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Magnuson, Kathryn. ***Availability and Price of Low-fat Dairy, Fruits, and Vegetables in Two Rural Counties in Northwestern Wisconsin***

Abstract

Americans consume below the recommended amounts of fruits, vegetables, and low-fat milk, which is linked to an increased risk of cardiovascular disease and cancer. The purpose of this study was to assess the prices and availability of fresh fruits, vegetables, low-fat milk, and organic produce in Chippewa County and Burnett County in northwestern Wisconsin. The food audits will assist the Chippewa Health Improvement Partnership (CHIP), the Nutrition Coalition of Chippewa County, and Burnett County to determine if interventions are needed to increase availability.

In August, 2011 and December, 2011, establishments were audited in Chippewa County and Burnett County. The establishments included farmers' markets, convenience stores, and grocery stores. A walk-through was completed to record prices and availability of fruits, vegetables, skim and 1% milk, and organic fruits and vegetables.

Burnett County had cheaper milk prices in the winter and Chippewa County had a wider range of 1% milk prices in the summer. There were a limited amount of fruits and vegetables offered at the farmers' markets and convenience stores in Chippewa County. In Burnett County, more fruits and vegetables were available in the winter. In Chippewa County, all vegetables surveyed were available in both seasons and more varieties of fruit were available in summer. There were price differences for many fresh fruits and vegetables between summer and winter. The number and prices of organic fruits and vegetables in Burnett County remained the same from summer to winter, except russet (Idaho) potatoes. More organic fruits and vegetables were available in the summer in Chippewa County. All of the organic fruits and vegetables were more

expensive than the same non-organic varieties, except for oranges. The results of this study will be used to determine how to increase access to fruits, vegetables, and low-fat milk in Chippewa County and Burnett County.

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Chapter I: Introduction

Americans currently consume below the recommended amounts of fresh fruits, vegetables, and low-fat milk, which are commonly considered the foods that comprise a healthy diet. The recommendation for vegetable consumption ranges from 1 to 3 cups per day, and the recommendation for fruit consumption ranges from 1 to 2 cups per day depending on age, sex, and level of physical activity (United States Department of Agriculture [USDA], 2011a). Only 38% of all American individuals consume the recommended servings of vegetables, and only 23% consume the recommended servings of fruit (Blisard, Steward, & Jolliffe, 2004). In any given week, approximately 19% of all low-income households purchase no fruits and vegetables, compared with only about 10% of higher income households (Blisard, Steward, & Jolliffe, 2004). In Wisconsin, the percentage of adults who consume fruits two or more times per day is between 30 to 34.9%, and only 20.0 to 24.9% of adults consume vegetables three or more times per day (CDC, 2010b). Another notable food group of major concern in the American diet is the dairy group. Since 1977-1978, decreased milk consumption has been witnessed in both children and adolescents (CDC, 2011).

Diets are often lacking among low-income Americans, especially in the amounts of fruits, vegetables, and dairy products consumed (Dong & Lin, 2009). Common household responses to inadequate food supplies include food budget adjustments, reduced food intake, and alterations in types of food served, such that dietary variety decreases and energy dense food replaces fruit, vegetables and dairy (Kendall, Olson & Frongillo, 1996; Olson, 1999; Tarasuk & Beaton, 1999; Bickel et al., 2000). Adults in the United States living with low-incomes consume fewer weekly servings of fruits, vegetables, and dairy, and thus are consuming lower levels of micronutrients, including the B complex vitamins, magnesium, iron, zinc, and calcium (Tarasuk & Beaton, 1999;

Dixon, Winkleby, & Radimer, 2001; Lee & Frongillo, 2001). These dietary patterns of decreased fruits, vegetables, and low-fat dairy are linked to the development of chronic diseases, including hypertension, hyperlipidemia, and diabetes (Vozonis & Tarasuk, 2003; Klesges et al., 2001).

Consumption of organic foods is one of the fastest growing divisions of food in the United States (Crinnion, 2010). Sales of organic food and beverages grew from $1 billion in 1990 to $21.1 billion in 2008 and are on track to reach $23 billion in 2009 (Crinnion, 2010). With a higher production cost, more labor, lower volume, and costly organic certification, organic fruits, vegetables and milk often cost more than non-organic foods (Fox News, 2012). Although generally more expensive than non-organic food items, organic food tends to be cheaper at specialty stores that stock a large variety of organic items. According to the Mayo Clinic (2011), protection from pesticides, the lack of food additives, and the potential environmental benefits are the three main reasons why consumers purchase organic foods rather than non-organic foods. However, with the drastic increase of the organic food market, a question remains whether organic food prices in rural markets make the organic food products prohibitive for the consumer living in rural areas.

Chippewa County is located in northwestern Wisconsin, and in 2010 hosted a population of 62,415 (U.S. Census Bureau, 2012b). Of Chippewa County's total land area, 53% is rural and 47% is urban (city-data.com, n.d.). In 2009, the median household income was $46,040 with 11.6% of the county population living below the poverty level. Burnett County in northwestern Wisconsin had a population of 15,457 in 2010 (U.S. Census Bureau, 2012a). The median household income was $38,580 in 2009, and 15.2% of the County were living below the poverty level (United States Department of Agriculture, Economic Research Service, 2009).

Research has indicated that there is less access to food stores in sparsely populated rural areas such as Burnett and Chippewa counties in Wisconsin and food prices are higher. Budget constraints in rural areas may make it even harder to purchase and include produce items in the diet (Krebs-Smith & Kantor, 2001). According to Blisard, Stewart, and Jolliffe (2003), on average, those living in low-income households spent $3.59 per person per week on fruits and vegetables in 2000. Higher-income households spend $5.02 per person per week on fruits and vegetables, which is significantly greater than low-income households. As Chippewa and Burnett are more rural counties in Wisconsin, a food audit to determine cost and availability of fruits, vegetables, and fluid milk in organic or nonorganic forms would provide beneficial data to address food availability and affordability needed to plan intercessions by the public health departments of these counties.

Public health professionals continue to see the benefits of fruit and vegetable consumption among populations. While studies that evaluate the availability of produce are sparse in the literature, disparities in availability may explain the disproportional intake of produce for some individuals (Morland & Filomena, 2007). Morland et al. (2002) found that areas where low-income households are located had fewer supermarkets and a smaller variety of foods, compared with that available in wealthy areas. Research has indicated that fruits and vegetables are more expensive and less readily available in more deprived, rural communities (Cummins et al., 2010). Therefore, it is anticipated if the present research indicates less availability of fruits, vegetables, and dairy in the rural areas of Burnett and Chippewa counties, then public health intervention strategies could increase retail availability or food pantry items of these items in the counties.

Statement of the Problem

The Chippewa Health Improvement Partnership (CHIP) is an effort to identify strategies to improve the health and quality of life in Chippewa County, Wisconsin by recognizing health needs (Chippewa Health Improvement Partnership, 2011). With the economic downturn that has occurred in the past several years and the budget cuts experienced by many social service/non-profit agencies, it has become apparent that there is a need to assess the food security and availability in Chippewa County. Burnett County in northwestern Wisconsin also could have a low availability of fresh fruits and vegetables for populations with income disparities. The food audit undertaken with this research will assist Burnett County, the Nutrition Coalition of Chippewa County, and the Chippewa Health Improvement Partnership to determine if interventions are needed to increase access of produce items and dairy products for Chippewa and Burnett counties.

Purpose of the Study

The purpose of this study is to conduct a food audit that will help determine if the residents of Chippewa County have availability or access to healthy foods, particularly fluid milk fresh fruits, and vegetables and whether these foods are cost prohibitive to those with lower incomes. The information collected will help to guide future health planning by the Chippewa Health Improvement Partnership (CHIP). CHIP is the current healthy communities' coalition that has recently added food availability and sustainability initiatives. More specifically, the information gathered from the food audit will be used by the director of the CHIP in Chippewa County to determine if more food pantries are needed to meet the food and nutritional needs of the residents. A food audit will also indicate if specific areas of Chippewa County should be targeted to make food more accessible. The food audit will not only provide valuable data but

will also supplement previous community health and nutritional assessments about the availability of food.

The Nutrition Coalition, which is coordinated by the Department of Health and Human Services of Chippewa County, will also utilize the data. The intent of the food audit for Chippewa County is for the internal use by the Nutrition Coalition to help find ways to increase access to fresh fruits and vegetables for the populations in the county with disparities, such as low-income or the elderly living on a fixed income. For Burnett County in northwestern Wisconsin, the data will be used to help with strategic planning and the best use of donations to help with the hunger relief.

Objectives of the Study

The first objective of the study is to evaluate prices and availability of fresh fruits, fresh vegetables, and low-fat milk in Chippewa and Burnett counties in northwestern Wisconsin. The second objective is to compare availability and prices of organic items to non-organic items in these two counties. The third objective is to compare seasonal prices and availability in each county.

Assumptions of the Study

The first assumption within this study is that prices and availability do not change within a season, and that one survey day represents the entire season. For example, completing an audit on August 29 represents the prices and availability of the items for the entire season of summer. A second assumption is that all of the items in the establishments were fully stocked when audited.

Definition of Terms

Cancer. The general name for a group of more than 100 diseases in which cells in a part of the body begin to grow out of control (American Cancer Society, 2011).

Cardiovascular disease. Includes numerous problems related to the heart and blood vessels. Many of these problems are precipitated by atherosclerosis, which is the build-up of plaque that narrows the arteries, making it harder for blood to flow (American Heart Association, 2011b).

Certified organic foods. Food produced according to certain production standards. For crops, it implies these foods were grown without the use of conventional pesticides, artificial fertilizers, human waste, or sewage sludge, and were processed without ionizing radiation or food additives (Wisconsin Department of Health, 2010, p. 6).

Choose My Plate. Part of a larger communication initiative based on the 2010 Dietary Guidelines for Americans to help consumers make better food choices. MyPlate illustrates the five food groups using a familiar mealtime visual, a place setting (USDA, 2011c).

Convenience stores. Small grocery stores that predominantly sell snack foods and sandwiches (Wisconsin Department of Health, 2010, p. 5).

Cost prohibitive. Prohibiting or tending to prevent purchase or use, i.e., prohibitive prices.

Dietary fiber. Nonstarch polysaccharides and lignin that are not digested by enzymes in the small intestine (USDHHS & USDA, Dietary Guidelines for Americans, 2005, p. 67).

Farmers' market. An association of local farmers who assemble at a defined location for the purpose of selling produce directly to consumers. Three or more farmers must be present at a market for it to be considered a viable market (Wisconsin Department of Health, 2010, p 5).

Grocery store. A store established primarily for the retailing of foods (Wisconsin Department of Health, 2010, p.5).

Heart attack. Occurs when the blood flow that brings oxygen to the heart muscle is severely reduced or cut off completely (American Heart Association, 2011a).

Hypertension. The arteries are not as elastic due to the build-up of cholesterol or plaque or because of scarring. Thus, the heart pumps harder to get blood through the arteries resulting in an elevated measured blood pressure reading (American Heart Association, 2012).

Low-income households. Less than 130 percent of the poverty line (Blisard, Stewart, & Jolliffe, 2003).

Micronutrients. Vitamins and minerals required in the human diet in very small amounts (USDHHS & USDA, Dietary Guidelines for Americans, 2005, p. 68).

Nutrient-dense foods. Foods that provide substantial amounts of vitamins and minerals with relatively fewer calories (USDHHS & USDA, Dietary Guidelines for Americans, 2005, p. 68).

Obesity. Excess proportion of total body fat, generally considered having a BMI >30 (WebMD, 2012).

Osteoporosis. A disease of progressive bone loss associated with an increased risk of fractures. The term osteoporosis literally means porous bone (American Academy of Orthopaedic Surgeons, 2007).

Recommended Dietary Allowances (RDA). Reference intakes that are intended to improve the long-term health of the population by reducing the risk of chronic disease and preventing nutritional deficiencies (Mahan & Escott-Stump, 2008).

Self-efficacy. The belief in one's capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1997).

Supermarket. Large grocery stores that stock products other than foods, such as clothing or household items (Wisconsin Department of Health, 2010, p. 5).

Type 2 diabetes mellitus. The most common form of diabetes that occurs when the body does not produce enough insulin or the cells become insulin resistant. Formerly referred to as adult-onset diabetes (American Diabetes Association, 2011).

Stroke. Occurs when a blood vessel carrying oxygen and nutrients to the brain is either blocked by a clot or bursts. Part of the brain cannot get the blood and oxygen needed, so the brain tissues die (American Stroke Association, 2011).

Limitations of the Study

One limitation of this study is that some of the fruits and vegetables were not priced in the same units among the establishments. For example, a cantaloupe at some grocery stores was sold per pound, and in another grocery store, the cantaloupe was priced per item. Therefore, separate sources such as Mott (2006) and Lynch (2008) were used to convert units so that the food items were consistent between all of the establishments. This may have skewed the price values that were converted, causing error because the weight found in one reference may not be the exact weight of the fruits and vegetables. A second limitation is that the audits were only conducted in the summer and winter, so the results cannot be generalized to the spring or autumn. Also, two of the farmers' markets audited were only open in the summer months. Lastly, the audit was completed in only two counties in Wisconsin; therefore, the results do not reflect all other counties in Wisconsin.

Methodology

The food cost and food availability audits to be completed in Chippewa County and Burnett County will assess the fruit, vegetable, milk availability and price differences between summer and winter. Specifically, the information gathered from the audits will be used by the director of the Chippewa Health Improvement Partnership (CHIP) in Chippewa County to determine if more food pantries are needed to meet the food and nutritional needs of the residents. CHIP is the healthy communities' coalition and one of the needs recently added to the list of initiatives was food availability/sustainability. Organic foods will be audited to determine price differences between organic and non-organic items in rural areas.

Chapter II: Literature Review

This research paper will continue with a literature review. The history of the Dietary Guidelines and recommended servings for fruits, vegetables, and milk will be discussed. This will be followed by the amounts of fruits, vegetables and milk consumed in the United States, and hypotheses of why Americans do not consume enough of these food items. The benefits of eating fruits and vegetables, and the factors that affect cost and availability of fresh fruits and vegetables are detailed, as well as a discussion of certified organic foods is provided. Lastly, the Chippewa Health Improvement Partnership is discussed.

History of the Food Guide Pyramid (Now MyPlate) and Dietary Recommendations

In order to understand the importance of fruits, vegetables, and low-fat dairy in the diets of Americans, one must understand the evolution of dietary recommendations for these foods, from the beginning of simply meeting nutrient needs to being essential for the human body to decrease chronic disease. Dietary recommendations have evolved with the increase in knowledge of health benefits of food groups as well as with changes in food consumption and physical activity patterns (Davis & Saltos, n.d.). The first published dietary guidance by the USDA was a Farmers' Bulletin written in 1894 by W.O. Atwater, followed by the first United States Department of Agriculture (USDA) food guide, *Food for Young Children* in 1916. This guide categorized food into five groups: milk and meat, cereals, vegetables and fruits, fats and fatty foods, and sugars and sugary foods. While specific vitamins and minerals had not even been discovered, protein, carbohydrate, and fat were the focus of the diets. This food guide was followed in 1917 by dietary recommendations based on these five food groups, targeted to the general public. Another updated food guide was released in 1921 that suggested amounts of

foods to purchase weekly for the average family, which remained popular throughout the 1920's (Davis & Saltos, n.d.).

In the early 1930's, the economic constraints of the depression years resulted in the development of food plans at four cost levels. In 1941, President Franklin Roosevelt called the National Nutrition Conference for Defense, which released the first set of Recommended Dietary Allowances (RDAs) by the Food and Nutrition Board of the National Academy of Sciences to improve the nutrition of citizens who were becoming soldiers (Davis & Saltos, n.d.). These RDAs listed specific recommended intakes for calories and nine essential nutrients: protein, iron, calcium, vitamins A and D, thiamin, riboflavin, niacin, and ascorbic acid (vitamin C), and also identified significant food sources of these nutrients.

In conjunction with the release of the RDAs, the USDA released the Basic Seven food guide in 1943 as the Wartime Nutrition Guide to cope with limited food supplies during the war, and revised it in 1946 as the National Food Guide (Davis & Saltos, n.d.). This guide specified a foundation diet that would provide a major share of the RDAs for nutrients, but only a portion of caloric needs assuming that people would consume more to meet calorie needs. The 1946 version suggested numbers of food group servings and was widely used for over a decade, but no mention of specific serving sizes for each food group was made (Center for Nutrition Policy and Promotion, 2011).

A new food guide known as the Basic Four (milk, meat, fruits and vegetables, and grains) was released by USDA in 1956 (Davis & Saltos, n.d.). This food guide, with its focus on getting enough nutrients, was widely used for the next two decades.

By the 1970's, research had related overconsumption of certain food components that included fat, saturated fat, cholesterol, and sodium and the risk of chronic diseases, such as heart

disease and stroke. In 1977, *Dietary Goals for the United States* heralded a new direction for dietary guidance (Davis & Saltos, n.d.). The focus shifted from obtaining adequate nutrients to avoiding excessive intakes of food components linked to chronic diseases.

The *Dietary Guidelines for Americans* were first published in 1980 by the USDA and Department of Health and Human Services (DHHS) and included seven principles of a healthful diet (Davis & Saltos, n.d.). The focus was on foods that provided essential nutrients while maintaining a healthy weight. Fat, saturated fat, cholesterol, and sodium were included as components of the diet that should be consumed in moderation to avoid chronic diseases. The guide suggested numbers of servings from each of five major food groups: the bread, cereal, rice, and pasta group; the vegetable group; the fruit group; the milk, yogurt, and cheese group; and the meat, poultry, fish, dry beans, eggs, and nuts group. The guide also recommended limited intake of a sixth food group: fats, oils, and sweets.

The *Dietary Guidelines for Americans* have been revised and issued jointly by USDA and DHHS every 5 years, with the most recent being the 2010 release (Davis & Saltos, n.d.). The second edition of the *Dietary Guidelines*, released in 1985, was very similar to the first, which was originally published in 1980. Some changes were made to provide guidance about nutrition topics that became more prominent such as following unsafe weight-loss diets, using large-dose supplements, and drinking of alcoholic beverages by pregnant women. The most notable addition to the Dietary Guidelines was the food guide pyramid that was released in 1992 which emphasized variety, proportionality, and moderation to individuals in using the Dietary Guidelines for Americans (Center for Nutrition Policy and Promotion, 2011). The Nutrition Labeling and Education Act of 1990 allowed for nutrition information to be put on nearly all

packaged and processed foods. The law was implemented in 1994, which helped individuals select foods according to the Food Guide Pyramid in order to follow a healthy diet.

MyPyramid was released in 2005 to replace the Food Guide Pyramid (Center for Nutrition Policy and Promotion, 2011), in which physical activity was added to emphasize its importance to health. MyPlate, the replacement for MyPyramid, was introduced in 2011 to focus on the 2010 Dietary Guidelines for Americans. The visual shows a plate that is divided into the four different food groups along with dairy, which is a symbol and reminder to consume half of the plate as fruits and vegetables along with a low-fat dairy product. Examining the increasing levels of recommended servings and amounts of dairy, fruits, and vegetables in the 20th century illustrates how these food groups are increasingly thought as protective of numerous diseases.

Recommended Dietary Guideline Changes to Fruits, Vegetables, and Milk

Changes have been continuously made to the daily recommended servings for fruit, vegetable, and milk since 1916 when the first USDA food guide, *Food for Young Children* was released (Davis & Saltos, n.d.). In 1916, fruit and vegetable recommendations were 5 servings per day (Davis & Saltos, n.d.). Notably, in the 1930's and 1940's, the vegetable recommendations were split into various subgroups: leafy green/yellow, potatoes/sweet potatoes, other vegetables/fruit, and tomatoes/citrus. In the 1930's the vegetable recommendations per week for leafy green/yellow was 11-12 servings, and recommendations per day were one serving of potato/sweet potato, three servings of other vegetables/fruit, and one serving of tomatoes/citrus. In 1992 the Food Guide Pyramid gave a daily recommendation for the vegetable group of 3 to 5 (1/2 cup) servings. According to MyPlate, the current recommendation is 2 ½ to 3 cups of vegetables per day (USDA, 2012c). Vegetables that are raw, cooked, fresh, frozen, canned, or dehydrated are all included in the vegetable group as well as 100% vegetable juice.

The Food Guide Pyramid from 1992 gave a recommendation of 2 to 4 (1/2 cup) servings from the fruit group. Two cups daily is the current recommendation from MyPlate for the fruit group for adults (USDA, 2012b). The fruit group includes any fruit or 100% fruit juice. Fruits may be fresh, canned, frozen, or dried (Davis & Saltos, n.d). The overall message is to make half of the plate consist of fruits and vegetables.

A recommended amount of milk per day was one cup in 1916, and then increased to two cups in the 1930's. Between the 1940's to 1970's, the recommendation was two or more cups of milk. The Food Guide Pyramid released in 1992 recommended 2 to 3 servings from the milk group that also included yogurt and cheese. Presently, the daily recommendation for the dairy group is three cups according to MyPlate, which also recommends switching to fat-free or low-fat (1%) milk (USDA, 2012a). Foods included in the dairy group include: milk, cheese, yogurt, and milk-based desserts.

Milk Consumption in the United States

In the United States from 2005-2006, children consumed the most milk among any age group, followed by teenagers, and then adults (USDA, ARS, 2010). The average amount of milk consumed per day for those two years and older was six ounces. Notably, since 1977-1978, decreased milk consumption has been witnessed in children and adolescents, but has stayed the same for adults. A higher amount of milk consumed has been measured in adolescents in the highest income group (>350% of poverty threshold), compared to those with an income at 101% to 185% of the poverty threshold. Children and adolescents in the highest income category also report low-fat milk as the usual milk type more frequently than those in the lowest income category. Among children and adolescents who reported milk consumption, two-percent milk was reported as the usual type of milk consumed more often than other milk types (CDC, 2011).

Most current, only 20.2% of children and adolescents report consuming low-fat milk as their usual type of milk; low-fat milk consumption was particularly low among non-Hispanic black, Hispanic, and low-income children and adolescents (USDA, ARS, 2010).

Milk is an excellent source of vitamin D, calcium, magnesium, potassium, and protein (USDA, 2011a). The nutrients in dairy products such as milk are linked to improved bone health and decreased risk of osteoporosis, cardiovascular disease and type 2 diabetes mellitus. Adequate intake during childhood and adolescence is important to increase bone mass. In American diets, dairy products are the principal source of calcium. According to Choose My Plate, three cups per day of dairy products are recommended for individuals nine years old and older. Specifically, it is recommended to consume fat-free, low-fat milk or other low-fat dairy products (USDA, 2011c). Clearly, with two-percent milk reported as the usual type of milk typically consumed by 45.4% of children and adolescents, this goal has not been achieved (CDC, 2011)

Amounts of Fruits and Vegetables Consumed in America

According to the Centers for Disease Control and Prevention (2010b), in 2009 only 32.5% of adults consumed fruit two or more times per day, and 26.3% consumed vegetables three or more times per day. Specifically, in Wisconsin, the percentage of adults who consumed fruits two or more times per day was 30 to 34.9%, and 20.0 to 24.9% of adults consumed vegetables three or more times per day (CDC, 2010b).

American households currently consume about 5.2 servings of fruits and vegetables per day, which is below the United States Department of Agriculture's recommendation of seven servings. Only 38% of all individuals consume the recommended servings of vegetables, and just 23% consume the recommended servings of fruit (Blisard, Steward & Jolliffe, 2004). Low-income households spend even less on fruits and vegetables. In any given week, approximately

19% percent of all low-income households purchase no fruits and vegetables, compared with only about 10 percent of higher income households (Blisard, Steward, & Jolliffe, 2004).

According to Jarrett-Boynton and co-workers (2003), the mean daily intake of vegetables ranged from 2.2 to 2.4 servings in children 6 to 11 years. This is below the recommended 3 to 5 servings daily. Furthermore, 25% of the vegetables consumed by children and adolescents were French fries. Fruit consumption was also below recommendations in children and youth 6 to 19 years old, ranging from 1.1 to 1.5 servings daily with the recommendation being 2 to 4 servings. Notably, only one in five children consumes five or more servings of fruit and vegetables daily (Jarrett-Boynton et al., 2003, p. 1321)

Adolescents are another group with low fruit and vegetable intake, with 80% consuming less than the recommended daily intake (Granner & Evans, 2011). There is a strong association with availability in the home for fruit and vegetable consumption of adolescents. Another at risk group is older infants and toddlers. In a study by Ponza, Devaney, Ziegler, Reidy & Squatrito (2004), it was determined that on any given day, a large number of older infants and toddlers did not consume any fruits or vegetables. As indicated by insufficient consumption, there may be innumerable reasons why individuals do not consume fruits and vegetables.

Reasons Why Americans Are Not Consuming Enough Fruits and Vegetables

Many individuals do not consume fruits and vegetables because there is often less access to food stores in sparsely populated rural areas and for low-income households in poor central cities. Access to fruits and vegetables is a major focus of this research paper. Also, in these rural areas, food prices are generally higher. For those individuals with low-incomes without regular access to a vehicle, there is difficulty traveling to distant stores with greater quality of produce.

Budget constraints may make it harder to purchase and include produce in the diet (Krebs-Smith & Kantor, 2001).

According to Reed, Frazão & Itskowitz (2004), although a majority of shoppers who stated that eating fruits and vegetables would be beneficial to improve health, the individuals surveyed also admitted that eating these foods would be difficult. The main reason for this difficulty is the belief of these individuals that fresh fruits and vegetables are too expensive to serve every day. Also, consumers may inaccurately assess the cost of buying fruits and vegetables due to a lack of knowledge about how much is in a serving size. Consumers may overestimate the amount in a serving size, which then results in a higher estimate of the cost per serving. Additionally, few people realize that a pound of most fruits provides 3 to 5 servings, so it is important to be aware of not only price per pound, but the number of servings in a pound. Taste, preferences, and availability are other factors that can be barriers to buying fruits and vegetables (Reed, et al., 2004). Furthermore, a study by Granner and Evans (2011) illustrated that the most important reasons why adolescents do not consume the recommended amounts of fruits and vegetables are due to fruit preferences, availability of fruit at home, family dinner frequency, and self-efficacy.

Households comprised of individuals who have obtained a higher educational degree have an increased ability to use nutritional information, and therefore, purchase, consume and spend more on fruits and vegetables regardless of income level (Blisard, Stewart, & Jolliffe, 2004). Furthermore, those who spend time and effort to receive a college education may also value the future more than those who do not obtain a college education. The value placed on future health may explain why households with college-educated individuals are more likely to buy healthy foods such as fruits and vegetables. The households that are less educated may not

put as much emphasis on the future, and may be less concerned about their health as a result (Blisard et al., 2003). The better educated households have internalized the benefits of eating fruits and vegetables.

Benefits of Eating Fruits and Vegetables

Conducting audits of fruit, vegetables, and fluid milk in rural counties would have no value if the benefits or conversely absence of these foods did not impact the health of the community members. Health benefits of eating fruits and vegetables may reduce risk for cardiovascular disease, stroke, and heart attack and protect against some types of cancer (CDC, 2010). Further, potassium, magnesium, and fruit and vegetable intakes are associated with greater bone mineral density in elderly men and women (Tucker et al., 1999).

Consuming a high amount of fruits and vegetables can reduce the risk for many leading causes of death and can help with weight management (CDC, 2010a). Fruits and vegetables are nutrient-dense foods, which are foods composed of few calories while providing micronutrients to reduce negative health effects (USDHHA & USDA, Dietary Guidelines of America, 2010). Consuming the recommended amounts is important for establishing a healthy eating pattern for adults and children.

Fruits contain essential nutrients, including potassium, dietary fiber, vitamin C, and folic acid (USDA, 2011a). Potassium functions to keep blood pressure at a healthy level. Feeling fuller longer, reducing cholesterol in the blood, and maintaining bowel function are the main functions of dietary fiber. Vitamin C helps to heal wounds and is important for teeth and gum health. Folic acid functions to help the body form red blood cells. Monoterpenes in citrus fruits and cherries have anticarcinogenic actions as well as cardioprotective effects (Kris-Etherton et

al., 2002). The intake of 400-600 grams per day of fruits and vegetables is associated with reduced incidence of many common forms of cancer (Heber & Bowerman, 2001).

Vegetables contain potassium, dietary fiber, folic acid, vitamin A, and vitamin C. Vitamin A maintains health of eyes and skin and helps protect the body from infections. Organosulfur compounds in garlic and onions and glucosinolates in cruciferous vegetables such as Brussels sprouts, broccoli, and kale have anticarcinogenic action actions as well as cardioprotective effects (Kris-Etherton et al. (2002). Pigments in vegetables such as lutein and zeaxanthin may decrease the risk for age-related macular degeneration. Of the vegetables tested by Sommerburg et al. (1998) corn had the highest amount of lutein and orange peppers had the highest amount of zeaxanthin followed by spinach and squash.

Because of the benefits of fruits and vegetables, consuming enough has become of public health importance that extends statewide and into individual county public health departments. Consuming fruits and vegetables appears to be a way of preventing chronic disease and to lower medical care costs. Thus, an evaluation of how much individuals spend on fruits and vegetables sheds some light on this public health issue.

Amount Spent on Fruits and Vegetables

Compared to the highest income households, the lowest income households spent 60% less on both fresh and processed fruits and vegetables (Krebs-Smith & Kantor, 2001). Households in the poorest 20% of the nation's income distribution spent $295 per person on fruits and vegetables in 1998 compared to the highest income cohort, who spent $739 per person on fruits and vegetables during the same year.

According to Blisard, Stewart, and Jolliffe (2004), on average, those living in low-income households spent $3.59 per person per week on fruits and vegetables in 2000. Higher-income

households spend $5.02 per person per week on fruits and vegetables, which is significantly greater than low-income households. This research also showed that when low-income households received a trivial increase in income, the increase was not spent on purchasing additional fruits and vegetables. On the other hand, if a high-income household experiences a similar increase in income, an increase in fruit and vegetable spending was noted. Lower-income households tend to purchase lower quality or processed fruits and vegetables, which may be higher in sugar or sodium and have fewer nutrients.

What Affects Cost and Availability of Fresh Fruits and Vegetables

According to Reed, Frazão, & Itskowitz (2004), the type of business or even which business the fruits and vegetables were purchased from can affect the price. Prices may differ dramatically between farmers' markets and grocery stores, and also among various grocery stores. Other factors that affect the price include: whether the item is on sale, the use of coupons, and the brand that is purchased. Seasonality of fresh produce has a large effect on the price.

Energy costs are a common factor in the increasing prices of fruits and vegetables (Capehart & Richardson, 2008). Production costs are higher due to producers spending more for fertilizer, crop drying, and transportation. Some of these costs are revealed to consumers in the form of higher prices. Fruit and vegetable prices increased 3.8% in 2007, which was partly due to the higher energy costs.

Information on availability of fruits and vegetables is sparse. The Produce Marketing Association (PMA) (2010) conducted audits of grocery stores for 52 weeks. Six of the top 10 most common fresh fruits that appeared in store-level baskets in each quarter were apples, bananas, watermelon, oranges, pineapple and honeydew. Nine of the top 10 most common fresh

vegetables that appeared in store-level baskets in each quarter were lettuce, potatoes, cabbage, carrots, summer squash, onions, eggplant, root vegetables, and greens.

The Cost of the Recommended Daily Servings of Fresh Produce

Recently, one of the biggest debates surrounding fruit and vegetable cost is that the United States Department of Agriculture (USDA) does not subsidize the farmers that grow these products. Critics claim those subsidized products such as corn, wheat and rice are becoming cheaper, while the price of fruit and vegetables keep rising, thus making it difficult to obtain the recommended number of daily servings of fruits and vegetables (Energy First, 2005). Yet the USDA argues that research conducted in 2009 indicates that on a study of 153 commonly consumed fresh and processed fruits and vegetables, the average prices ranged from less than 20 cents per edible cup to more than $2 per edible cup (USDA, 2011b). Furthermore, an adult on a 2,000 calorie diet could satisfy recommendations for vegetable and fruit consumption of the 2010 Dietary guidelines at an average price of $2 to $2.50 per day, or approximately 50 cents per edible cup (USDA, 2011b).

Findings of even less cost per serving were obtained by the PMA (2010). The PMA collected point-of-sale (POS) sales data for fresh fruits and vegetables at the grocery store level, by week and by item for 52 weeks. Stores with very limited assortments (without at least 15 fruit and 15 vegetable items in distribution) were excluded as outliers. An edible portion factor was applied to the conversion to serving sizes. One of the questions addressed was to determine the lowest average cost for a consumer to purchase nine servings of fruits and vegetables with variety. Nationally, the average retail price for nine servings of fruits and vegetables (four servings of fruits and five servings of vegetables) was $2.18, but if the consumer opted for the least expensive choices, the average retail price of nine servings was $0.88. The East region

showed the lowest average price for nine servings for the year, with $2.08, while the South was the highest at $2.30. The PMA (2010) noted that a serving of fruit cost $0.28 and a serving of vegetables cost $0.21 making these items a remarkable value; there are few items in the supermarket for under $0.25 per serving.

The PMA (2010) noted that in the entire United States, watermelon, bananas, apples, pears, pineapple and peaches were fresh fruit options at less than $0.28 per serving and potatoes, lettuce/salad, eggplant, cooking greens, summer squash, and carrots were vegetable options at less than $0.21 per serving (Produce Marketing Association, 2010).

In the central region of the United States where the state of Wisconsin is located, the average cost of fruit per serving ranged from $0.25 to $0.28 throughout the year. Watermelon, bananas, apples, pineapple, grapes, and pears were the least expensive fruits per serving in all four quarters of the year. Similarly the vegetables' average retail price per serving ranged from $0.19 to $0.24 through the seasons. However, the top five least expensive vegetables per serving were well below the average in the central region of the United States. Cabbage, potatoes, greens, lettuce, and prepared cooking greens appeared in the top five least expensive vegetables in all four quarters of the year in the central region (Produce Marketing Association, 2010).

Certified Organic Foods: Cost and Nutritional Value

Consumption of organic foods is one of the fastest growing divisions of food in the U.S. (Crinnion, 2010). Organic food and beverage sales were one billion dollars in 1990, but increased dramatically to 21.1 billion dollars in 2008. According to the USDA (2011d), the term organic indicates that "the food or other agricultural product has been produced through approved methods that integrate cultural, biological, and mechanical practices that foster cycling

of resources, promote ecological balance and conserve biodiversity. Synthetic fertilizers, sewage sludge, irradiation, and genetic engineering may not be used." (p. 1).

Organic food has a high production cost and lower volume, so it costs more than non organic foods (USDA, 2010d). Typically, organic food is cheaper at specialty stores that have a large variety of organic items. Also, instead of buying all organic groceries, just buying the organic produce that is claimed to have the highest levels of pesticides will save money. These foods include: celery, peaches, strawberries, apples, blueberries, nectarines, bell peppers, spinach, cherries, kale/collard greens, potatoes, and grapes (USDA, 2010d).

While many studies show that organic foods are rich in nutrients, most researchers generally agree there is a need for more research. Dangour et al., (2010) conducted a systematic review of research from January, 1958 to September, 2008 and concluded that evidence is lacking for nutrition-related health effects from consumption of organically produced food stuffs. However, more and more evidence exists to the contrary. Crinnion (2010) reported that levels of vitamin C, iron, magnesium, phosphorus, and phytochemicals were greater in organic foods compared to non organic foods of the same variety in a recent review.

Virginia Worthington (2001) reviewed 41 published studies comparing the nutritional value of organically grown and conventionally grown fruits, vegetables and grains. Specifically, organic foods have 27% more vitamin C, 21.1% more iron, 29.3% more magnesium, and 13.6% more phosphorus. In addition, organic products had 15.1% less nitrates than conventional counterparts. Some recent research has shown that organic foods have higher levels of omega-3 fatty acids, and organic peaches and pears have higher antioxidant and total polyphenol levels (Crinnion, 2010).

Research seems to indicate that the primary benefit of organic produce may be the higher content of antioxidants and polyphenols. This may be due to the fact that organic agriculture practices have the potential to produce high-quality products with improved antioxidant content (Lairon, 2009). One example was research conducted by a team from the University of California at Davis (UCD) that found organic kiwi fruit had much higher levels of total polyphenols and vitamin C content than conventional kiwi fruit produced from nearby vineyards on the same farm in Marysville, California (Amodio, Colelli, Hasey, & Kader, 2007). Similarly, another group at UCD found 40.7%, 58.4%, 19%, and 50% more antioxidants in organically grown, freeze-dried corn, air-dried corn, strawberries, and marionberries, respectively, than found in the conventionally grown counterparts (Asami, Hong, Barrett, & Mitchell, 2003). The higher delivery of nutrients by organic produce has been examined *in vivo*. The higher antioxidants have also been found in blood and urine samples of participants given organic food or conventional food for three weeks in a cross over design (Nielsen, Freese, Kleemola, & Mutanen, 2002). Although sparse, research supporting the nutritional superiority of organic produce is available.

Consumers may wish to know whether organic dairy products offer consumers benefits as well. Organically grown cows grazed on fresh pasture produced milk with higher levels of antioxidants and beneficial fatty acids such as conjugated linoleic acid and omega-3 fatty acids. This research conducted by Butler et al. (2008) occurred in the United Kingdom and utilized 25 farms using three different systems: conventional high input, organically certified, and non-organic sustainable low input. These findings were confirmed by Ellis et al. (2006) also in the United Kingdom who conducted a study over a 12 month milk production cycle. These researchers found organic milk contained 68% more omega-3 fatty acids. Rist et al. (2007)

found benefits *in vivo* in that mothers consuming mostly organic milk had about 50% higher levels of rumenic acid, a conjugated linoleic acid, in breast milk. Most researchers indicate there is a need to conduct additional studies on the nutritional content of organic versus conventional food products (Dangour et al., 2010).

In any case, consumers are seeking out organic foods. The top three reasons why consumers purchase organic foods are protection from pesticides, the lack of food additives, and to benefit the environment (Mayo Clinic, 2011). According to the USDA (2011d), organic produce contains significantly fewer pesticide residues than non organic produce. Food additives such as preservatives, artificial sweeteners, colorings and flavorings are not used in organic foods (USDA, 2011d).

Chippewa County and Burnett County in Northwestern Wisconsin

Chippewa County is located in northwestern Wisconsin and consists of the cities of Bloomer, Chippewa, Cornell, Stanley and the northern region of Eau Claire and in 2010 hosted a population of 62,415 (U.S. Census Bureau, 2012b). Of the total land area, 53% was rural and 47% was urban in July 2009 (City-data.com, n.d.). According to the U.S. Census Bureau (2012b), the majority, or 95.3%, of the population was white. The other races consisted of Black, American Indian, Alaska Native, Asian, Hispanic, and Latino in 2010. From the years 2005-2009, the percent of people age 25 and older with a high school diploma was 88.4% and those with a bachelor's degree or higher was 17.5%. In 2009, 13.5% of people were over age 65 and 23.2% of people were under 18 years old. In 2009, the median household income was $46,040 and 11.6% people lived below the poverty level.

Burnett County in northwestern Wisconsin had a population of 15,457 in 2010 (U.S. Census Bureau, 2012a), with a majority of the population being white (91.6%). Black, American

Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander, Hispanic and Latino were minority races. In 2005-2009, the percent of people 25 years and older with a high school diploma was 88.4% and 16.0% held a bachelor's degree or higher. In 2009, 22.1% of the population was over 65 years old and 19.0% was younger than 18 years old. The median household income was $38,580 in 2009 and 15.2% of people lived below the poverty level.

Chippewa Health Improvement Partnership and Burnett County

The Chippewa Health Improvement Partnership (CHIP) is an effort to identify strategies to improve the health and quality of life in Chippewa County, Wisconsin by recognizing health needs (Chippewa Health Improvement Partnership, 2011). St. Joseph's Hospital facilitates CHIP along with a Board of 25 local citizens, representing schools, churches, businesses, health and medical facilities, senior citizens, government, legal agencies, and the public, who are all involved in improving the health of the residents of Chippewa County. In the beginning, the initiative was undertaken to improve the health of the city of Chippewa Falls, but expanded to the County of Chippewa in 2000.

Food availability/sustainability was addressed and recently passed as a key initiative to be undertaken by CHIP. Supplementing information from previously conducted community health needs assessments, a food audit will provide further data in order to prioritize needs and resources. Specifically, the audit will determine if the residents of Chippewa County currently have access to healthy food, low-fat milk products and in particular fruits and vegetables. The audit will also determine the cost of the items that are available. This will help CHIP determine if these items are cost prohibitive for low-income families. Furthermore, the audit will provide data to CHIP to determine if additional food pantries are needed and if strategies should be developed to ensure that specific healthy healthy foods are accessible to the County. In Burnett

County in northwestern Wisconsin, the data will be used to help with strategic planning and the best use of donations to help with the hunger relief.

Chapter III: Methodology

Food audits were completed in Chippewa and Burnett counties in Wisconsin to determine if there is adequate availability of fresh fruits, fresh vegetables, low-fat milk, and organic items. Prices and availability were recorded for the targeted items to determine if more food pantries are needed to supply adequate amounts of these foods to the lower income residents of two communities. This chapter will discuss the collaborations developed in order to conduct this research, the subject selection and description, instrumentation, data collection procedures, data analysis, limitations, and summary.

Collaboration

This study is a collaboration with Rhonda Brown, director of the Chippewa Health Improvement Partnership (CHIP), with the goal to assess the food availability in Chippewa County. Data will help determine whether the Healthy Commnities Initiative should specifically focus on making healthy foods more accessible in that county. The food audit will also help the county officials for coordinating efforts of food pantry directors to assess gaps in services and county-wide food needs. Data may indicate whether Chippewa County has a need for more food pantries. Also, the audit will be used to determine if cost is a prohibitive factor for purchasing even if the items are available for low-income individuals in the County.

The food audit undertaken with this research was developed to assist the Chippewa Health Improvement Partnership to determine if interventions are needed to increase access of produce items and dairy products for Chippewa County. Burnett County, Wisconsin could also have a low availability of fresh fruits and vegetables for populations with income disparities. Overall, the food audit was designed to assist in providing data to help meet the food and nutritional needs of the residents in Chippewa and Burnett counties.

Subject Selection and Description

A proposal for this research was sent to The Institutional Review Board for the Protection of Human Subjects in Research (IRB) at the University of Wisconsin-Stout. The proposal was reviewed and approved quickly as the research did not involve human subjects or official records about human subjects. (See Appendix A for the IRB approval memo).

Grocery stores, convenience stores, farmers' markets and a supermarket were audited in Chippewa County. Three grocery stores were also audited in Burnett County in northwestern Wisconsin. The audit form that was created to record prices and availability of produce is located in Appendix B. To locate the grocery stores, convenience stores, and farmer's markets, the researcher utilized the Internet and a phone book. Additional grocery stores that were audited were found by passing by the store when driving to audit other stores.

In Chippewa County, 10 grocery stores, 23 convenience stores, and three farmers' markets were audited in August, 2011 (See Appendix C). In December, 2011, 10 grocery stores, 23 convenience stores, and one t market were audited in Chippewa County (See Appendix D). In Burnett County, Wisconsin, three grocery stores were audited in August, 2011 and December, 2011 (See Appendix E).

Instrumentation

The audit form was created with a list of the most commonly consumed fresh fruits and vegetables, skim milk, 1% milk, and blank lines to write in the organic foods. The audit form can be viewed in Appendix B. The form included the date, store name, address, and county of the establishment. The availability and price were recorded on the form for the fresh fruits, fresh vegetables, skim milk, 1% milk, and organic foods. All of the organic fresh fruits and vegetables

within the establishment were written in the blank spaces on the form along with price and availability.

Data Collection Procedures

The data collection was completed by observation in establishments in both counties in August, 2011 and in December, 2011. The availability and prices of the items were recorded on the audit form by walking through the store and observing the prices and availability of the items. In one of the grocery stores, a manager was very helpful with providing prices of the items in the store since these were not listed. No issues occurred when performing the audits, and the managers appeared to be pleased to participate in the study.

Data Analysis

Data of cost of items priced per different units were converted to a price for a single unit using reference sources (Mott, 2006; Lynch, 2008). The Statistical Program for Social Sciences, version 19, was used to analyze the data. Means, frequencies, and percentages were generated. According to experts, the sample size was too small to run paired samples t-test with any confidence. However, to obtain relevant data, the mean prices per item unit, mean price differences between summer and winter, and standard deviations were determined.

Limitations

A limitation of this study was that only three grocery stores were audited in Burnett County. Results from this data collection should not be generalizable nor are reflective of the entire county due to such a small sample size. A second limitation was that prices and availability were only collected during the summer and winter, which implies a lack of information about prices and availability during the autumn and spring seasons. Therefore, results should not be generalized for the entire year. More research during all four seasons would

allow for a more complete examination on how seasonality impacts prices and availability of fresh fruits, fresh vegetables, low-fat milk, and organic fruits and vegetables. However, despite the limitations this data will be very useful for the Chippewa Health Improvement Partnership (CHIP) in Chippewa County and for Burnett County.

Chapter IV: Results

The main purpose of this research study was to assess the availability and prices of organic and non-organic fruits and vegetables, and low-fat milk in the summer and winter in Burnett County, Wisconsin, and Chippewa County, Wisconsin. The summer audit was completed in August, 2011, and the winter audit was completed in December, 2011 through observation. The price and availability of organic and non-organic fruits and vegetables, and low-fat milk in the establishments of the two counties were recorded on an audit form. The establishments consisted of farmers' markets, grocery stores, and convenience stores. This chapter will report the findings of fruit and vegetable availability at farmers' markets, milk prices, and non-organic and organic prices and availability in Burnett County, Wisconsin, and Chippewa County, Wisconsin, in the summer and winter.

Farmers' Markets

Availability of fruits and vegetables at three farmers' markets in August, 2011 in Chippewa County, Wisconsin are shown in Table 1. All three farmers' markets carried corn on the cob, cucumbers, green beans, standard tomatoes, and whole carrots. Two of the farmers' markets had green cabbage, cherry tomatoes, green peppers, and yellow onions. None of the farmers' markets had cantaloupe, coconuts, pineapples, artichokes, pomegranate, strawberries, Brussels sprouts, cauliflower, or peas in the summer.

Table 1

Availability of Fruits and Vegetables at Three Farmers' Markets during the Summer within Chippewa County, Wisconsin

Fruit Item	Availability		Vegetable Item	Availability	
	No	Yes		No	Yes
Apples	2	1	Artichoke	3	0
Apricots	2	1	Baby Carrots	2	1
Avocados	2	1	Broccoli	2	1
Bananas	2	1	Brussels Sprouts	3	0
Blueberries	2	1	Cabbage (Green)	1	2
Cantaloupe	3	0	Cauliflower	3	0
Cherries	2	1	Celery	2	1
Coconuts	3	0	Cherry Tomatoes	1	2
Grapefruit	2	1	Corn on the Cob	0	3
Grapes (Green)	2	1	Cucumbers	0	3
Grapes (Red)	2	1	Green Peppers	1	2
Honeydew	2	1	Green Beans	0	3
Kiwi	2	1	Lettuce (Head, Iceberg)	2	1
Lemons	2	1	Mushrooms (Whole)	2	1
Limes	2	1	Mushrooms (Half)	3	0
Mangos	2	1	Peas	3	0
Nectarines	2	1	Red Peppers	2	1
Oranges	2	1	Russet (Idaho) Potatoes	2	1
Peaches	2	1	Rutabagas	2	1
Pears	2	1	Sweet Potato	2	1
Pineapples	3	0	Tomatoes (On Vine)	2	1
Plums (Red)	2	1	Tomatoes (Standard)	0	3
Pomegranate	3	0	Whole Carrots	0	3
Raspberries	2	1	Yellow Onions	1	2
Strawberries	3	0	Zucchini	2	1
Watermelon	2	1			

Milk Prices in Burnett County

Table 2 presents the frequency of 1% milk prices per gallon at three grocery stores in Burnett County, Wisconsin, in the summer and winter. The price of 1% milk was $3.99 at two stores in both the summer and winter. The price of milk at one store in the summer was $3.59 and $3.89 in the winter.

Table 2

Frequency of 1% Milk Prices at Three Grocery Stores within Burnett County, Wisconsin during the Summer and Winter

Price (Per Gallon)	Frequency	Percent
Summer		
3.59	1	33.3
3.99	2	66.7
Winter		
3.89	1	33.3
3.99	2	66.7

Table 3 presents the frequency of skim milk prices per gallon at three grocery stores in Burnett County, Wisconsin, in the summer and winter. The price of skim milk was $3.99 at two stores in both the summer and winter. The price of milk at one store in the summer was $3.48 and $3.79 in the winter.

Table 3

Frequency of Skim Milk Prices at Three Grocery Stores within Burnett County, Wisconsin during the Summer and Winter

Price (Per Gallon)	Frequency	Percent
Summer		
3.48	1	33.3
3.99	2	66.7
Winter		
3.79	1	33.3
3.99	2	66.7

Milk Prices in Chippewa County

Table 4 shows the frequency of 1% milk prices per gallon in the grocery and convenience stores in Chippewa County, Wisconsin in the summer. The prices ranged from $2.19 to $4.19. The most frequent prices were $3.39 and $3.99, and represented 24.2% of the stores. Including all of the stores, 48.4% of the milk prices were $3.49 or less.

Table 4

Frequency of 1% Milk Prices at Ten Grocery Stores and Twenty-Three Convenience Stores within Chippewa County, Wisconsin, during the Summer

Price (Per Gallon)	Frequency	Percent
2.19	1	3.0
3.15	1	3.0
3.18	1	3.0
3.25	3	9.1
3.29	3	9.1
3.39	4	12.1
3.49	3	9.1
3.53	1	3.0
3.59	1	3.0
3.65	1	3.0
3.69	2	6.1
3.79	3	9.1
3.89	3	9.1
3.99	4	12.1
4.19	1	3.0

The frequency of skim milk prices per gallon in the grocery and convenience stores in Chippewa County, Wisconsin in the winter are shown in Table 5. The prices ranged from $2.29 to $3.99. The most common price was $3.39, which was found at 25.8% of the stores. Including all of the stores, 45.1% of the skim milk prices were $3.49 or less.

Table 5

Frequency of 1% Milk Prices at Ten Grocery Stores and Twenty-Three Convenience Stores within Chippewa County, Wisconsin, during Winter

Price (Per Gallon)	Frequency	Percent
2.29	1	3.2
2.98	1	3.2
2.99	1	3.2
3.25	2	6.5
3.39	8	25.8
3.49	1	3.2
3.50	1	3.2
3.59	1	3.2
3.69	7	22.6
3.75	1	3.2
3.85	2	6.5
3.89	3	9.7
3.99	2	6.5

The frequency of skim milk prices per gallon in the grocery and convenience stores in Chippewa County, Wisconsin in the summer is shown in Table 6. The prices ranged from $2.93 to $4.09. The most frequent price was $3.49, which was found in 12.1% of the stores. Including all of the stores, 57.5% of the milk prices were $3.49 or less.

Table 6

Frequency of Skim Milk Prices at Ten Grocery Stores and Twenty-Three Convenience Stores within Chippewa County, Wisconsin, during the Summer

Price (Per Gallon)	Frequency	Percent
2.93	1	3.0
3.09	3	9.1
3.15	1	3.0
3.19	2	6.1
3.25	3	9.1
3.29	3	9.1
3.39	1	3.0
3.45	1	3.0
3.49	4	12.1
3.53	1	3.0
3.59	3	9.1
3.79	2	6.1
3.89	3	9.1
3.99	2	6.1
4.09	1	3.0

In the summer, the prices ranged from $2.77 to $3.69 per gallon for skim milk in the grocery and convenience stores in Chippewa County, Wisconsin (Table 7). The most frequent price was $3.19, which was found in 21.2% of the stores. Including all of the stores, 57.5% of the milk prices were $3.49 or less.

Table 7

Frequency of Skim Milk Prices at Ten Grocery Stores and Twenty-three Convenience Stores within Chippewa County, Wisconsin, during the Winter

Price (Per Gallon)	Frequency	Percent
2.77	1	3.0
2.99	1	3.0
3.19	7	21.2
3.25	3	9.1
3.29	1	3.0
3.39	2	6.1
3.49	4	12.1
3.50	1	3.0
3.59	3	9.1
3.65	2	6.1
3.69	2	6.1

Non-organic Fruits and Vegetables in Burnett County

The number of non-organic fruits offered at three grocery stores in Burnett County, Wisconsin in the summer and winter is shown in Table 8. In the summer, pomegranates were offered in zero stores, apricots and coconuts were offered in one store, and nectarines, pears, pineapples, and raspberries were offered in two stores. In the winter, apricots, nectarines, and peaches were offered in zero stores, and cherries, coconuts, red plums, and watermelon were offered in two stores. In the summer and winter, apples, avocados, bananas, blueberries, cantaloupe, grapefruit, red and green grapes, honeydew, kiwi, lemons, limes, mangos, oranges, and strawberries were available.

Table 8

The Number of Grocery Stores within Burnett County, Wisconsin Offering Non-organic Fruits during the Summer and Winter

Fruit Item	Summer	Winter
	Number of Establishments Offering	Number of Establishments Offering
Apples	3	3
Apricots	1	0
Avocados	3	3
Bananas	3	3
Blueberries	3	3
Cantaloupe	3	3
Cherries	3	2
Coconuts	1	2
Grapefruit	3	3
Grapes (Green)	3	3
Grapes (Red)	3	3
Honeydew	3	3
Kiwi	3	3
Lemons	3	3
Limes	3	3
Mangos	3	3
Nectarines	2	0
Oranges	3	3
Peaches	3	0
Pears	2	3
Pineapples	2	3
Plums (Red)	3	2
Pomegranate	0	3
Raspberries	2	3
Strawberries	3	3
Watermelon	3	2

Table 9 presents the number of non-organic vegetables offered at three grocery stores in Burnett County, Wisconsin in the summer and winter. In the summer, artichokes were offered in one store, and Brussels sprouts, cherry tomatoes, red peppers, and standard tomatoes were offered in two stores. In the winter, corn on the cob was offered at none of the stores, artichokes

were offered in one store, and cherry tomatoes were offered in two stores. In both summer and winter, all of the stores offered baby carrots, broccoli, green cabbage, cauliflower, celery, cucumbers, green beans, green peppers, iceberg lettuce, whole and half mushrooms, peas, russet (Idaho) potatoes, rutabagas, sweet potatoes, on the vine tomatoes, whole carrots, yellow onions, and zucchini.

Table 9

The Number of Grocery Stores within Burnett County, Wisconsin, Offering Non-organic Vegetables during the Summer and Winter

Vegetable Item	Summer	Winter
	Number of Establishments Offering	Number of Establishments Offering
Artichoke	1	1
Baby Carrots	3	3
Broccoli	3	3
Brussels Sprouts	2	3
Cabbage (Green)	3	3
Cauliflower	3	3
Celery	3	3
Cherry Tomatoes	2	2
Corn on the Cob	3	0
Cucumbers	3	3
Green Beans	3	3
Green Peppers	3	3
Lettuce (Head, Iceberg)	3	3
Mushrooms (Whole)	3	3
Mushrooms (Half)	3	3
Peas	3	3
Red Peppers	2	3
Russet (Idaho) Potatoes	3	3
Rutabagas	3	3
Sweet Potato	3	3
Tomatoes (On the Vine)	3	3
Tomatoes (Standard)	2	3
Whole Carrots	3	3
Yellow Onions	3	3
Zucchini	3	3

The sample size was too small to run paired samples t-tests with confidence, but the mean prices per item unit, mean price differences between summer and winter, and standard deviations were obtained for the summer and winter fruit prices. The mean prices of cherries, watermelon, green grapes, mangos, and red grapes were higher in the winter at the three grocery stores audited in Burnett County, Wisconsin (Table 10). A mean difference between the seasons was found for cherries ($3.86), watermelon ($3.88), green grapes ($1.44), mangos ($0.93), red grapes ($1.27), and cantaloupe ($1.69), which were considerably higher in the winter. The mean prices for many of the remaining fruit items also increased somewhat from summer to winter Exceptions were the price of avocadoes and pears; there was a mean price increase in the summer of $0.58 and $0.35, respectively. Watermelon was the fruit with the highest price in the summer. The lowest priced fruit in the summer was blueberries. In the winter, watermelon was the most expensive fruit. The least expensive fruit in the winter was kiwi. From summer to winter, the price of plums stayed the same.

Table 10

Comparison of Summer and Winter Organic and Non-organic Mean Fruit Price Differences of Three Grocery Stores within Burnett County, Wisconsin

Fruit Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Apples	8	2.03[a]	/lb	-0.10	0.48
		2.13[b]			0.36
Avocados	4	1.91	Each	0.58	0.14
		1.33			0.57
Bananas	6	0.72	/lb	-0.01	0.12
		0.73			0.09
Blueberries	6	0.40	Per oz	-0.37	0.06
		0.77			0.26
Cantaloupe	6	2.55	Each	-1.69	0.51
		4.24			0.41
Cherries	4	3.14	/lb	-3.86	0.22
		6.99			0.00
Coconuts	2	2.99	Each	--	--
		3.49			
Green Grapes	6	2.32	/lb	-1.44	0.77
		4.76			0.21
Honeydew	6	1.06	Each	-0.83	0.17
		1.89			0.50
Kiwi	6	0.63	Each	-0.05	0.15
		0.68			0.10
Mangos	6	1.12	Each	-0.93	0.32
		2.06			0.51
Pears	4	1.54	/lb	0.35	0.07
		1.19			0.28
Plums	4	2.24	/lb	--	0.35
		2.24			0.35
Raspberries	4	3.30	/6 oz	-0.20	1.12
		3.49			0.71
Red Grapes	6	2.62	/lb	-1.27	0.32
		3.89			0.17
Strawberries	6	3.33	/lb	-0.93	0.28
		4.26			1.55
Watermelon	4	4.99	Each	-3.88	0.00
		8.87			1.41

[a]Summer Price

[b]Winter Price

The mean prices of grapefruit, lemons, limes, oranges, and pineapples decreased from the summer to the winter at three grocery stores in Burnett County, Wisconsin (Table 11). The mean differences from winter to summer were $0.08, $0.04, $0.02, $0.45 and $0.85 for grapefruit, lemons, limes, oranges, and pineapples, respectively. Pineapples were the citrus fruits with the highest price in the summer and winter. Limes had the lowest price in both the summer and the winter. The price of pineapples exhibited the largest decrease in price from $4.99 to $4.14 when the summer was compared to the winter.

Table 11

Comparison of Summer and Winter Organic and Non-organic Mean Citrus Fruit Price Differences of Three Grocery Stores within Burnett County, Wisconsin

Fruit Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Grapefruit	8	1.54[a]	/lb	0.08	0.64
		1.47[b]			0.73
Lemons	8	0.81	Each	0.04	0.22
		0.77			0.26
Limes	6	0.77	Each	0.02	0.13
		0.65			0.11
Oranges	8	1.99	/lb	0.45	0.00
		1.54			0.44
Pineapples	8	4.99	Each	0.85	0.00
		4.14			1.20

[a]Summer Price
[b]Winter Price

The mean difference in prices of all of the surveyed vegetable items did not change to a great extent from the summer to winter at the three grocery stores in Burnett County, Wisconsin (Table 12). The highest priced vegetable was fresh peas with a price of $7.36 and $8.02 per pound in the summer and winter, respectively. Cherry tomatoes also had notably higher prices in both the summer and winter of $5.52 and $5.40 per pound, respectively. Cucumbers were the vegetable with the lowest price per each in both the summer and winter of $0.79 and $0.89, respectively. Artichoke, whole mushrooms, and celery prices were consistent in price from the summer to winter. The mean prices for most of the vegetable items increased slightly in winter. The highest mean difference of price was found for tomatoes on the vine and standard tomatoes with a mean price increase of $0.87 and $0.65, respectively in the winter. Peas also increased in price in the winter by $0.66, zucchini increased by $0.63, followed by broccoli that increased by $0.47. However, Brussels sprouts, cauliflower, cherry tomatoes, green beans, and red peppers decreased in price in winter. The biggest mean difference in the decrease of price in the winter was found for Brussels sprouts of $0.50 per lb with green beans and red peppers also seeing a mean price decrease in the winter of $0.44 and $0.19, respectively.

Table 12

Comparison of Summer and Winter Organic and Non-organic Mean Vegetable Price Differences of Three Grocery Stores within Burnett County, Wisconsin

Vegetable Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Artichoke	2	2.99[a]	Each	--	--
		2.99[b]			
Broccoli	6	1.79	/lb	-0.47	0.17
		2.26			0.64
Brussels Sprouts	4	4.49	/lb	0.50	0.71
		3.99			0.00
Cabbage (Green)	6	1.67	Each	-0.31	0.85
		1.98			0.43
Cauliflower	8	1.54	Each	0.12	1.54
		1.42			1.42
Celery	8	1.89	/Bag	--	0.81
		1.89			0.81
Cherry Tomatoes	4	5.52	/lb	0.12	2.95
		5.40			3.12
Cucumbers	4	0.79	Each	-0.10	0.00
		0.89			0.14
Green Beans	4	4.76	/lb	0.44	2.50
		4.32			3.30
Green Peppers	6	0.96	Each	-0.07	0.31
		1.02			0.23
Head of Lettuce	6	1.56	Each	-0.03	0.15
		1.59			0.10
Mushrooms (Whole)	6	1.99	/8 oz	--	0.00
		1.99			0.00
Mushrooms (Half)	6	2.39	/8 oz	-0.10	0.10
		2.49			0.26
Peas	6	7.36	/lb	-0.66	2.38
		8.02			2.06
Red Peppers	4	1.84	Each	0.19	0.21
		1.65			0.00
Tomatoes (On the vine)	6	2.19	/lb	-0.87	0.73
		3.06			0.12
Tomatoes (Standard)	4	2.19	/lb	-0.65	0.28
		2.84			0.21
Zucchini	6	1.82	/lb	-0.63	0.29
		2.46			0.50

[a]Summer Price
[b]Winter Price

The mean prices of all of the root vegetable items did not change greatly from the summer to winter at the three grocery stores in Burnett County, Wisconsin (Table 13). The highest priced root vegetable in the summer and winter was red potatoes. The vegetable with the lowest price in summer was rutabagas. Russet (Idaho) potatoes had the lowest price in the winter. The red potato and yellow onion prices were consistent from the summer to winter. The mean difference in prices of rutabagas and whole carrots was $0.20 and $0.05, which represented an increase from summer to winter. Baby carrots, russet (Idaho) potatoes, and sweet potatoes decreased in price from summer to winter, with the mean difference of $0.07, $0.33, and $0.13 for the three vegetables, respectively.

Table 13

Comparison of Summer and Winter Organic and Non-organic Mean Root Vegetable Price Differences of Three Grocery Stores within Burnett County, Wisconsin

Vegetable Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Baby Carrots	6	1.56[a]	/lb	0.07	0.21
		1.49[b]			0.26
Red Potatoes	2	2.16	/lb	--	--
		2.16			
Russet (Idaho) Potatoes	8	1.22	/lb	0.33	0.64
		0.89			0.48
Rutabagas	4	1.04	/lb	-0.20	0.21
		1.24			0.07
Sweet Potato	6	1.66	/lb	0.13	0.32
		1.52			0.32
Whole Carrots	8	1.05	/lb	-0.05	0.23
		1.10			0.21
Yellow Onions	8	1.23	/lb	0.00	0.44
		1.23			0.45

[a]Summer Price
[b]Winter Price

Non-organic Fruits and Vegetables in Chippewa County, Wisconsin

The number of non-organic fruits offered at grocery stores, convenience stores, and three Farmers' markets in the summer and winter in Chippewa County, Wisconsin is presented in Table 14. In the summer, the fruits offered by most establishments were apples (55.5%), followed by bananas (52.3%), then oranges (47.2%). No stores provided pomegranates in the summer. In the winter, the fruits offered by the most establishments were apples and bananas (50.0%), followed by oranges (44.4%), then pears (36.1%). None of the stores provided apricots, nectarines, peaches, and red plums in the winter.

Table 14

The Number of Grocery Stores, Convenience Stores, and Farmers' Markets Offering Non-organic Fruits during the Summer and Winter within Chippewa County, Wisconsin (N = 36)

	Summer		Winter	
Fruit Item	Number of Establishments Offering	Percentage	Number of Establishments Offering	Percentage
Apples	20	55.5%	18	50.0%
Apricots	8	22.2%	0	0.0%
Avocados	10	27.8%	9	25.0%
Bananas	19	52.3%	18	50.0%
Blueberries	10	27.8%	7	19.4%
Cantaloupe	10	27.8%	7	19.4%
Cherries	12	33.3%	4	11.1%
Coconuts	5	13.9%	6	16.7%
Grapefruit	10	27.8%	12	33.3%
Grapes (Green)	10	27.8%	8	22.2%
Grapes (Red)	11	30.6%	10	27.8%
Honeydew	10	27.8%	6	16.7%
Kiwi	10	27.8%	9	25.0%
Lemons	12	33.3%	11	30.6%
Limes	13	36.1%	10	27.8%
Mangos	10	27.8%	8	22.2%
Nectarines	9	25.0%	0	0.0%
Oranges	17	47.2%	16	44.4%
Peaches	14	38.9%	0	0.0%
Pears	11	30.6%	13	36.1%
Pineapples	11	30.6%	11	30.6%
Plums (Red)	10	27.8%	0	0.0%
Pomegranate	0	0.0%	9	25.0%
Raspberries	6	16.7%	5	13.9%
Strawberries	10	27.8%	7	19.4%
Watermelon	9	25.0%	6	16.7%

The number of non-organic vegetables offered at the grocery stores, convenience stores, and three farmers' markets in the summer and winter in Chippewa County, Wisconsin is displayed in Table 15. In the summer, the vegetables offered by most establishments were russet

(Idaho) potatoes and yellow onions (41.7%), followed by baby carrots, iceberg lettuce and standard tomatoes (38.9% for each), then whole carrots, and corn on the cob (36.1% for each). In the winter, the vegetables offered by the most establishments were russet (Idaho) potatoes and yellow onions (44.4%), followed by baby carrots, standard tomatoes (36.1% for each), and then iceberg lettuce (33.3%). Of the surveyed vegetables, all were offered by some stores in both the summer and winter.

Table 15

The Number of Grocery Stores, Convenience Stores, and Farmers' Markets Offering Non-organic Vegetables during the Summer and Winter within Chippewa County, Wisconsin (N = 36)

Vegetable Item	Summer		Winter	
	Number of Establishments Offering	Percentage	Number of Establishments Offering	Percentage
Artichoke	3	8.3%	3	8.3%
Baby Carrots	14	38.9%	13	36.1%
Broccoli	9	25.0%	11	30.6%
Brussels Sprouts	6	16.7%	6	16.7%
Cabbage (Green)	11	30.6%	11	30.6%
Cauliflower	9	25.0%	10	27.8%
Celery	11	30.6%	11	30.6%
Cherry Tomatoes	7	19.4%	5	13.9%
Corn on the Cob	13	36.1%	2	5.6%
Cucumbers	12	33.3%	11	30.6%
Green Beans	12	33.3%	5	13.9%
Green Peppers	11	30.6%	11	30.6%
Lettuce (Head, Iceberg)	13	36.1%	12	33.3%
Mushrooms (Whole)	10	27.8%	10	27.8%
Mushrooms (Half)	9	25.0%	8	22.2%
Peas	5	13.9%	5	13.9%
Red Peppers	10	27.8%	8	22.2%
Russet (Idaho) Potatoes	15	41.7%	16	44.4%
Rutabagas	10	27.8%	10	27.8%
Sweet Potato	9	25.0%	10	27.8%
Tomatoes (On the Vine)	10	27.8%	11	30.6%
Tomatoes (Standard)	14	38.9%	13	36.1%
Whole Carrots	13	36.1%	11	30.6%
Yellow Onions	15	41.7%	16	44.4%
Zucchini	9	25.0%	6	16.7%

The mean prices of some fruits such as avocados, blueberries, green grapes, mangos, strawberries and watermelon were notably different from the summer to the winter at the grocery stores and convenience stores in Chippewa County, Wisconsin (Table 16). An increase in mean difference in price was found for blueberries ($0.12), green grapes ($1.50), mangos ($0.48), and strawberries ($2.10) from the summer to the winter. The average mean price for raspberries was higher in the winter, $4.04 than the summer $3.47, reflecting a mean difference of $0.58. Other foods that were higher in the winter than summer were red grapes, honeydew melons, coconuts, and cherries.

Conversely, the mean difference in price for avocados was $0.78 and the mean difference in pears was $0.11 which saw a decrease in the price from the summer to the winter. The mean prices for the remaining fruit items such as apples, bananas, cantaloupe, and kiwi decreased in price from summer to winter. The mean difference in the decrease of prices ranged from $0.08 for apples, $0.03 for bananas, $0.04 for cantaloupe, and $0.03 for kiwi from summer to winter.

Blueberries that were sold in ounces, kiwi sold per fruit, and bananas sold by pound were the least expensive fruits in the summer. In the winter and summer, watermelon and cherries were the most expensive fruits.

Table 16

Comparison of Summer and Winter Organic and Non-organic Mean Fruit Price Differences of Ten Grocery Stores and Twenty-three Convenience Stores within Chippewa County, Wisconsin

Fruit Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Apples	34	1.67[a]	/lb	0.08	0.45
		1.59[b]			0.45
Avocados	18	1.77	Each	0.78	0.45
		0.99			0.27
Bananas	34	0.62	/lb	0.03	0.25
		0.59			0.24
Blueberries	14	0.34	/oz	-0.12	0.09
		0.46			0.17
Cantaloupe	14	3.22	Each	0.04	1.34
		3.18			0.70
Cherries	8	4.74	/lb	-0.75	1.19
		5.49			1.23
Coconuts	10	2.55	Each	-0.22	0.62
		2.77			0.40
Green Grapes	14	2.62	/lb	-1.50	0.30
		4.12			0.72
Honeydew	10	3.89	Each	-0.12	0.82
		4.01			0.77
Kiwi	16	0.48	Each	0.03	0.10
		0.45			0.13
Mangos	16	1.15	Each	-0.48	0.22
		1.63			0.40
Pears	18	1.46	/lb	0.11	0.25
		1.35			0.21
Raspberries	8	3.47	/6 oz	-0.58	0.43
		4.04			0.41
Red Grapes	18	2.18	/lb	-0.38	0.64
		2.56			0.60
Strawberries	14	2.46	/lb	-2.10	0.87
		4.56			1.57
Watermelon	12	5.37	Each	-1.15	0.96
		6.52			2.49

[a]Summer Price
[b]Winter Price

The mean price of citrus fruits at the grocery and convenience stores in Chippewa County, Wisconsin is shown in Table 17. The mean prices of grapefruit, oranges, and pineapple was lower in the winter with the mean difference in price being $0.16, $0.20, and $0.89, respectively The mean price of lemons increased and the mean price of limes decreased from the summer to the winter, but these differences only amounted to $0.04. Pineapples were the most expensive citrus fruit in both the summer and the winter. Limes were the least expensive fruit in both the summer and the winter.

Table 17

Comparison of Summer and Winter Organic and Non-organic Mean Citrus Fruit Price Differences of Ten Grocery Stores and Twenty-three Convenience Stores within Chippewa County, Wisconsin

Fruit Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Grapefruit	18	1.06[a]	/lb	0.16	0.27
		0.90[b]			0.26
Lemons	22	0.68	Each	-0.04	0.19
		0.72			0.20
Limes	20	0.52	Each	0.04	0.20
		0.48			0.15
Oranges	28	1.97	/lb	0.20	0.86
		1.77			0.91
Pineapples	18	4.58	Each	0.89	1.36
		3.69			1.17

[a]Summer Price
[b]Winter Price

The mean prices of all of the surveyed vegetable items did not change to any great extent from the summer to winter at the grocery stores and convenience stores in Chippewa County, Wisconsin (Table 18). The mean difference in price indicated that some items such as cauliflower ($0.35) and head of lettuce ($0.12) were higher in the winter versus the summer. Many of the mean prices for the remaining vegetable items also increased from summer to winter, but these differences were not staggering with the exception of green peas in which the mean difference was $0.94. Other vegetables in which the mean difference was of note were zucchini ($0.22) and artichoke ($1.03).

Broccoli, celery, green beans, green peppers, on the vine tomatoes, and standard tomatoes decreased in price from summer to winter, but these differences too were not dramatic with the exception of cherry tomatoes in which the mean difference was $1.06. Cherry tomatoes were the most expensive vegetable in the summer, and peas were the most expensive in the winter. In the summer, corn on the cob was the least expensive vegetable, and green peppers were the least expensive vegetables in the winter.

Table 18

Comparison of Summer and Winter Organic and Non-organic Mean Vegetable Price Differences of Ten Grocery Stores and Twenty-three Convenience Stores within Chippewa County, Wisconsin

Vegetable Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation . ($)
Artichoke	6	1.62[a]	Each	-1.03	0.20
		2.65[b]			0.76
Broccoli	16	2.09	/lb	0.06	0.80
		2.03			0.83
Brussels Sprouts	10	3.15	/lb	-0.06	0.24
		3.21			0.31
Cabbage (Green)	20	1.98	Each	-0.10	2.19
		2.08			1.93
Cauliflower	20	2.43	Each	-0.35	0.80
		2.78			0.77
Celery	22	1.47	/Bag	0.04	0.36
		1.43			0.31
Cherry Tomatoes	8	5.43	/lb	1.06	1.22
		4.37			0.74
Corn on the Cob	2	0.23	Each	--	--
		0.97			
Cucumbers	20	0.95	Each	-0.03	0.72
		0.98			0.71
Green Beans	10	1.96	/lb	0.33	0.95
		1.63			0.41
Green Peppers	20	0.89	Each	0.02	0.73
		0.87			0.59
Lettuce (Head, Iceberg)	20	1.51	Each	-0.12	0.24
		1.63			0.20
Mushrooms (Whole)	18	1.81	/8 oz	-0.02	0.16
		1.83			0.27
Mushrooms (Half)	16	1.99	/8 oz	-0.02	0.20
		2.01			0.28
Peas	10	3.93	/lb	-0.94	1.24
		4.89			0.31
Red Peppers	16	1.71	Each	-0.04	0.24
		1.75			0.26
Tomatoes (On the vine)	18	1.93	/lb	0.09	0.48
		1.84			0.43
Tomatoes (Standard)	22	1.82	/lb	0.18	0.31
		1.64			0.38
Zucchini	8	1.55	/lb	-0.22	0.89
		1.77			0.19

[a]Summer Price
[b]Winter Price

Root vegetables may offer the consumer the most economical choices in both the summer and winter. Seasonal prices did not vary as greatly as was seen with the other vegetables at the grocery stores and convenience stores within Chippewa County (Table 19). The greatest mean difference was the $0.39 decrease in the pricing of sweet potatoes from summer to winter. A decrease was also noted for yellow onions, baby carrots and russet (Idaho) potatoes from summer to the winter; the mean difference in price was $0.15, $0.09, and $0.10, respectively. In contrast, the mean prices of rutabagas and whole carrots were higher in the winter; the mean difference in price was $0.10 and $0.02 for the rutabagas and whole carrots, respectively. The baby carrots were the most expensive root vegetable in both the summer and the winter. In both the summer and winter, russet (Idaho) potatoes were the least expensive root vegetable.

Table 19

Comparison of Summer and Winter Organic and Non-organic Mean Root Vegetable Price Differences of Ten Grocery Stores and Twenty-three Convenience Stores within Chippewa County, Wisconsin

Vegetable Item	N	Mean Price	Item Unit	Mean Difference ($)	Standard Deviation ($)
Baby Carrots	30	1.68[a]	/lb	0.09	0.41
		1.59[b]			0.37
Russet (Idaho) Potatoes	28	0.58	/lb	0.10	0.29
		0.48			0.17
Rutabagas	18	0.91	/lb	-0.10	0.07
		1.01			0.19
Sweet Potato	14	1.25	/lb	0.19	0.30
		1.06			0.39
Whole Carrots	28	0.92	/lb	-0.02	0.16
		0.94			0.27
Yellow Onions	26	0.72	/lb	0.15	0.31
		0.57			0.19

[a]Summer Price
[b]Winter Price

Organic Fruits and Vegetables

The prices of organic fruits and vegetables at three grocery stores in Burnett County, Wisconsin are presented in Table 20. There were four types of organic fruits and eight types of organic vegetables available during both the summer and winter. The prices of all of the organic fruits and vegetables stayed the same from summer to winter, except for russet (Idaho) potatoes. Russet (Idaho) potatoes were more expensive per pound in the summer compared to the winter.

Table 20

Comparison of Prices of Organic Fruits and Vegetables Offered in the Summer and Winter of Three Grocery Stores within Burnett County, Wisconsin

Organic Item	Summer Price ($)	Winter Price ($)
Fruit		
Apples	2.66/lb	2.66/lb
Grapefruit	4.99/lb	4.99/lb
Lemons	5.99/head	5.99/head
Oranges	2.99/bag	2.99/bag
Vegetable		
Broccoli	2.49/lb	2.49/lb
Cauliflower	0.59 Each	0.59 Each
Celery	1.99/lb	1.99/lb
Red Potatoes	2.16/lb	2.16/lb
Russet (Idaho) Potatoes	1.99/lb	1.59/lb
Spinach	0.99/oz	0.99/oz
Whole Carrots	1.35/lb	1.35/lb
Yellow Onions	1.83/lb	1.83/lb

The mean price of organic fruits at grocery stores in Chippewa County, Wisconsin in the summer and winter is shown in Table 21. There were 10 varieties of organic fruit available in the summer and three varieties of organic fruit available in the winter. There were not enough

organic fruits to complete mean price differences and standard deviations. Figure 2 will illustrate the differences graphically.

Table 21

Comparison of Mean Price of Organic Fruits in the Summer and Winter of Ten Grocery Stores within Chippewa County, Wisconsin

Organic Fruit	Availability in Summer	Mean Price in Summer ($)	Availability in Winter	Mean Price in Winter ($)
Apples	Yes (2)[a]	2.01/lb	Yes (1)	1.99/lb
Bananas	Yes (2)	1.59/lb	No	--
Blueberries	Yes (1)	3.99/pint	No	--
Green Grapes	Yes (1)	3.99/lb	No	--
Kiwi	Yes (2)	0.76 Each	No	--
Lemons	Yes (2)	0.48 Each	Yes (1)	0.55 Each
Mangos	Yes (1)	1.99 Each	No	--
Oranges	Yes (2)	1.39/lb	Yes (1)	1.50/lb
Raspberries	Yes (1)	6.99/6 oz	No	--
Strawberries	Yes (1)	6.99/lb	No	--

[a]Number in parentheses refers to number of stores that carried item

Table 22 presents the mean price of organic vegetables at grocery stores in Chippewa County, Wisconsin in summer and winter. Twenty-six organic vegetable varieties were available in the summer and 15 organic vegetable varieties were available in the winter. The mean prices of green cabbage, cucumbers, and romaine lettuce stayed the same from the summer to the winter. Figure 3 will illustrate the differences graphically.

Table 22

Comparison of Mean Price of Organic Vegetables during the Summer and Winter of Ten Grocery Stores within Chippewa County, Wisconsin

Organic Vegetable	Availability in Summer	Mean Price in Summer ($)	Availability in Winter	Mean Price in Winter ($)
Baby Carrots	Yes (5)[a]	1.95/lb	Yes (1)	1.99/lb
Baby Spinach	No	--	Yes (2)	0.85/oz
Beets	Yes (1)	3.49/lb	No	--
Broccoli	Yes (3)	3.23/lb	Yes (1)	3.99/lb
Cabbage (Green)	Yes (1)	7.48 Each	Yes (1)	7.48 Each
Cauliflower	Yes (3)	3.31 Each	Yes (1)	3.99 Each
Celery	Yes (2)	2.69 Per bag	Yes (1)	2.09 Per bag
Celery Hearts	Yes (4)	3.19/lb	Yes (2)	4.04/lb
Cherry Tomatoes	Yes (1)	6.83/lb	No	--
Cucumbers	Yes (1)	2.98 Each	Yes (1)	2.98 Each
Eggplant	Yes (1)	1.69/lb	No	--
Grape Tomatoes	Yes (2)	6.37/lb	No	--
Green Onions	Yes (2)	0.42/oz	No	--
Green Peppers	Yes (1)	2.89 Each	Yes (2)	2.14 Each
Head of Lettuce	Yes (1)	2.12 Each	Yes (1)	2.38 Each
Leeks	Yes (1)	3.49/lb	No	--
Lettuce (Romaine)	Yes (1)	2.49 Each	Yes (1)	2.49 Each
Mushrooms (Whole)	Yes (2)	2.49/8 oz	Yes (1)	1.99/8 oz
Orange Bell Peppers	Yes (1)	4.99/lb	No	--
Red Potatoes	Yes (2)	1.67/lb	No	--
Romaine Hearts	Yes (1)	3.29/3 Count	Yes (4)	3.67/3 Count
Russet (Idaho) Potatoes	Yes (2)	0.84/lb	No	--
Sweet Onions	Yes (1)	1.16/lb	No	--
Sweet Potatoes	Yes (1)	1.29/lb	No	--
Tomatoes (Grape)	Yes (1)	4.99/pint	No	--
White Onions	Yes (1)	1.24/lb	No	--
Whole Carrots	Yes (5)	1.08/lb	Yes (4)	0.96/lb
Yellow Onions	Yes (1)	1.66/lb	No	--
Zucchini	No	--	Yes (1)	1.88 Each

[a]Number in parentheses refers to number of stores that carried item

Comparison of Organic Fruits and Vegetables Offered by Burnett County, Wisconsin, and Chippewa County, Wisconsin

The number of organic fruits and vegetables was greater in the summer than in the winter in Chippewa County, Wisconsin (Figure 1). Organic fruits decreased by a magnitude of 80%, while organic vegetables decreased by a magnitude of 50% from the summer to winter in Chippewa County, Wisconsin. Although limited, the total number of organic fruits and vegetables remained the same from summer to winter in Burnett County, Wisconsin.

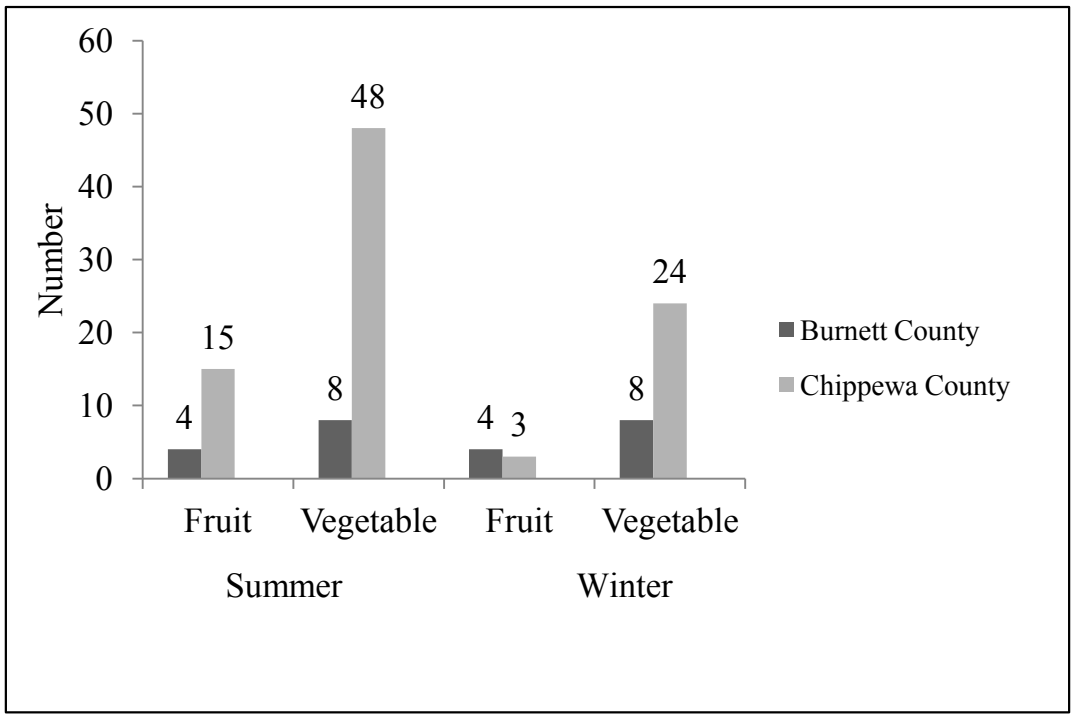

Figure 1. Total number of organic fruits and vegetables offered at three grocery stores in Burnett County, Wisconsin, and at ten grocery stores in Chippewa County, Wisconsin, during the summer and winter.

Comparison of Mean Prices of Organic and Non-Organic Fruits and Vegetables in Chippewa County, Wisconsin, in the Summer

Figure 2 compares the mean cost of some more commonly consumed organic and non-organic fruits. The organic varieties of apples, bananas, green grapes, and strawberries had a higher mean price compared to the same non-organic varieties at 10 grocery stores in Chippewa County, Wisconsin in the summer. Organic oranges had a lower mean price than non-organic oranges in the summer. Organic strawberries were more than double the price of non-organic strawberries.

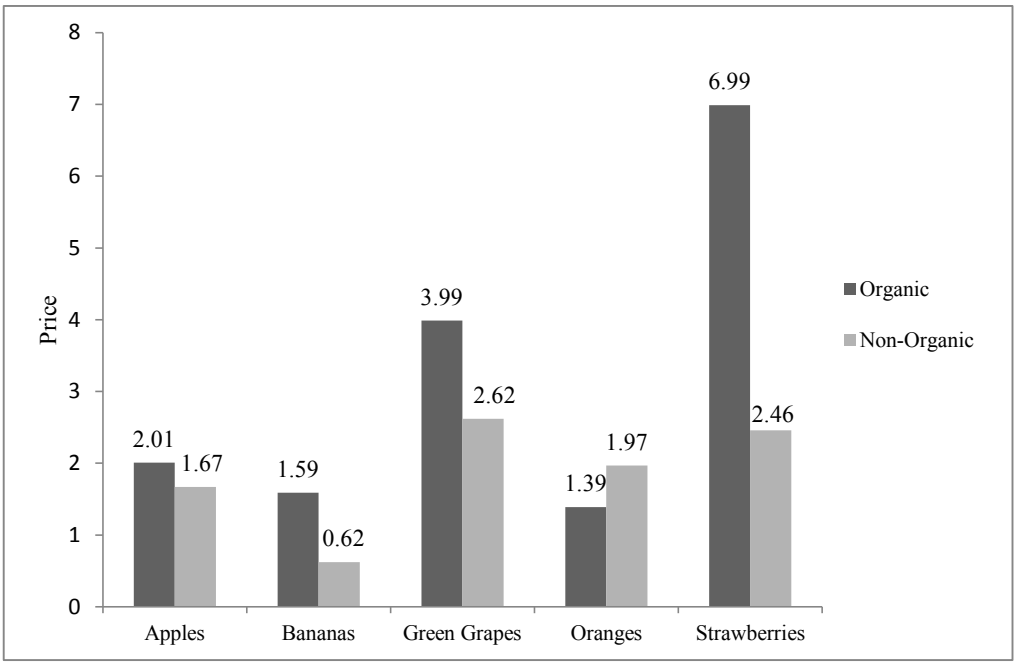

Figure 2. Comparison of the mean cost of a select group of more commonly consumed organic and non-organic fruits in ten grocery stores in Chippewa County, Wisconsin, in the summer.

Figure 3 compares the mean cost of some more commonly consumed organic and non-organic vegetables. The organic varieties of baby carrots, broccoli, cabbage, cucumbers, russet potatoes, and yellow onions had a higher mean price compared to the same non-organic varieties at the grocery stores in Chippewa County, Wisconsin in the summer. Organic cabbage was more than triple the price of non-organic cabbage.

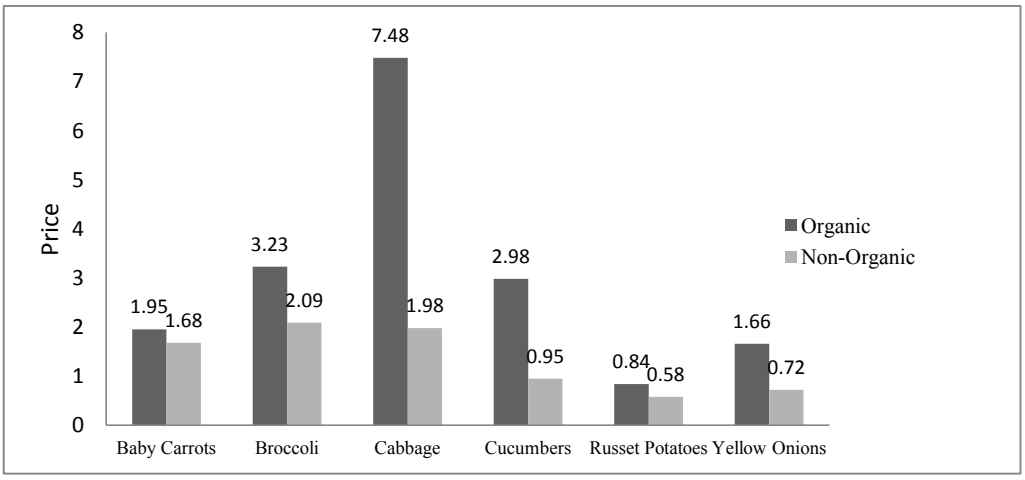

Figure 3. Comparison of the mean cost of some commonly consumed organic and non-organic vegetables in ten grocery stores in Chippewa County, Wisconsin, in the summer.

Chapter V: Discussion

The purpose of this study was to examine the availability and prices of fresh fruits, fresh vegetables, low-fat milk, and organic fruits and vegetables sold in Chippewa County, Wisconsin, and in Burnett County, Wisconsin. Audits were completed in August, 2011, and December 2011, by recording both the prices and availability of the items at grocery stores, convenience stores, and farmers' markets. Comparisons between the seasons of summer and winter were made to determine if there were seasonal differences in price and availability of these items.

Meeting the dietary recommendations for low-fat dairy, fresh fruits and vegetables is dependent on the availability and prices of these food items in establishments. According to the Centers for Disease Control and Prevention (2010c), increasing the availability of high quality and affordable fruits and vegetables is important for increasing consumption. Supermarkets, grocery stores, and convenience stores can take action to increase shelf space for fresh fruits and vegetables. The outcome of these establishments carrying affordable and adequate amounts of fresh fruits and vegetables could result in a higher intake of these items, which leads to healthier diets among the area residents served.

Rural neighborhoods are more likely to have limited access to supermarkets (Sturm & Datar, 2011). There is a positive association between access to supermarkets offering healthy foods and the diet quality of adults. Additionally, those who have better access to supermarkets have lower rates of obesity and healthier diets (Larson, Story & Nelson, 2009). Higher prices of fruits, vegetables, and milk is linked to lower consumption of these items. According to Sturm & Datar (2011), the result of higher prices for fruits and vegetables has been shown to lower consumption and to increase rates of obesity in children. Lower body mass index (BMI), an

indication of more normal body weight, is also seen in adults who eat a higher amount of fruit. (Sturm & Datar, 2011).

A research study showed that children living in neighborhoods without a grocery store consumed less fruits and vegetables than those with at least one grocery store in the neighborhood (Mushi-Brunt, Haire-Joshu, Elliott & Brownson, 2007). Furthermore, low fruit and vegetable intake was associated with a greater risk of obestiy in these neighborhoods. High fruit and vegetable intake is a major factor in lowering heart disease, stroke, and mortality (Drewnowski, Darmon & Briend, 2004). Dietary intakes that contain a high quantity of fruits, vegetables, whole grains, poultry, and fish lower the risk of heart disease and improves overall health status.

Cost and availability of fruits and vegetables are both factors related to food choices of consumers (Pollard, Kirk & Cade, 2002). Among lower socioeconomic groups, prices of fruits and vegetables are the most influential factors affecting food choice. According to Zenk et al. (2009), grocery stores offer greater availabiity of lower priced and higher quality, healthy foods compared to convenience stores. Lower income neighborhoods tend to be closer to more convenience stores with less variety and higher prices. These lower income families are also farther away from grocery stores than high income neighborhoods. Thus, lower income families tend to purchase their food from convenience stores where there is less variety and higher prices.

Limitations

One limitation of this study is that only three grocery stores were audited in Burnett County, Wisconsin. Results from this data collection should not be generalized to the entire County, since this is such a small sample size. A second limitation is that two of the farmers' markets that were audited were only open in the summer months. Thirdly, the audit was

completed in only two counties in Wisconsin, so the results do not reflect other counties in the state. Lastly, prices and availability were only collected during the summer and winter. There is a lack of information about prices and availability during the autumn and spring seasons, so results should not be generalized for the entire year. More research during all four seasons would allow for a more complete examination of how seasonality impacts prices and availability of fresh fruits, fresh vegetables, low-fat milk, and organic fruits and vegetables.

Conclusions

According to the United States Department of Agriculture (USDA, ARS, 2010), individuals two years and older consumed only six ounces of milk on average per day, which is below the recommendation of three cups per day. The health benefits of milk include a decreased risk of osteoporosis, cardiovascular disease, and type 2 diabetes mellitus (USDA, 2011a). In Burnett County, skim and 1% milk prices per gallon were slightly higher in the winter than in the summer. In Chippewa County, 1% milk had a wider range of prices per gallon in the summer than in the winter. In addition, the same percentages of skim milk prices were $3.49 per gallon or less in both the summer and the winter in Chippewa County. Some 1% and skim milk prices from several establishments in Chippewa County were cheaper than the three stores in Burnett County.

The federal government sets minimum prices for more than half of the milk produced in the United States (Jesse & Cropp, 2008). According to data collected by the United States Department of Labor (2012), the average price of milk per gallon in the United States has increased overall with a few slight decreases in price from 2002 to 2012. The average price of whole milk per gallon was $2.76 in 2002, $3.08 in 2006, $3.57 in 2011, and the average price as of March 2012 was $3.53. In 2011, the average price for the summer months of June, July, and August was $3.66, and the average price for the winter months of December, January, and

February was $3.41. Several establishments audited in Chippewa County priced milk lower than $3.41. Skim milk average prices are lower in rural areas compared to prices in major urban areas (Leibtag, 2005). Interestingly, lower-income households paid two to seven cents less per gallon for low-fat milk than high-income households. Milk prices also differ depending on the type of establishment that is selling the milk. Traditional establishments, such as conventional supermarkets, superstores, and specialty retailers, sell skim and low-fat milk at 5-12% lower than nontraditional establishments, including dollar stores and wholesale clubs. This accounts for the wide range of 1% and skim milk prices from the sampled establishments in Chippewa County.

Many Americans consume below the recommended amounts of fresh fruits, vegetables, and low-fat milk. The Centers for Disease Control and Prevention (2010b) states that 32.5% and 26.3% of adults consumed fruits two or more times per day and vegetables three times per day, respectively. Fruits and vegetables offer a variety of health benefits, including risk reduction of cardiovascular disease, stroke, and heart attack (USDA, 2010a). The number of fruits and vegetables offered at the three farmers' markets was very limited. Also, there were more varieties of vegetables than fruits available at the farmers' markets in the summer.

In the summer, Burnett County offered all surveyed fruits and vegetables except pomegranates in at least one of the grocery stores. Furthermore, apricots, nectarines, peaches, and corn on the cob were the fruit and vegetable items that were not available at any of the Burnett County grocery stores in the winter. When looking at the mean prices of fruit items that were offered in the three grocery stores, 8 decreased in price and 12 increased in price from summer to winter. The prices of cherries, green grapes, mangos, and red grapes increased substantially from summer to winter. Plums remained the same price throughout summer and winter. When looking at the mean prices of vegetable items that were offered in the three

grocery stores, 12 increased in price and eight decreased in price from summer to winter. Yellow onions remained the same price throughout the summer and winter in the three Burnett County grocery stores.

In Chippewa County, apples were offered by the most establishments, followed by bananas, then oranges in both the summer and winter. Pomegranates were not available in the summer, and apricots, nectarines, peaches, and red plums were not available in the winter. In the summer and winter, russet (Idaho) potatoes and yellow onions were available in the most establishments. Including all of the surveyed vegetables, all were offered in at least one establishment in both summer and winter. When looking at the mean prices of fruit items that were offered in the 10 grocery stores and twenty-three convenience stores, 10 decreased in price and 11 increased in price from summer to winter. The prices of blueberries, green grapes, mangos, and strawberries significantly increased from summer to winter. Significant decreases from summer to winter were seen in the prices of avocados, bananas, and grapefruit. When comparing the mean prices of vegetable items, 11 decreased in price and 13 vegetables increased in price. From summer to winter, the price of yellow onions significantly decreased.

Seasonality of fresh fruits and vegetables has a large effect on the price (Reed, Frazão & Itskowitz, 2004). Also, the type of establishment that the fruit or vegetable is purchased will affect the price. For example, fresh fruits at a farmers' market are priced differently than at a supermarket. According to Reed, Frazao & Itskowitz (2004), the most common fruits and vegetables purchased by consumers were bananas, oranges, apples, potatoes, and tomatoes in an analysis. The researchers also concluded that 63% of fruits and 57% of vegetables were cheapest in the fresh form compared to canned, frozen, and dried forms. Fruit and vegetable purchases accounted for 15.1% of the total amount spent on food by Americans.

Meeting the dietary recommendations for fruit and vegetable intake per day can be achieved by spending 12% of the average daily food expenditure, which was $5.50 in 1999 (Reed, Frazão & Itskowitz, 2004). For example, to consume three servings of fruit and four servings of vegetables per day, it can cost as little as 64 cents. This would require the consumer to buy the fruit and vegetables that are in season. Consuming fruits and vegetables on a daily basis supplies an individual with vitamins A, vitamin C, and fiber. Also, fruits and vegetables are naturally low in fat and calories.

Organic food consumption has grown dramatically in the United States, with the sales increasing from one billion dollars in 1990 to 21.1 billion dollars in 2008 (Crinnion, 2010). The number and prices of organic fruits and vegetables in Burnett County remained the same in the summer and winter, except for russet (Idaho) potatoes, which decreased in price from summer to winter. In Chippewa County, there were 15 organic fruits offered in the summer and only three offered in the winter. More organic vegetables were available in Chippewa County. Forty-eight organic vegetables were offered in the summer and 24 were available in the winter. When comparing some organic fruit prices to non-organic fruit prices in Chippewa County, organic apples, bananas, green grapes, and strawberries were more expensive than the same non-organic varieties. Organic oranges were less expensive than non-organic oranges. Organic baby carrots, broccoli, cabbage, cucumber, russet potatoes, and yellow onions were more expensive than the non-organic vegetables of the same variety. Although organic fruits and vegetables are somewhat available, the price appears to be seasonal similar to that of non-organic fruits and vegetables.

Information Presented at Meeting in Chippewa County, Wisconsin

The Chippewa Health Improvement Partnership is made up of committees that help with the food initiative. The results of this study were presented at a Steering Committee and Assessment Team meeting in Chippewa County. The results will help the members of the committees determine if an intervention is needed to increase availability of fruits, vegetables, and low-fat milk.

The three farmers' markets audited in the summer had a variety of fruits and vegetables commonly available in Wisconsin. Klinger's Farm Market and the Chippewa Falls Farmers' market both had a wide selection of fresh produce. The farmers' market in Stanley was quite small with only five booths. The items that were not available at any of the farmers' markets were cantaloupe, coconuts, pineapples, pomegranate, strawberries, artichokes, Brussels sprouts, cauliflower, and peas. At the grocery and convenience stores, prices per gallon of 1% milk ranged from $2.19 to $4.19 in the summer and ranged from $2.29 to $3.99 in the winter. In the summer, 24.2% of the stores had 1% milk prices of $3.39 and $3.99. In the winter, 25.8% of the stores had 1% milk prices of $3.39. Prices per gallon of skim milk ranged from $2.93 to $4.09 in the summer and ranged from $2.77 to $3.69 in the winter. In both the summer and winter, 57.7% of skim milk prices were $3.49 or less.

The items offered by most establishments were apples, bananas, oranges, russet (Idaho) potatoes, yellow onions, baby carrots, iceberg lettuce, standard tomatoes, whole carrots, and corn on the cob in the summer. Pomegranates were not offered in the summer at any of the establishments. In the winter, apples, bananas, oranges, pears, russet (Idaho) potatoes, yellow onions, baby carrots, standard tomatoes, and iceberg lettuce were offered the most. Apricots, nectarines, peaches, and red plums were not offered in the winter. In the summer, blueberries,

kiwi, bananas, limes, corn on the cob were the least expensive items. Green peppers were the least expensive item in the winter. In the summer, cherry tomatoes were the most expensive item. In the winter, peas were the most expensive item. In the summer and winter, watermelon, pineapples, cherries, baby carrots were the most expensive items, while russet (Idaho) potatoes were the least expensive item.

There were 10 varieties of organic fruit and 26 organic vegetable varieties available in the summer. Three varieties of organic fruit and 15 organic vegetable varieties were available in the winter. Organic apples, bananas, green grapes, and strawberries had a higher mean price compared to the same non-organic varieties in the summer. Organic oranges had a lower mean price than non-organic oranges in the summer. Organic baby carrots, broccoli, cabbage, cucumbers, russet potatoes, and yellow onions had a higher mean price compared to the same non-organic varieties in the summer.

The overall findings from this study show that there is a limited availability of fruits and vegetables at the three farmers' markets and at convenience stores. Skim milk prices did not change dramatically between summer and winter, with the same percentage of low-fat milk costing $3.49 or less. Price differences exist between summer and winter for some of the fruits and vegetables at the grocery stores. There were more organic fruits and vegetables in the summer compared to the winter.

Recommendations

Increasing the availability of fresh fruits and vegetables should involve changes to the food environments within the grocery and convenience stores (Rose, Bodor, Hutchinson & Swalm, 2010). This approach is easier to execute than changing the amount of establishments in the community that offer fresh fruits and vegetables. Studies have shown that grocery stores are an important place to increase fruit and vegetable intake (Glanz & Yaroch, 2004). The types of

interventions that grocery stores can take part in that have strong support are point-of-purchase (POP) information, reduced prices and coupons, increased availability and variety, and promotion and advertising. The POP approach includes designing shelf labels that specify which foods are healthy options, and specifically which fruits and vegetables are nutrient dense. Increasing the availability and variety of fruits and vegetables may be accomplished by making these items easier to locate in stores. Furthermore, increasing the amount of refrigerated shelf space to use for fruits and vegetables may help consumers find these items easier. Advertising using posters, games, or multimedia sources can help to encourage individuals to purchase fruits and vegetables. An example would be to give a tour of the grocery stores in order to point out and emphasize the healthy items available in the store. Grocery stores could also increase organic fruits and vegetables to enhance purchase and consumption of these foods.

Farmers' markets could make changes by offering a larger variety of fresh fruits and vegetables. In addition, developing more advertisements would help members of the community to know when and where the farmers' markets take place. According to Glanz & Yaroch (2004), a large number of individuals used farmers' market coupons which had been given to community members. However, it was not determined if there had been changes in the coupon user's fruit and vegetable purchases. To increase the amount of fruits and vegetables available, convenience stores could offer a larger variety of these items. Also, a concerted effort by retailers to make sure the items are good quality would also increase consumption.

Future Research

The results of this study will be used by CHIP to determine if Chippewa County has access to healthy foods, specifically fruits and vegetables. Also, the results will be used to determine if more food pantries are necessary for the residents of Chippewa County to have

access to healthy foods. In Burnett County, the results from the food audit will help to find ways to increase access to fresh fruits and vegetables.

A further collection of data on prices and availability in the spring and fall in both counties would allow researchers to determine how these factors change throughout the year. Also, it would be helpful to complete food audits in other counties in Wisconsin, including both urban and rural counties. This would help researchers study the food environment differences between the counties with different demographics. The population who is most often affected by poor access to supermarkets and healthful food are those who live in rural neighborhoods that are low-income (Larson, Story & Nelson, 2009). Specifically targeting low-income neighborhoods would be beneficial.

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Appendix A: Institutional Review Board Approval Memo

STOUT
UNIVERSITY OF WISCONSIN

Research Services
152 Voc Rehab Building

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

715/232-1126
715/232-1749 (fax)
http://www.uwstout.edu/rs/

Date: July 27, 2011

To: Kathryn Magnuson

Cc: Carol Seaborn

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

Susan Foxwell

Subject: **Protection of Human Subjects**

After review of your project, "*An Audit of Fruits, Vegetables and Low-fat Milk in Chippewa County, Wisconsin and a Rural County in Northwestern Wisconsin*" I concur that your research **does not** involve human subjects or official records about human subjects. Therefore, your project does not need further review and approval of the Institutional Review Board (IRB) for the Protection of Human Subjects.

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

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: am

Appendix B: The Audit Form used to Record Prices and Availability

Date_____

Store Name _____ Address _____
County_____

Fruits	**Available (x) & Number of Varieties**	**Price (Include Units)**
Apples (Individual Red Delicious)		
Apricots		
Avocados		
Bananas		
Blueberries		
Cantaloupe		
Cherries (Rainier)	(Valencia, Bing)	
Coconuts		
Grapefruit		
Grapes (green)		
Grapes (red)		
Honeydew Melon		
Kiwi Fruit		
Lemons		
Limes		
Mangos		
Nectarines		
Oranges (Navel)	(Valencia, etc)	

Peaches		
Pears		
Pineapples		
Plums (red)		
Pomegranate		
Raspberries		
Strawberries		
Watermelon		
Vegetables		
Artichoke		
Green Beans		
Broccoli		
Brussels Sprouts		
Cabbage (green)		
Baby Carrots		
Whole Carrots		
Cauliflower		
Celery		
Corn on the cob		
Cucumbers		
Lettuce (Head, iceberg)		
Mushrooms (whole, white)		
Mushrooms (half, white)		
Yellow Onions	(Vidalia, red, sweet, white)	

Peas		
Green Peppers		
Red Peppers		
Russet (Idaho) Potatoes	(Baker, yellow, gold, red, B sized red)	
Sweet Potatoes		
Rutabagas		
Cherry Tomatoes		
Tomatoes (on the vine)		
Standard tomatoes		
Zucchini		
Milk (Cheapest Variety)		
Skim (Gallon)		
1% (Gallon)		
Organic Fruits and Vegetables		

Appendix C: Establishments Audited in August, 2011 in Chippewa County, Wisconsin

Grocery Stores	Convenience Stores	Farmers' Markets
Aldi's	Bloomer Holiday	Chippewa Falls Farmers' Market
Chippewa Falls Gordy's County Market	Bloomer Kwik Trip	Klinger's Farm Market
Chippewa Falls Gordy's County Market	Cadott DJ's Mart	Stanley Farmers' Market
Cornell Gordy's	Cadott Foodliner-Cenex	
County Market	Chippewa Falls BP	
IGA Foodliner	Chippewa Falls Cenex	
Joe's Family Market	Chippewa Falls DJ's Mart	
Mega Foods	Chippewa Falls DJ's Mart	
Price Rite Foods	Chippewa Falls Express Mart	
Sokup's Market	Chippewa Falls Express Mart	
Walmart Supercenter	Chippewa Falls Holiday	
	Chippewa Falls Holiday	
	Chippewa Falls Kwik Trip	
	Chippewa Falls Kwik Trip	
	Chippewa Falls Kwik Trip	
	Chippewa Falls Mega Holiday	
	Cornell BP	
	Cornell Holiday	
	Cornell Stop-a-Sec	
	New Auburn Bridge Stop	
	Stanley DJ's Mart	
	Stanley Express Mart	
	Stanley Travel Shop	

Appendix D: Establishments Audited in December, 2011 in Chippewa County, Wisconsin

Grocery Stores	Convenience Stores	Farmers' Markets
Aldi's	Bloomer Holiday	Klinger's Farm Market
Chippewa Falls Gordy's County Market	Bloomer Kwik Trip	
Chippewa Falls Gordy's County Market	Cadott DJ's Mart	
Cornell Gordy's	Cadott Foodliner-Cenex	
County Market	Chippewa Falls BP	
IGA Foodliner	Chippewa Falls Cenex	
Joe's Family Market	Chippewa Falls DJ's Mart	
Mega Foods	Chippewa Falls DJ's Mart	
Price Rite Foods	Chippewa Falls Express Mart	
Sokup's Market	Chippewa Falls Express Mart	
Walmart Supercenter	Chippewa Falls Holiday	
	Chippewa Falls Holiday	
	Chippewa Falls Kwik Trip	
	Chippewa Falls Kwik Trip	
	Chippewa Falls Kwik Trip	
	Chippewa Falls Mega Holiday	
	Cornell BP	
	Cornell Holiday	
	Cornell Stop-a-Sec	
	New Auburn Bridge Stop	
	Stanley DJ's Mart	
	Stanley Express Mart	
	Stanley Travel Shop	

Appendix E: Establishments Audited in August, 2011 and December, 2011 in Burnett County, Wisconsin

Grocery Stores
Webster Wayne's Food Plus
Grantsburg Family Foods
Siren Four Winds Market