey.

Objective 5: Are fourth grade males and females willing to try unfamiliar fruits and vegetables?

Outcome: Frequencies for the number of times students identified their willingness to try new and different fruits and vegetables were determined, though comparisons between genders were not made. Statistical analysis were not run, therefore statistical differences were not determined for this portion of the FFVP survey.

Objective 6: Are there differences in the overall dietary pattern/intake consumption between males and females in fourth grade?

Outcome: Multivariate testing were conducted to determine whether significance exists between consumption of specific food items and the days of the dietary recall, and also between consumption of specific food items, the days of the dietary recall and gender. A confidence levels of ($p < .005$) was designated as a determination of statistical significance of the specified food item. Significant differences were found between consumption of the food items and the days of the survey for: milk and yogurt, soda, water, juice, fried potatoes, chips, crackers and pretzels, cookies and cake, candy, ice cream, bananas,

apples, plums, peaches, oranges, grapes, kiwi, watermelon, pears, strawberries, pineapple, cantaloupe, raisins, potatoes, lettuce, carrots and cauliflower. Significant differences were found between consumption of the food item, gender and days of the survey for: soda, grapes and strawberries.

Limitations

The small sample size, involvement of only fourth grade males and females, and the geographical location all limit the generalization of these findings to other populations of fourth grade students throughout the United States and the rest of the world.

Conclusion

Although students reported improvements in their eating habits, this study found that all of the fourth graders surveyed failed to meet the recommended five to nine servings of fruits and vegetables each day. The FFVP survey found the average overall intake of fruits and vegetables was less than a single serving per day. Males were found to eat more fruit than females, with an average number of servings near three-fourths daily. Females were found to eat more vegetables than males, consuming an average of one serving per day. Males also appeared more willing to try new and different fruits and vegetables than females, as suggested by self-reports. These results replicate what the FNS division of the USDA and other studies have already determined, that less than one-third of the child and adolescent populations meet the recommended "5-A-Day" fruit and vegetable recommendation (USDA et al, 2005). These results also prove that children and adolescents can be picky eaters, but if exposed to a wide variety of new and different fruits and vegetables, they will eventually try the food item. Continuous exposure may

prompt higher intakes within the fruit and vegetable food groups, increasing health and decreasing obesity and the risk factors for developing various diseases and health conditions.

The conclusions drawn from this study are of benefit to the many groups that are personally, as well as professionally, involved. First, the results of this study can be used by the USDA and the FFVP to gain additional funding to expand and encompass new states and Indian Tribal Organizations with each successive year. Second, all of the schools involved can use the results to develop or revise existing wellness programs to increase and promote healthier lifestyle behaviors and habits. Third, registered dietitians and other nutrition professionals and public health nutrition educators can use the findings when developing future nutrition educational plans and materials that promote healthful eating habits such as increased fruit and vegetable consumption, and lifestyle changes, such as increased daily physical activity and decreased fast food restaurant patronage, to combat the childhood overweight and obesity epidemic.

Recommendations

Several recommendations can be made as a result of conducting this survey. First, a larger sample size would have most advantageous, as the results could have been more generalized, as suggested previously. Second, additional studies could be done to further determine the exact quantity of the targeted foods consumed as previous studies mainly discuss quantities of foods consumed rather than frequencies. Frequencies are helpful in understanding food habits, but quantities are more precise information on food intakes. For instance, in this study a student who reported having eaten a food item two times per day, in reality, could have eaten a lesser amount of that food than a student who

responded to eating the same food one time per day. Third, it would have been helpful to verify quantities of particular food items, to better determine actual quantities eaten, and increase accuracy of results analysis. Fourth, individual interview regarding diet recalls may have increased accuracy, as it may have been difficult for children to remember what they ate for the three days prior to the survey administration, but having an interviewer there to probe and prompt answers may have been helpful. Fifth, the length and quality of the survey may also have deterred children from accurately completing the entire survey. Questions were lengthy and repetitive, which could have provided students ample time to lose focus and concentration. A shorter survey, or the entire FFVP survey broken down into various sections and given on multiple days, may have increased participation and accuracy of results. Lastly, the FFVP survey was misleading, as it encompassed various aspects of students' home and school lives, and was not very specific to fruit and vegetable intake, attitude and willingness to try new and different fruits and vegetables. All of the aforementioned recommendations and suggestions would have, obviously, required more time and more manpower to complete this particular research project, a concept not prudent at this time, but may be beneficial to researchers/research teams in the future.

The frequency of consumption of selected food items in this Wisconsin Fresh Fruit and Vegetable Program survey provides information on the use of foods, such as fruits and vegetables, which are encouraged in the diets and lower the risk of chronic diseases and conditions such as: high blood pressure, heart attacks, type 2 diabetes and certain types of cancer within the United States. Understanding the use of foods among children, specifically those foods selected within the FFVP, is an important step in

developing strategies to promote the healthful eating habits that may help combat the risk of chronic disease and condition development during childhood growth and development, and later in life.

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Appendix A: Wisconsin Fresh Fruit and Vegetable Survey

Wisconsin Student Survey

- This survey asks about you and what you think about eating different foods. Your answers will tell schools how to help students be healthy.
- It is your choice to complete this survey. You do not have to do it, but we hope that you will. If there's a question you don't want to answer, you can skip it. You can stop answering the survey questions at any point if you don't want to continue.
- We will ask for your name on the next page, but your name and answers will be kept private. No student, class, or school will ever be mentioned by name in a report of this survey.
- Please read each question carefully.
- Raise your hand to ask for help if you have questions.

Thank you for taking this survey!

10. In the last week (7 days), how many times did you do a physical activity, like going to physical education (phy ed) class, exercising, dancing, or playing a sport?

- 0 times
- 1 time
- 2-3 times
- 4-6 times
- 7-10 times
- more than 10 times

11. In the last week (7 days), how many times did you eat a meal or snack from a fast food restaurant (for example: McDonald's, Pizza Hut, Burger King, KFC, and Taco Bell)?

- 0 times
- 1 time
- 2-3 times
- 4-6 times
- 7-10 times
- more than 10 times

12. In the last week (7 days), how many times did your family sit down and eat dinner/supper together as a family?

- 0 times
- 1 time
- 2-3 times
- 4-6 times
- 7 times

13. My parents limit the amount of time I spend watching TV or playing video games.

- Always
- Sometimes
- Never

14. If you were given a new kind of fruit at home, would you try it?

- I would not try it
- I might try it
- I would try it

15. If you were given a new kind of fruit at school, would you try it?

- I would not try it
- I might try it
- I would try it

16. Would you choose fruit as a snack instead of chips or candy?

- I would not choose fruit
- I might choose fruit
- I would choose fruit

1. Circle the picture of apples



2. Have you ever eaten an apple? Yes No

3. If you have never eaten an apple, would you try one?

I would try it I might try it I would not try it

1. Circle the picture of oranges



2. Have you ever eaten an orange? Yes No

3. If you have never eaten an orange, would you try one?

I would try it I might try it I would not try it

1. Circle the picture of bananas



2. Have you ever eaten a banana? Yes No

3. If you have never eaten a banana, would you try one?

I would try it I might try it I would not try it

1. Circle the picture of watermelon



2. Have you ever eaten watermelon? Yes No

3. If you have never eaten watermelon, would you try it?

I would try it I might try it I would not try it

1. Circle the picture of raisins



2. Have you ever eaten a raisin? Yes No

3. If you have never eaten a raisin, would you try one?

I would try it I might try it I would not try it

1. Circle the picture of blueberries



2. Have you ever eaten a blueberry? Yes No

3. If you have never eaten a blueberry, would you try one?

I would try it I might try it I would not try it

1. Circle the picture of grapes



2. Have you ever eaten a grape? Yes No

3. If you have never eaten a grape, would you try one?

I would try it I might try it I would not try it

1. Circle the picture of cantaloupe



2. Have you ever eaten cantaloupe? Yes No

3. If you have never eaten cantaloupe, would you try it?

I would try it I might try it I would not try it

1. Circle the picture of celery



2. Have you ever eaten celery? Yes No

3. If you have never eaten celery, would you try it?

I would try it I might try it I would not try it

1. Circle the picture of broccoli



2. Have you ever eaten broccoli? Yes No

3. If you have never eaten broccoli, would you try it?

I would try it I might try it I would not try it

1. Circle the picture of cauliflower



2. Have you ever eaten cauliflower? Yes No

3. If you have never eaten cauliflower, would you try it?

I would try it I might try it I would not try it

1. Circle the picture of cucumber



2. Have you ever eaten a cucumber? Yes No

3. If you have never eaten a cucumber, would you try one?

I would try it I might try it I would not try it

1. Put a check next to the fruits and vegetables listed below that **you have ever tried**.

2. Circle the ones that **you like**.



- apple
- apricot
- artichoke
- asparagus
- avocado
- bamboo shoots
- banana
- beets
- blueberry
- broccoli
- Brussels sprouts
- cabbage
- cantaloupe
- carrots
- cauliflower
- celery
- cherries

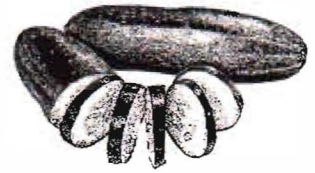
- corn
- cranberries
- cucumber
- eggplant
- grapefruit
- grapes
- green beans
- green pepper
- honeydew melon
- kidney beans
- kiwi
- kohlrabi
- lemon
- lettuce



- lima beans
- lime
- mango
- mushrooms

- nectarine
- okra
- onion
- orange
- papaya
- parsnip
- peas
- peach
- pear
- pineapple
- plum
- potato
- pumpkin
- radish
- raisins
- raspberry
- red or yellow bell pepper
- rhubarb
- rutabaga
- scallions
- spinach

- strawberry
- summer squash
- sweet potato, yams
- Swiss chard
- tangerine
- tomato



- turnip
- water chestnuts
- watermelon
- winter squash
- yellow wax beans
- zucchini



Yesterday, how many times did you eat...(circle the number of times for each food)

	0 times	1 time	2 times	3 times	4 times	5 or more times
tangerines	0	1	2	3	4	5+
grapes	0	1	2	3	4	5+
kiwi	0	1	2	3	4	5+
watermelon	0	1	2	3	4	5+
pears	0	1	2	3	4	5+
strawberries	0	1	2	3	4	5+
pineapple	0	1	2	3	4	5+
cantaloupe	0	1	2	3	4	5+
honeydew melon	0	1	2	3	4	5+
raisins	0	1	2	3	4	5+
cranberries	0	1	2	3	4	5+
blueberries	0	1	2	3	4	5+
other fruit _____	0	1	2	3	4	5+
other fruit _____	0	1	2	3	4	5+

11. eat one of the fresh, frozen, dried or canned **vegetables** listed below:

winter squash	0	1	2	3	4	5+
mashed, baked, or boiled potatoes	0	1	2	3	4	5+
corn	0	1	2	3	4	5+
lettuce, green salad, or spinach	0	1	2	3	4	5+
carrots	0	1	2	3	4	5+
celery	0	1	2	3	4	5+
tomatoes	0	1	2	3	4	5+
cabbage - raw or cooked	0	1	2	3	4	5+
cucumber	0	1	2	3	4	5+

Appendix B: Significance Values for Specified Foods ($p < .005$)

	p-value <.005: Days	p-value < .005: Days and Gender
Milk & Yogurt	0	0.443
Soda	0	0
Water	0.002	0.734
Juice	0	0.642
Fried Potatoes	0	0.944
Chips & Crackers	0.003	0.362
Cookies & Cake	0	0.546
Candy	0	0.035
Ice Cream	0.002	0.76
Banana	0	0.292
Apple	0	0.661
Plum	0.002	0.259
Peach	0.002	0.468
Orange	0	0.224
Tangerine	0.09	0.949
Grape	0.001	0.004
Kiwi	0	0.636
Watermelon	0	0.471
Pears	0.001	0.607
Strawberries	0	0.005
Pineapple	0.005	0.302
Cantaloupe	0.001	0.89
Honeydew Melon	0.019	0.109
Raisin	0	0.275
Cranberry	0.06	0.519
Blueberry	0.132	0.242
Winter Squash	0.211	0.485
Potato	0	0.324
Corn	0.021	0.128
Lettuce	0.001	0.843
Carrots	0.001	0.88
Celery	0.241	0.892
Tomato	0.068	0.748
Cabbage	0.889	0.688
Cucumber	0.011	0.849
Peas	0.125	0.688
Peppers	0.025	0.194
Broccoli	0.007	0.366
Cauliflower	0.003	0.614
Sweet Potatoes	0.159	0.644
Rutabaga	0.176	0.435
Asparagus	0.081	0.786
Kohlrabi	0.073	0.073
Zucchini	0.073	0.241

Appendix C: Passive Parental Permission Form
Wisconsin Student Survey

Our school is taking part in the Wisconsin Student Survey sponsored by the Wisconsin Department of Health and Family Services. The survey will ask about the health behaviors of 4th, 7th, and 9th grade students. The survey will focus on fruits and vegetables and will ask questions about them. It will also ask about eating fruits and vegetables, physical activity, eating school meals and eating foods other than fruits and vegetables.

Students will be asked to fill out a paper and pencil format questionnaire that takes about 30-40 minutes to complete. They will take the survey during regular class time.

Completing the anonymous survey will cause little or no risk to your child. The survey has been designed to protect your child's privacy as his or her results will be kept confidential. Also, no class or student will ever be mentioned by name in a report of the results. Your child's school will be taking part in the Wisconsin Fresh Fruit and Vegetable Program, which provides for a free fruit or vegetable snack each day of the school year. The results of this survey will help us evaluate the effectiveness of the program and can possibly assist with securing permanent funding for the program. We would like all students to take part in the survey, **but the survey is voluntary**. No action will be taken against you or your child, if your child does not participate. Students can skip any questions they do not wish to answer. In addition, students may stop participating in the survey at any point without penalty. Additionally, a copy of the survey is available at your child's school if you wish to inspect the survey prior to admission.

If your child's teacher or principal cannot answer your questions about the survey, call Amy Meinen at (608) 267-9194.

Please read the section below. **If you do not wish for your child to take part in the survey, check the box, sign and date the form and return the form to the school.** Signing and returning this form will dismiss your child from taking this survey. If you have no objection to your child taking part in the survey, you should do nothing with this form. Thank you.

Child's name: _____ Grade: _____

I have read this form and know what the survey is about.

My child **may not** take part in this survey.

Parent's signature: _____ Date: _____

Appendix D: Human Subjects Training Certification

UW-Stout Human Subjects Training Certification**Name:** Anne-Marie Tschida**Stout ID:** 377647**College or Unit:** College of Human
Development**Training Date:** 2004-
09-23**Department:** Food & Nutrition**Phone:** 651-247-3842**Comments:**

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Appendix E: IRB Approval



Stout Solutions • Research Services
152 Voc Rehab Building

STOUT
UNIVERSITY OF WISCONSIN

University of Wisconsin-Stout
P.O. Box 790
Menomonie, WI 54751-0790

715/232-1126
715/232-1749 (fax)
<http://www.uwstout.edu/rps/>

Date: February 22, 2006

To: Anne-Marie Tschida

Cc: Lydia Chowa

From: Sue Foxwell, Research Administrator and Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research (IRB)

Subject: Protection of Human Subjects in Research

Your project, "*Evaluation of the Implementation of the Fresh Fruit and Vegetable Program in Wisconsin*" is **Exempt** from review by the Institutional Review Board for the Protection of Human Subjects. The project is exempt under Category 5 of the Federal Exempt Guidelines and holds for 5 years.

Reviewer comments:

- 1) Question 2 (exemption): This is not exempt under category 2/3 because identifying information will be collected. It's not exempt under category 6, because it's not evaluating the quality of the food, the taste, acceptance, etc. It is exempt under category 5, because it is an evaluation of a public service program.
- 2) On the IRB protocol, you have indicated that your data will be gathered via an online survey. Elsewhere in your proposal, you state you will use a "paper and pencil-formatted survey." I suggest you clarify your method.
- 3) If you are doing an online survey, I offer these recommendations based on your responses to Question 8 on the IRB protocol form:
 - a) Your results will be available on a web site that is available to others besides the investigators, you should include a description of the site, whether it will be public or password-protected, and how it will be linked.

- b) If you don't place all of the emails in a "Bcc" line, you should explain how you will protect confidentiality, since other options either are cumbersome to execute (individual emails) or provide the entire recipient list in a visible field in the email.
- c) Your survey URL will contain identifying information, which means that each person's responses are digitally linked to that information. I suggest an explanation of how these data files will be stored and/or used in the future.

Please copy and paste the following message to the top of your survey form before dissemination:

This project has been reviewed by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46

Please contact the IRB if the plan of your research changes. Thank you for your cooperation with the IRB and best wishes with your project.

***NOTE: This is the only notice you will receive – no paper copy will be sent.**

SF:dd