RELATION OF HEALTH BEHAVIORS TO GARDENING AMONG THE PRAIRIE BAND POTAWATOMI NATION IN KANSAS

by

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Abstract

Low fruit and vegetable (FV) intake and low physical activity (PA) levels are linked to increased risk of chronic diseases such as overweight and obesity, diabetes mellitus, and cardiovascular diseases. American Indians/Alaska Natives (NA) seem to be even more susceptible to these chronic diseases when compared to the general United States (U.S.) population, though little research has been conducted on smaller NA tribes. Gardening has been shown to increase vegetable consumption and be a means of PA. The purpose of this study was to see if gardeners of the Prairie Band Potawatomi Tribe (PBPN) in Kansas were more likely to have positive health indicators than non-gardeners. The objective was to discover if PBPN gardeners were more likely than non-gardeners to eat the daily recommended amount of fruit (2 servings) (Center for Nutrition Policy and Promotion, 2015a), eat the daily recommended amount of vegetables (3 servings) (Center for Nutrition Policy and Promotion, 2015b), meet the weekly recommended amount of PA (Centers for Disease Control and Prevention, 2009), perceive their health to be good, and determine if PBPN gardeners meet the weekly recommended amount of PA through gardening activities. Surveys were utilized to gather gardening and health information for PBPN tribal members. Data was coded and descriptive and contingent statistical analyses were performed. Gardeners were more likely than non-gardeners to eat the daily recommended amount of vegetables, the daily amount of both FV, and meet all FV and PA recommendations. Most gardeners met PA recommendations through gardening activities. Gardeners were not more likely than non-gardeners to eat the daily recommended amount of fruit, meet the recommended amount of PA, or to perceive their health as good. Encouraging gardening seems promising as a means of encouraging healthy lifestyles.

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Dedication

I dedicate this thesis to my family.

* For those who came before me, who passed down a heritage of upright character and a passion for learning.
* For those with me now – particularly my parents, Lowell and Anita, who instilled in me a desire to learn and the importance of education, and taught me through word and deed what is most important in life; as well as my siblings, Leamon & Rachel, and Elissa, for their examples, love, and support.
* For those yet to come, whom I have yet to meet but already love, and for whom I hope to be the example that my parents have been to me.

Chapter 1 - Introduction

Many chronic diseases, such as overweight, obesity, and diabetes mellitus are becoming increasingly prevalent among residents in the United States (U.S.), and though cardiovascular diseases are on the decline they still remain the number one cause of death. American Indians/Alaska Natives (AI/AN) are also plagued with these diseases, as they are more likely to die from diabetes than the general U.S. population, and cardiovascular diseases are their number one cause of death. Meeting recommendations for fruit and vegetable (FV) consumption and physical activity (PA) levels reduce the risk of such chronic diseases, but unfortunately too few people eat enough FV and get enough PA to the point where their health will be positively affected. Gardening has been linked to increased vegetable consumption, and has been shown to be a means of PA. Does gardening increase FV consumption and PA levels among the Prairie Band Potawatomi Nation (PBPN)? Can it be an effective means to reduce risk of chronic diseases through increased FV consumption and PA levels?

Research Objective

The objective of this study was to determine if gardeners have more positive health indicators than non-gardeners in the following areas:

- Eating daily recommended amount of FV
- Meeting weekly recommended amount of PA
- Perceive health as good
- Meet weekly recommended amount of PA through gardening

This objective was addressed through surveys that were distributed at the PBPN Harvest Feasts in Fall 2012 and Fall 2013 and the PBPN Spring Gardening Workshop in Spring 2014.

Thesis Outline

The remainder of this thesis is organized into five chapters. Chapter 2 is a review of the literature, and looks at trends in FV consumption levels, PA levels, effects of FV intake and PA levels on health and chronic diseases, AI/AN health disparities, vegetable intake of gardeners, and gardening as a means of PA. Chapter 3 describes the methods for which the surveys were

distributed, collected, coded and analyzed. Chapter 4 presents the findings of PBPN survey participant demographics and their health indicators factored by gardening, gender and age groups. Chapter 5 discusses the implications from the health indicator findings. Chapter 6 discusses overall conclusions and suggestions for future research.

Chapter 2 - Review of Literature

When looking at health status we often consider FV consumption and PA levels as they relate to health. Many agencies, government offices and organizations use questionnaires to obtain information about health as it relates to FV consumption and PA levels. While we can learn much about health through the findings of such questionnaires, there are limitations to obtaining information in such a way, such as selection bias, variability in questions, and relying on memory to report behaviors. While most of the presented literature comes from peer reviewed sources, it is important to keep the limitations of the literature in mind.

Diet Trends

Tracking FV consumption in the U.S. proves difficult since many different sources and surveys are utilized, with some sources and surveys more reliable than others. Since many surveys ask about food groups, but do not specify specific foods, problems arise in determining the types of FV eaten, such as fresh fruit compared to fruit juice, and fiber-rich vegetables compared to starchy vegetables. Different forms of FV differ in nutrition quality and can affect health in different ways. In addition to quality differences among FV, data have mostly been collected on the availability of FV, but not the actual consumption of FV, resulting in estimated data that are believed to be inflated compared to actual consumption rates (Kearney, 2010). Comparisons are also complicated due to differing recommendations throughout U.S. history. For example, in the 1970s the United States Department of Agriculture (USDA) suggested that four or more servings of FV be eaten daily, then in 1984 the USDA changed the suggestion to encourage three to five servings of vegetables and two to four servings of fruits be eaten daily (Davis & Saltos, 1993). Since 1991, the USDA has promoted the "Five a Day" slogan, to encourage at least five servings of FV daily, with the recommended minimum of two servings of fruit and three servings of vegetables used for the purpose of this study (Center for Nutrition Policy and Promotion, 2015a; Center for Nutrition Policy and Promotion, 2015b).

From 1976-1980, 29% of U.S. men and women reported eating two or more servings of fruit the day before they took the National Health and Nutrition Examination Surveys (NHANES) II, and 45% had no fruit the day preceding the survey (Patterson, Block, Rosenberger, Pee, & Kahle, 1990). As indicated in subsequent NHANES surveys, the number of adults reporting eating two or more servings of fruit a day seemed to decrease in 1988-1994 to

16.8%, then rise again in 1999-2004 to 17.5% (Casagrande, Wang, Anderson, & Gary, 2007). It is important to note that even though there seemed to be a drop in daily reported fruit consumption from 1976-1980 to 1988-1994, fruit juice was initially included as fruit in the NHANES surveys, then was later categorized as "fruit juice" instead of as fruit. The change in how fruit juice is categorized might be the reason for what seems to be a large decrease in fruit consumption.

The percentage of reported vegetable consumption has also shown increases and decreases throughout time, with 27% of men and women reporting eating three or more servings of vegetables on the day preceding the NHANES II survey from 1976-1980, and 22% reporting not having eaten any vegetables the preceding day (Patterson et al., 1990). The number of adults reporting meeting the current recommended amount of vegetables, excluding fried potatoes, increased in 1988-1994 to 29.9% but declined in 1999-2002 to 27.4% (Casagrande et al., 2007).

The percentage of adults reporting eating two or more servings of fruit and three or more servings of vegetables is significantly smaller than those reporting meeting only one of the recommendations. From 1976-1980, only 9% of adults reported meeting both FV guidelines the day preceding the NHANES survey and 11% reported not eating any FV (Patterson et al., 1990). In 2003-2004 only 2.2% of men and 3.5% of women reported eating the recommended amounts of both FV (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009). Seeing that only 11% of adults report not eating any FV and only 9% report meeting FV recommendations, there is a greater percentage of adults who eat FV but do not meet recommendations than there is of people who do not eat any FV.

Even though it is important to know how much of the population is and is not eating the recommended amount of FV, it is also important to know on average how many servings of FV are eaten, to determine if the number of servings has increased across the population. From 1976-1980, men and women reported eating a mean of 1.08 servings of fruit and 1.77 servings of vegetables (Patterson et al., 1990). From 1999-2000 the reported mean servings of fruit per day increased to 1.50, and the mean intake for vegetables per day, excluding starchy vegetables, increased to 2.00 (Guenther, Dodd, Reedy, & Krebs-Smith, 2006). Most recently, the Centers for Disease Control and Prevention (CDC) has reported that the median daily intake of fruits is 1.10 servings in the U.S., with Kansans eating 1.00 servings; both U.S. and Kansas adults eat a median of 1.60 vegetable servings daily (Centers for Disease Control and Prevention, 2013b).

For total FV consumption, it has been reported that the mean intake for FV was 4.70 servings per day from 1999-2000 (Guenther et al., 2006), but had previously been only 3.43 servings per day in 1994 and later was only 3.24 servings per day in 2005 (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008).

While FV consumption is low for both men and women, from 1976-1980 men were more likely to report eating vegetables than women, and women were more likely to report eating more fruit than men (Patterson et al., 1990). In 2003-2004 more men reported meeting the FV recommendations than women, with 8.3% of men reporting eating two or more servings of fruit compared to 6.5% of women, and 15.3% of men reporting eating three or more servings of vegetables compared to 7% of women (Kimmons et al., 2009). From 1994 to 2005 both men and women reported decreased FV consumption, from 3.21 servings per day to 2.98 for men and 3.66 for servings per day to 3.50 for women (Blanck et al., 2008). There were significant decreases in reported FV consumption from 1994 to 2005 for men aged 55-64, as well as non-Hispanic white men. Significant increases in reported FV consumption from 1994 to 2005 occurred among men aged 18-24, women aged 25-34, non-Hispanic black women, nonsmoking women, and women who graduated high school (Blanck et al., 2008).

Since the 1970's the percentage of men and women who reported meeting the daily recommended amounts of FV, as well as the daily mean servings of FV eaten by men and women, has fluctuated, with a rise of reported FV consumption in the most recent findings. Some of the fluctuations might not be an actual change in FV eaten, but could result from a difference in surveys, including differences in excluding certain FV from the FV categories. Overall, women reported a higher mean of daily FV consumption, but men reported being more likely to meet daily FV recommendations. Despite recent reported increases in meeting FV recommendations, the general U.S. population consistently does not meet the USDA's recommended amount of daily FV.

Physical Activity Trends

In 2008 theU.S. Department of Health and Human Services (HHS) announced federal PA guidelines. Health and Human Services recommends that adults, in increments of at least ten minutes, participate in a minimum of 150 minutes moderate physical activity (MPA) or a minimum of 75 minutes vigorous physical activity (VPA) weekly or an equivalent mix of moderate and vigorous physical activity (MVPA) (Centers for Disease Control and Prevention,

2009; President's Council on Fitness, Sports & Nutrition, 2015). To assist American adults in meeting these PA guidelines, HHS provides a list of some PA that are categorized as moderate or vigorous, from which adults can choose appropriate activities to meet their needs and to compare PA of similar energy expenditure.

Traditionally, PA intensity levels have been measured and reported through two means: METs (metabolic equivalents) and self-reporting. The energy it takes to sit quietly for one minute equals one MET. Moderate PA burns three to six times more energy than sitting quietly, and therefore burns three to six METs. Vigorous PA burns more than six METs per minute (Harvard School of Public Health, 2015). The 2011 Compendium of Physical Activities lists 823 various activities and the MET associated with each one (Ainsworth et al., 2011). Some PA METs have not been measured but have been estimated by comparing them to PA that use similar body motions. The estimated METs and codes for these PAs are italicized within the 2011 Compendium of Physical Activities, to distinguish them from PA METs that have actually been measured.

Estimated METs are not the only weakness of measuring PA, as measuring the intensity and duration of individuals' PA also has flaws. Often the individual is asked to report from memory and estimation, through means of survey, how many days a week they participate in MPA and VPA, and for each day they participate in these activities, how many minutes in that day they spend in MPA and VPA (Centers for Disease Control and Prevention, 2010). When PA is reported by individuals, they are only supposed to report their leisure-time PA (Centers for Disease Control and Prevention, 2010). Since this excludes work-time PA, PA levels might be underestimated, and true trends for overall PA are unlikely to be represented in the data.

Response discrepancies from surveys can differ across a variety of sources, including wording, questionnaire construction, and survey administration (Babbie, 2010). Such discrepancies in self-reporting are seen from a comparison of three surveillance systems. When comparing PA levels in 2005, National Health Interview Survey (NHIS) reported that 30.2% of the U.S. adult population was physically active, similar to the 33.5% that the NHANES reported as physically active, both of which are smaller than the 48.3% reported as physically active by the Behavioral Risk Factor Surveillance System (BRFSS) (Carlson, Densmore, Fulton, Yore, & Kohl III, 2009). In regards to physical inactivity, confliction between surveillance systems can be seen as NHIS reported that 40.7% of the adult population was physically inactive, compared to

32.4% reported by NHANES and 13.9% reported by BRFSS (Carlson et al., 2009). These response discrepancies could possibly result from wording, as all three surveys ask similar questions with slight wording variations regarding PA, though the questions in NHIS and BRFSS are more similar than NHANES, yet the results from NHIS are more comparable to results from NHANES than they are to the results from BRFSS. More likely, the discrepancies are a result of how long the surveys are and where the PA questions are placed in the survey, as each survey varied in length and other questions asked. It is also possible that how the interviewer administered the survey created discrepancies, such as how the interviewer dressed, the interviewer's familiarity with the questionnaire, and if exact wording for questions was used (Babbie, 2010).

In recent years trends in PA and physical inactivity have also gained interest among scientists and the government to more deeply understand the relationship between PA and physical inactivity to health conditions. The percentage of adults in the U.S. reported meeting aerobic PA recommendations during leisure time has increased from 43.3% in 1997 to 49.8% in 2014, when adjusted for age (Clarke, Ward, Freeman, & Schiller, 2015), and data from NHANES showed a margin of significance for increased reported PA from 1999 to 2006 (Carlson et al., 2009). While there is a clear increase in reported leisure-time PA, a reported decrease in physical inactivity is not as apparent. According to the Physical Activity Council, the reported inactivity rate of Americans aged six and older increased from 26.6% in 2009 to 28.3% in 2014 (Physical Activity Council, 2015). However, findings from NHANES showed a significant decrease in reported physical inactivity among U.S. adults from 1999 to 2006 (Carlson et al., 2009).

Even though PA and inactivity rates rise and fall through the years there are clear trends among demographic groups, including where individuals live, income levels, age, and gender. Physical activity rates vary among different geographic regions. The percentage of adults who reported being physically active in Kansas is 64.7% which is roughly the same as the 64.5% of adults nation-wide who reported being physically active (Centers for Disease Control and Prevention, 2010). However, a greater percentage of adults from the West (69.5%), the Northeast (67.7%) and even the entirety of the Midwest (65.4%) reported being more physically active than adults from Kansas, while adults from the South (61.8%) reported being less physically active than adults from Kansas. (Centers for Disease Control and Prevention, 2010).

Likewise, when comparing the percentage of adults who are not only physically active, but who are highly active, receiving at least 300 minutes of MPA per week, or 150 minutes of VPA per week, or an equivalent combination of MVPA per week, the percentage of Kansas adults at 42% falls slightly under that of 43.5% nation-wide U.S. adults who reported being highly active. Again, a greater percentage of adults from the West (48.8%), Northeast (46.3%), and the entirety of the Midwest (43.2%) reported being highly active compared to adults from Kansas, and more adults from Kansas reported being highly active compared to adults from the South (41.2%) (Centers for Disease Control and Prevention, 2010).

Physical activity also varies among income levels, as only 32.4% of adults living in poverty reported being sufficiently PA compared to 57.8% of adults whose family income is four-times above the poverty level (Centers for Disease Control and Prevention, 2013a).

Age is a large indicator of PA levels in both the young and the elderly. In a week long study of school children wearing an accelerometer, age was inversely related to PA levels. Boys and girls in grades 1 through 3 were MVPA 121.0 and 100.9 minutes on average per day, respectively. These numbers decrease significantly for boys and girls in grades 4 through 6, who are MVPA 73.1 and 35.6 minutes on average per day, respectively, then again decrease for boys and girls in grades 7 through 9 to 41.4 and 27.3 minutes on average per day, respectively, and once again decrease for boys and girls in grades 10 through 12 to 30.0 and 20.2 minutes on average per day, respectively (Trost et al., 2002). Physical activity levels even decrease for the elderly, as shown from the NHANES, reporting that 60 to 69 year olds ranged from 14.2 to 130.7 minutes of MVPA per day, while 70 to 79 year olds decreased in the amount of MVPA to a range of 9.0 to 97.2 minutes a day, and decreasing once again in 80 to 89 years olds with a range of 5.6 to 64.0 minutes of MVPA per day (Evenson, Buchner, & Morland, 2012).

In addition to geographic, income, and age differences, PA rates differ between men and women. From years 2008 to 2010, 50.4% of men reported meeting the recommended PA levels compared to only 42.1% of women (Centers for Disease Control and Prevention, 2013a). Even when women are physically active, 22% reported being insufficiently active compared to 18.4% of men who are insufficiently active. Women also reported being more likely than men to be inactive, and both are more likely to be less active than to be insufficiently active at 36.6% and 31.4% respectively.

Physical activity is hard to measure, resulting in part from self-reporting, which leads to discrepancies in PA studies. It appears that the general U.S. adult population is increasing in likelihood to meet the HHS PA recommendations, and are decreasing physical inactivity. However, the general U.S. population ages six and older is increasing in physical inactivity. The likelihood that U.S. adults are to meet PA recommendations can vary among demographics, including geographic location, poverty status, age and gender. Though Kansas residents are about as physically active as the general U.S. population, they are less likely to meet leisure-time PA recommendations than residents in the West, Northeast, and Midwest regions of the U.S., and more likely to be physically active than residents in the South region of the U.S. Individuals who live in poverty are less likely to be physically active than individuals who live above the poverty line, and women are less likely to be physically active than men. Physical activity is inversely related with age, as older individuals are less active than younger individuals. Even with an increasing percentage of the adult population meeting the recommended amount of weekly, leisure-time PA, most individuals do not meet these recommendations.

Role of Fruits and Vegetables in Health

Studies have shown that individuals who eat a plant and lean meat based diet are at lower risk for becoming overweight or obese (Boeing et al., 2012), for diabetes mellitus (DM) (R. H. Liu, 2003), and cardiovascular diseases (CVD) (Hung et al., 2004). Diabetes mellitus and CVD plague AI/AN, as evident in that CVD are the second leading cause of death among AI/AN, and DM is the fourth leading cause of death among AI/AN (Centers for Disease Control and Prevention, 2015a). Since overweight/obesity have been linked with CVD (Hubert, Feinleib, McNamara, & Castelli, 1983; Must et al., 1999) and DM (Chan, Rimm, Colditz, Stampfer, & Willett, 1994; Colditz, Willett, Rotnitzky, & Manson, 1995; Mokdad et al., 2003), and considering that only 27.6% of AI/AN have a healthy weight and 40.8% are obese (Go et al., 2013), overweight/obesity is important to this study.

It is important to note that even though higher levels of FV consumption benefits health, individuals who eat more FV tend to have healthier habits in general. For example, a study of female teachers aged 40 to 60 years, who live in Tehran, Iran, found those with the highest reported fruit consumption, as well as those with the highest reported vegetable consumption, reported being more physically active than those with the lowest fruit consumption and vegetable consumption (Esmaillzadeh et al., 2006). Similarly, female and male health professionals who

reported consuming more FV also reported smoking less and being more physically active or exercising more than those who reported consuming fewer FV (Bazzano, Li, Joshipura, & Hu, 2008; Joshipura et al., 1999; S. Liu et al., 2000)

Fruit and Vegetable Consumption and Overweight/Obesity

A healthy diet, including high levels of FV intake, has long been associated with decreased risk for overweight/obesity (Heo et al., 2011). Ello-Martin, Roe, Ledikwe, Beach, & Rolls (2007) compared the effects of a reduced fat diet to a reduced fat and increased FV diet with obese women. Individually, they met weekly with a dietician for six months, then they met monthly with a small group and with a dietician for the next month, where they received instruction on food selection and portion sizes. Individuals who participated in the reduced fat diet lost a median of 14.7 pounds in the first six months, compared to individuals in the reduced fat and increased FV diet who lost a median of 19.6 pounds, with a significant difference between the two groups ($p = 0.034$). By the end of the year, individuals participating in the reduced fat and FV diet lost significantly more body weight than individuals participating in the reduced fat diet ($p = 0.021$).

While it may not be surprising that individuals who consumed a diet with increased FV intake lost more weight, it is surprising when considering that participants in the reduced fat and increased FV diet reported eating a significantly higher amount of food, with a mean of 225 grams more, than participants in the reduced fat diet ($p = 0.025$) (Ello-Martin et al., 2007). Despite the substantially higher amount of food consumed, participants in the reduced fat and increased FV diet lost significantly more weight than participants in the reduced fat diet. This indicates that higher FV intake is vital in decreased risk of overweight/obesity.

Fruit and Vegetable Consumption and Diabetes Mellitus

Diabetes has been on the rise since the 1950's, from 0.93% of the population being diagnosed in 1958 to 7.18% being diagnosed in 2013 (Centers for Disease Control and Prevention, 2014b). To promote a healthy lifestyle for diabetic individuals, the Academy of Nutrition and Dietetics (2014) suggests including starchy foods, non-starchy vegetables, fruits, lean meats, low-fat dairy, and healthy fats on a daily basis. In recent years there has been a particular interest in researching the direct effects of FV consumption on the prevalence of Type 2 Diabetes.

A healthy diet has long been associated with reduced risk of diabetes, though this association might be assumed because of the relation of overweight and obesity to diabetes. Among overweight Latino youth from California, increased reported vegetable consumption did not significantly increase insulin sensitivity, which is an indicator for reduced risk of DM. However, nutrient-rich vegetables, specifically dark green and deep orange and yellow vegetables did have a significant partial correlation with insulin sensitivity ($p = 0.03$) (Cook et al., 2014).

The possibility of FV variety being more significant than FV quantity can also be seen in a study of men and women between 40-79 years old in Norfolk, England (Cooper et al., 2012). Whether adjusting for gender, or gender and several covariates, men and women who reported eating 4.9 more varieties of fruit per week were significantly less likely to have DM ($p <0.001$ and $p = 0.002$, respectively). This held true for individuals who reported 5.9 more varieties of vegetables when adjusted for sex ($p <0.001$), and when adjusted for sex and several other values ($p = 0.03$). Individuals who reported eating 8.3 more varieties of combined FV were also significantly less likely to have Type 2 Diabetes ($p <0.001$) (Cooper et al., 2012).

Fruit and Vegetable Consumption and Cardiovascular Disease

The amount of FV that an individual consumes each day has a significant impact on cardiovascular health, and can influence CVD, myocardial infarction, ischemic heart disease and coronary heart disease. When comparing the influence of FV intake on cardiovascular health, those who eat the fewest amount of FV each day are compared to those who eat the most FV each day. This more clearly shows the contrast of FV intake on cardiovascular health than comparing those whose daily FV intake levels do not differ much. One strength of the following surveys is that they are longitudinal for a minimum of six years and up to twenty-one years.

There is a significant inverse correlation between FV intake, F intake alone, V intake alone and future incidence of CVD for women (S. Liu et al., 2000). When adjusting risk for age and treatment, women who reported eating only a median of 2.6 servings FV per day had significantly higher incidences of CVD than women who reported eating a median of 10.2 servings FV ($p = 0.01$). Similar results are found among women who reported eating a median of 0.6 servings of fruit per day compared to women who reported eating a median of 3.9 servings of fruit ($p = 0.03$). This again holds true for women who reported eating a median of 1.5 servings of vegetables per day when compared to women who reported eating a higher median of 6.9

servings ($p = 0.02$). The correlation between servings of FV eaten per day and CVD is even greater if women were excluded who self-reported diabetes, a history of hypertension, or a history of high cholesterol at baseline for FV ($p = 0.005$), for fruit ($p = 0.007$), and for vegetables ($p = 0.02$). Higher levels of daily FV intake also has positive benefits for men in reducing mortality caused by CVD (Bazzano et al., 2002). When adjusting for age, race, sex and energy, for men and women combined CVD mortality risk was significantly higher among those who reported eating less than one serving of FV per day than the CVD risk among those who reported eating three or more servings of FV per day ($p <0.001$).

Increased FV consumption can also reduce the risk of myocardial infarction. After adjusting for age and treatment, cases of myocardial infarction were significantly higher among women who reported eating a median of 2.6 FV servings per day, compared to women who reported eating a median of 10.2 FV servings ($p = 0.004$) (S. Liu et al., 2000). Significant differences were also found among women who reported eating only 0.6 servings of fruit per day, compared to women who reported eating 3.9 servings of fruit per day ($p= 0.04$). Higher vegetable intake per day did not seem to independently affect myocardial infarction, as there was no difference ($p = 0.13$) for women who reported eating a median of 1.5 vegetable servings per day compared to women who reported eating 6.9 vegetable servings per day.

Ischemic heart disease, or coronary heart disease incidents and death rates also increase when daily FV consumption is lower. Significant inverse relationships were found for FV intake and ischemic heart disease incidents, with 21.8% of adults who reported eating FV less than once per day having incidents of ischemic heart disease, and only 17.9% of adults who reported eating FV at least three times per day having incidents ($p = 0.02$) (Bazzano et al., 2002). In fact, adults who reported having the highest FV consumption can have up to a 20% lower risk for ischemic heart disease than those who reported having the lowest FV consumption (Joshipura et al., 2001). Not only does lower daily FV intake increase ischemic heart disease incidences, but it increases ischemic heart disease mortality to an even greater extent. There is a meaningful inverse relationship for FV intake and ischemic heart disease mortality, with ischemic heart disease mortality affecting 9.6% of adults who reported eating FV less than once per day, compared to ischemic heart disease mortality which affects only 5.7% of adults who reported eating at least 3 servings of FV per day ($p = 0.007$) (Bazzano et al., 2002). Just as important as eating high levels of FV, the types of FV eaten can impact the likelihood of ischemic heart disease. High

consumptions of green leafy vegetables, cruciferous vegetables and vitamin C-rich FV seemed to lower the risk for ischemic heart disease more than other FV (Joshipura et al., 2001).

Physical Activity and Health Outcomes

Numerous studies have been conducted to show the many ways in which health is positively associated with low, MVPA. The amount of literature on PA health benefits can be overwhelming, so for the purpose of this study three aspects of health were chosen, overweight and obesity, DM, and cardiovascular health, to understand the influence that PA has on them specifically. These three areas of health are particularly important to this study since they are prevalent among AI/AN. Cardiovascular diseases are the second leading cause of death and DM is the fourth leading cause of death among AI/AN (Centers for Disease Control and Prevention, 2014b). Diabetes is of particular concern for the AI/AN population, since they are 2.8 times more likely to die from diabetes compared to all races of the U.S. (Indian Health Service, 2015a). Overweight and obesity was selected because it has been linked to cardiovascular health and DM in several studies (Chan et al., 1994; Colditz et al., 1995; Freedman, Dietz, Srinivasan, & Berenson, 1999; Hubert et al., 1983; Mokdad et al., 2003; Must et al., 1999).

Physical Activity and Overweight/Obesity

In the past few decades research has shown an inverse relationship between PA and body mass index (BMI) and waist circumference (WC). More recently studies have delved into the effects of PA intensity levels, duration of PA, and even sedentary time on BMI and WC. This research offers some insight for reducing and preventing obesity, but at times it also seems to offer conflicting information. While BMI is a standard way in which overweight/obesity is reported, studies have shown that the body fat relationship to BMI varies among different ethnic groups (Deurenberg, Yap, & Van Staveren, 1998). The difference in the BMI and body fat relationship among ethnic groups demonstrates that BMI is not the ideal way to report overweight/obesity, even if it is a standard method.

Physical activity has been shown to have an inverse correlation with BMI and WC among a variety of geographic locations, ethnic races, and ages. One indication of the far-reaching effects that PA has on overweight and obesity levels, regardless of geography and ethnicity, was found in a study of children from 34 countries, where 29 of 33 countries showed a significant inverse relationship between PA and overweight (Janssen et al., 2005). The effects can be seen

on different ages because overweight preschool boys were shown to participate in significantly less PA during preschool than their non-overweight classmates (Trost, Sirard, Dowda, Pfeiffer, & Pate, 2003), while adults were also shown to have a significant inverse relationship between their PA levels and BMI and WC (Henson et al., 2013).

While there is plenty of evidence that PA influences BMI and WC, some data gives conflicting information about who benefits most from PA and the intensity and duration needed for optimal health outcomes. Even though Trost et al. (2003) found that overweight preschool boys were significantly less physically active at school than non-overweight preschool boys, it was also discovered that this is not the case for preschool girls, as there was no significant difference between PA levels of overweight and non-overweight preschool girls. Energy expenditure does not appear to be the most important factor affecting the metabolic syndrome; when reported MPA energy expenditure matches that of reported VPA energy expenditure, the VPA has more effect on the metabolic syndrome (Janssen et al., 2005).

Many studies look at the current PA levels and intensity as well as the current BMI, but do not observe the longitudinal benefits of PA. When longitudinal studies are performed, the benefits of PA on BMI and WC become more apparent. Such was the case in a three-year follow up of overweight and obese 5 to 10 year olds in Australia. Children who reported an increase in their PA level, and maintained the new PA level, despite their initial reported PA level, showed an improved BMI (Trinh, Campbell, Ukoumunne, Gerner, & Wake, 2013), indicating that there is potential for long-term benefits of an initial increase of PA and then maintaining the increased PA levels.

Physical Activity and Diabetes

Increased PA levels is generally accepted as predictor for decreased type 2 diabetes risk. Even when adjusting for alcohol consumption, energy intake, and BMI, a reported increase in PA by just one level has the potential to reduce the risk of type 2 diabetes by 13% in men and 7% in women (InterAct Consortium, 2012). Consistently staying physically active throughout life, or even increasing consistent moderate physical activities later in life, can reduce the risk of type 2 diabetes up to 40% compared to remaining sedentary or performing only light activities (Jefferis, Whincup, Lennon, & Wannamethee, 2012). Physical activity seems especially effective in reducing the risk of diabetes in men who are overweight or obese.

Low levels of reported PA increases the risk of developing type 2 diabetes in men and women regardless of whether or not they are abdominally lean or obese. However, when replacing WC with BMI the link between lower levels of reported PA and increased risk of type 2 diabetes weakened in men (InterAct Consortium, 2012), indicating that WC is just as important, and potentially more important than BMI in diabetes prevention. Waist circumference seems to affect women differently than men, as women who reported low PA levels and are abdominally lean are at greater risk of developing type 2 diabetes compared to women who reported low PA levels and are abdominally obese.

Physical activity can be particularly beneficial when practiced consistently for a prolonged period of time. After four years of consistent lifestyle intervention, including education, dietary modification and increased PA, there was a 43% risk reduction in diabetes. Fifteen years later there remained a 32% risk reduction (Lindström et al., 2013). Increasing moderate, consistent PA levels can reduce the risk of diabetes by 40% after four years (Jefferis et al., 2012).

Physical Activity and Cardiovascular Health

The effects of PA on cardiovascular health are observed primarily through measures such as waist circumference, blood pressure, and cholesterol levels (American Heart Association, 2015; Silver, 2015). The implication that PA levels have an inverse relationship with WC was implied previously when discussing the inverse relationship of PA with BMI, which is often determined through measurements of WC, weight and height. In addition to this indirect relationship, evidence also indicates a direct, statistically significant inverse relationship between PA and WC, independent of sedentary time (Ekelund et al., 2012).

Increased PA levels, independent of sedentary time has shown significant impact on blood pressure and cholesterol levels. While blood pressure and cholesterol are often given more attention in adulthood, even in children and adolescents, increased PA levels can significantly reduce systolic blood pressure and lower HDL cholesterol levels, independent of sedentary time (Ekelund et al., 2012). In addition to spanning the ages, PA is effective in promoting healthy cholesterol levels among various ethnic groups and genders. Chinese children, adults, males and females with higher reported PA levels had lower HDL levels than those who had lower reported PA levels. In addition, males had a significant relationship between PA levels and LDL levels (Adair, Gordon-Larsen, Du, Zhang, & Popkin, 2014).

Even though increased MVPA has shown an inverse relationship with WC, even after adjusting for sedentary time in adults (Henson et al., 2013), the amount of sedentary time that individuals engage in can also impact their WC and cholesterol levels. Ekelund et al. (2012) found that even though sedentary time was not associated with cardio metabolic outcomes independent of MVPA time, lower sedentary time greatly influenced the health outcomes of lower and higher PA levels. Television viewing, a sedentary activity, has a significant positive association with weight in children from twenty-two countries (Janssen et al., 2005). In addition to weight, increased PA levels are generally shown to reduce HDL cholesterol, but in some cases sedentary behavior has a stronger relationship with HDL cholesterol than PA does (Cliff et al., 2013).

Health Outcome Disparities of American Indians/Alaska Natives

Throughout the U.S., levels of chronic diseases are on the rise, such as overweight and obesity (Flegal, Carroll, Ogden, & Johnson, 2002; Ogden & Carroll, 2010), and diabetes (Mokdad et al., 2001). While deaths from cardiovascular diseases are on the decline, they still remain the number one cause of death for U.S. residents (Centers for Disease Control and Prevention, 1999; Centers for Disease Control and Prevention, 2015c). American Indians/Alaska Natives seem to be particularly susceptible, as preventable diseases contribute to some of their leading causes of death. Preventable diseases linked to overweight and obesity, such as heart disease, diabetes, chronic liver disease, chronic lower respiratory diseases, stroke, and nephritis, are among the top ten causes of death for AI/AN (Centers for Disease Control and Prevention, 2015a). In the state of Kansas, when medical information was gathered on racial groups, AI/AN were often overlooked. As a result, limited health and socioeconomic information is available on AI/AN in Kansas (Kimminau & Satzler, 2005).

From 1999 through 2001, diseases of the heart was the number one cause of death among all AI/AN in the Indian Health Service (IHS) areas, accounting for 11.7% of deaths and diabetes mellitus was the number four cause of death, accounting for 4% of deaths (Indian Health Service, 2008). Diseases of the heart remained the number one cause of death, and diabetes mellitus remained the number four cause of death, from 2007 to 2009 (Indian Health Service, 2015b). The Oklahoma area of the IHS, which includes Kansas, also had diseases of the heart as the leading cause of death, accounting for 16% of the area's deaths, and diabetes mellitus as the

fourth cause of death accounting for 5.2% of deaths from 1999 to 2001 (Indian Health Service, 2008).

While all races combined in the U.S. had diseases of the heart as the leading cause of death accounting for 29.6% of deaths, diabetes mellitus was not even mentioned in the top ten leading causes of death for all races combined (Indian Health Service, 2008). When diabetes and heart disease were listed together on the death record, AI/AN had a significantly higher rate of death than all races combined in the U.S., with AI/AN from 35 through 74 years of age in all the IHS areas having a rate of 94.1 per 100,000 deaths due to diabetes and heart disease, the Oklahoma IHS area having a rate of 84.8 per 100,000 deaths, and all races combined in the U.S. having a rate of 48.3 per 100,000 (Indian Health Service, 2008).

American Indian/Alaska Native race is often underreported on death certificates, therefore rates for cause-of-death must be adjusted to properly represent race. The percentage of AI/AN who are under the age of five is much higher at 9.3% compared to the 6.8% of all races in the U.S. combined, and the percentage of AI/AN over the age of 54 is much lower at 12.3% compared to the 21.9% of all races combined in the U.S. This means that rates for cause-of-death must be adjusted for proper representation of comparable ages (Indian Health Service, 2008).

When compared to all races combined in the U.S. AI/AN of all IHS areas were 3.1 times as likely to die from diabetes mellitus, while AI/AN from the IHS Oklahoma area were 2.5 times as likely to die from diabetes mellitus from 2007 through 2009 (Indian Health Service, 2015). The risk of DM for AI/AN seems to be growing, though not always in a steady upward trend. The percentage of AI/AN who died from DM increased 79.7% from 1973 to 1998, then decreased 39% from 1998 to 2008 (Indian Health Service, 2015b).

Diabetes mellitus is not the only health risk for AI/AN. While AI/AN are not more likely to die from heart diseases than all races of the U.S. combined, they are 3.1 times more likely of dying from heart disease than they are from diabetes mellitus alone (Indian Health Service, 2008). While all races combined in the U.S. were 1.1 times as likely to die from heart disease in 1999 to 2001 than AI/AN of all IHS areas, the Oklahoma area of IHS was 1.1 times as likely to die from heart disease than all races of the U.S. combined, as well as 1.2 times as likely as AI/AN from all IHS areas combined (Indian Health Service, 2008).

Socioeconomic and Education Disparities of American Indians/Alaska Natives

When discussing health disparities, income and education disparities must not be overlooked, for studies have shown that they correlate. Health disparities are linked to wealth disparities (Attanasio & Hoynes, 2000) and income and education levels are independent factors influencing health (Winkleby, Jatulis, Frank, & Fortmann, 1992). The Indian Health Services have published two reports, using data from the 2000 U.S. Census, on AI/AN health, which show health, education and income disparities. Even though *Regional Differences in Indian Health 2002-2003 Edition, Part 2* and *Trends in Indian Health 2014 Edition: Population Statistics* both use the 2000 U.S. Census, the reported education and income levels are sometimes different, though they both come to the same conclusion. The report from 2002 to 2003 is used in these instances, as it provides data not only for the AI/AN population, but also for all races combined in the U.S.

According to information taken from the 2000 U.S. census, 80.4% of all races in the U.S. combined were at least high school graduates, compared to only 70.9% of AI/AN in all the IHS areas. The Oklahoma area of IHS graduation rates was slightly closer to all races in the U.S. than to all IHS areas, at 76.6% (Indian Health Service, 2015b). Even greater than high school graduation disparities are Bachelor's Degree or higher disparities for individuals aged 25 and older. All races combined of the U.S. have a 24.4% rate for Bachelor's Degree or higher compared to only 9.6% of AI/AN alone in all IHS areas (Indian Health Service, 2008). The Oklahoma area of IHS, which has the highest percentage of Bachelor's Degrees of all the IHS areas, only has 13.3% of individuals with Bachelor's Degrees or higher (Indian Health Service, 2008).

American Indians/Alaska Natives are also more likely to be unemployed compared to all races combined in the U.S. Information from the 2000 U.S. census shows that 16.3% of AI/AN males age 16 and older, and 13% of AI/AN females age 16 and older, were unemployed compared to only 4% of males of all races combined and 3.3% of females of all races combined (Indian Health Service, 2008). American Indians/Alaska Natives in the Oklahoma area of IHS are less likely than AI/AN of all IHS areas, but more likely than all races combined in the U.S., to be unemployed, with 8.8% males age 16 and older and 8.1% of females age 16 and older

unemployed (Indian Health Service, 2008). Within Kansas, AI/AN are twice as likely to be unemployed than the general population (Kimminau & Satzler, 2005).

Education often correlates with income (Office of Occupational Statistics and Employment Projections, 2015), and this can be seen as AI/AN in all IHS areas make a yearly median household income of $32,461 compared to all races combined in the U.S who make a yearly median household income of $50,046 (Indian Health Service, 2008). American Indians/Alaska Natives in the Oklahoma area of IHS had a slightly lower yearly median household income than AI/AN in all IHS areas, at $29,117 (Indian Health Service, 2008).

Poverty levels are determined by the number of individuals living in a household and the household's yearly income level (United States Census Bureau, 2014; United States Department of Health and Human Services, 2013). Since AI/AN have a lower yearly median household income, it would make sense that a higher percentage of AI/AN fall below the poverty level. Data from the 2000 U.S. census indicate that 29.2% of AI/AN in all IHS areas lived below the poverty level, compared to only 12.4% of all races combined in the U.S. (Indian Health Service, 2008). While the percentage of AI/AN living in the Oklahoma area of IHS who lived below the poverty level was lower than that of all AI/AN, at 22%, it was still much higher than that of all races combined.

Prairie Band Potawatomi Nation History

The Prairie Band Potawatomi Nation, who, according to tribal tradition, are believed to have once been a single tribe made of the Potawatomi, Ojibwas and Odawas, resided in Michigan's lower peninsula when Europeans first came to the Americas. The tribe lived off the land of the plentiful Great Lakes area; hunting, fishing, and trading with other tribes for needs that they themselves could not obtain (Hodge, 2014; Prairie Band Potawatomi Nation, 2015c).

As the original 13 colonies expanded, and European settlers moved further west, the PBPN had to give up the concept of sharing land and resources with all who live, to the idea of landownership. The next few centuries brought war, and the PBPN suffered several loses as they allied with the French and British. In 1812 they tried to join forces with the Shawnee, but the tribes were not able to put aside their differences, which allowed the U.S. to prevail once again (Prairie Band Potawatomi Nation, 2015a).

Through a succession of treaties, the land where the PBPN resided was taken from them, starting in Illinois and Indiana, then eventually in Michigan (Prairie Band Potawatomi Nation,

2015c). The tribe was moved from their original homeland to Platte County, Missouri in the mid 1830's, then to the Council Bluffs, Iowa area in the 1840's (Prairie Band Potawatomi Nation, 2015a). Eventually the PBPN were forced to move one last time, which migration is now referred to as the Trail of Death, to what is present-day Kansas (Pierpoint, 2000; Willard & Willard, 2014).

In Missouri and Iowa the tribe had control of up to 7,812.5 square miles, and were reduced to 890 square miles in Kansas. Through time, not understanding the custom and culture of the settlers, the tribe sold some of their land. The combination of selling their land to settlers, the U.S. government taking their land to give to white settlers, and through the Dawes Act, the tribe lost most of their land in Kansas. The reservation now consists of 121 square miles (Prairie Band Potawatomi Nation, 2015c).

The tribe has faced challenges as it has had to adapt to western culture and was forced to relocate. Some tribal members desired to integrate into western culture, including division of land into allotments, while other tribal members held true to their beliefs and heritage. This lead to the dividing of the tribe on two occasions, once in the 1830's, and again in the 1860's (Prairie Band Potawatomi Nation, 2015a). In addition to differences in opinion among tribal members, traditional life was challenged as the PBPN had traditionally migrated each season but were forced by the U.S. government and settlers to establish residency in one location (Bollwerk, 2006).

The PBPN tribe currently resides in Mayetta, Kansas and has nearly 5,000 enrolled members (Prairie Band Potawatomi Nation, 2015b). In 2006 the PBPN was able to buy a 128 acre farm in Illinois, a part of which includes land that had been given to the PBPN in the 1829 Treaty of Prairie du Chien, but the PBPN had been forced to leave just a few years later. The PBPN had attempted to regain the land by petitioning various government officials for assistance, but to no prevail. Using money earned from their casino, they were able to purchase the land in 2006 without any outside assistance (Lewin, 2006).

Gardening and Health

Gardeners have been linked with healthy lifestyles that affect their mental and physical health. Zick, Smith, Kowaleski-Jones, Uno, & Merrill (2013) found that community gardeners in Salt Lake City are significantly more likely to have lower Body Mass Indexes than their neighbors and siblings. Female gardeners were found to have a -1.88 BMI compared to their

sisters, which means that a 5 foot, 5 inch tall female gardener would weigh about 11 pounds less than her sister of comparable height. Female gardeners are also 45% less likely to be overweight or obese when compared with their sister. Similar to comparisons with their sisters, when compared to female neighbors, female gardeners had a -1.84 BMI, or were likely to weigh 11 pounds less if they are both 5 feet, 5 inches. Female gardeners were also 34% less likely to be overweight or obese compared to her neighbor.

Men who gardened also showed lower BMI's and a reduced risk for overweight and obesity when compared to their brothers and neighbors. Male gardeners had a -1.33 BMI compared to their brothers, or would weigh about 9 pounds less if they were both 5 feet, 10 inches tall. When compared to male neighbors, male gardeners had a -2.36 BMI, meaning that if they were both 5 feet, 10 inches tall then a male gardener would weigh about 16 pounds less than his neighbor. Male gardeners were also 62% less likely to be overweight or obese compared to their neighbors (Zick, Smith, Kowaleski-Jones, Uno, & Merrill, 2013).

What causes gardeners to have more positive health indicators than their neighbors, siblings, and non-gardeners? Studies have shown that gardeners are more likely to eat FV than non-gardeners (Barnidge et al., 2013), and gardening tasks have been shown as a way to obtain PA (Park, Shoemaker, & Haub, 2008b). Fruit and vegetable consumption and PA are important behaviors to thwart overweight, obesity, and the several diseases related to them.

Gardening, Fruit and Vegetable Consumption

Studies have been done on garden based nutrition education programs affecting children's preferences for FV (Gatto, Martinez, Spruijt-Metz, & Davis, 2015; Ratcliffe, Merrigan, Rogers, & Goldberg, 2011; Triador, Farmer, Maximova, Willows, & Kootenay, 2015) but have not examined the general likelihood that youth gardeners are likely to eat more FV compared to non-gardeners independent of such programs.

It seems logical that FV consumption would increase when individuals participate in a FV garden, since the individuals are able to select the varieties of produce which are grown, spend time and money to cultivate the produce, and have the fresh produce readily available once it is harvested. Several studies have been developed to show that there is indeed a link between gardening and FV consumption.

One of the most studied populations concerning gardening and vegetable consumption is that of school children who participate in school garden programs. Middle school children who

participated in a San Francisco school garden program self-reported that they were more likely to try new vegetable varieties and had a significantly increased preference for vegetables. Students who did not participate in the school garden program did not increase their preference for vegetables, in fact their preference for vegetables decreased (Ratcliffe et al., 2011)

If school children increase their preference for, and likelihood to eat vegetables by growing a garden, can the same be said about adults? Unfortunately there is not as much information about adults in this area of inquiry, but what is available has shown similar results, that adults who participate in community gardens reported consuming more FV than adults who do not participate in community gardens (Alaimo, Packnett, Miles, & Kruger, 2008; Barnidge et al., 2013).

Gardening and Physical Activity

Gardening is a popular past time of many Americans. In 2012 the total sales for all do-it-yourself lawn and garden activities in the U.S. was $29.451 billion, with 85 million households participating in such activities (National Gardening Association, 2014b). Food gardening, which consists of growing vegetables, berries, fruit and herbs, is particularly popular in recent years, and reached a new high in 2012 with participation up 13% and total sales up 35%.

Recent studies have investigated physical intensity levels of various gardening activities (Park, Shoemaker, & Haub, 2008a) and the potential of gardening as a means for receiving the minimum recommended amount of PA (150 minutes MPA weekly, or 75 minutes VPA weekly, or an equivalent of weekly MVPA) to maintain a healthy weight (Park et al., 2008b), as suggested by the Office of Disease Prevention and Health Promotion (2015). Since gardening is a popular past time in the U.S., and several gardening activities are ranked as MVPA, participating in gardening has great potential in contributing to an individual's ability to meet the weekly recommended amount of PA, and thus the health benefits associated with regular PA.

Gardening tasks that require the use of both the upper and lower body were found to be a moderate intensity level of PA. Such activities include digging, turning compost, raking, transplanting plants, mulching with MET values of 2.5 ± 0.5 to 3.6 ± 0.8 (Park et al., 2008a), and fertilizing, weeding, and tying plants to stakes with MET values of 3 to 4 for adults age 65+ (Park, Lee, & Son, 2011), and planting transplants, mixing growing medium, watering, harvesting, sowing, hoeing, mulching, weeding and raking with MET values of 3.5 ± 0.5 to 5.0 ± 0.8 for adults in their twenties (Park, Lee, Lee, & Son, 2014). Other gardening activities that

require moderate activity levels, such as laying sod, planting trees, sacking grass and leaves, or gathering garden tools while walking have not directly been tested to determine that they actually do require MPA levels (Ainsworth et al., 2011). These activities are assumed to require moderate activity levels because they use body positions similar to other physical activities that have been tested and determined as requiring MPA levels (Gunn et al., 2005).

During one gardening observation, active gardeners of 63 to 86 years of age participated in MPA (3.8 ± 1.4 METs) on an average of 60 ± 25 minutes (Park et al., 2008b). More than 50% of these same gardeners reported spending an average of 15 hours gardening each week in June and July, and an average of 33 hours gardening each week in May. A minimum average of 39 minutes was reported by these gardeners for doing moderate activities each day in June and July, including harvesting for 18 minutes, carrying tools for 2 minutes and weeding for 19 minutes. In May a minimum average of 192 minutes each day was reported by these gardeners for doing moderate activities, including trimming for 23 minutes, planting seedlings and shrubs for 15 minutes, harvesting for 14 minutes, general gardening for 85 minutes, and weeding and cultivation for 55 minutes. The gardeners that performed these gardening activities exemplify that the CDC's minimum recommended amount of weekly PA can be met through moderate intensity gardening activities.

Summary

Increased FV intake and PA levels have inverse relationships with overweight/obesity, CVD and DM. While FV intake and PA levels are increasing and higher percentages of people are meeting the USDA's recommended levels, the percentage of people meeting these recommendations is still small. American Indians/Alaska Natives, including those residing in Kansas, are at particular risk for overweight/obesity, CVD and DM. The PBPN's forced removal from their native lands near the Great Lakes to their current location in eastern Kansas has impacted their diet and way of life. Gardening can benefit health, as it increases preferences for a variety of vegetables and serves as a means of PA.

Chapter 3 - Methods

Survey Methodology

A survey design was used, with the population being PBPN tribal members. The sample for this project was drawn from attendees at the Fall 2012 and Fall 2013 PBPN Harvest Feasts and the Spring 2014 PBPN Gardening Workshop, thus were a convenience sample. Since the sample was not randomly selected, results from this study cannot be compared to the population of the entire PBPN tribe. During the Fall 2012 and Fall 2013 PBPN Harvest Feasts, and the Spring 2014 PBPN Gardening Workshop, surveys were distributed to PBPN members. Written questionnaires were used to survey the PBPN tribal members to determine if there is a link between gardening and health behaviors and indicators.

Fall 2012

The research team developed the "Vegetable Consumption and Physical Health Survey", which was distributed to members of the Prairie Band Potawatomi Nation as they entered the Bingo Hall for their Harvest Feast in November 2012 (Galgamuwa, 2013). The survey had two purposes: 1) learn about traditional food use among individual tribal members, and 2) learn about health behaviors and indicators among tribal members.

Incentives were given to participants for returning their survey, including t-shirts, re-usable grocery bags, and raffle tickets for a variety of gardening supplies. One hundred surveys were distributed, 95 were returned. Surveys lacking a signature on the consent form or filled out by individuals under the age of 18 were not used. If it could not be determined whether the individual who filled out the survey was at least 18 then the survey was not used. This brought the number of usable surveys for this study to 88 for a response rate of 88%.

Questions covered information pertaining to 1) gardening, 2) fruits and vegetables, 3) foods you eat, 4) traditional foods, 5) physical activity, 6) health and 7) household. There were eighteen multiple-choice questions, thirteen open-ended questions, and one Likert-scale question. For the purpose of this study, sections on "fruits and vegetables" and "traditional foods" were not utilized, thus will not be further described.

The "gardening" section contained three multiple-choice questions and two open-ended questions. These questions gathered information on whether the individual participated in the

spring gardening workshop, how many years the individual had grown vegetables, which vegetables the individual grew the past year, major challenges faced when growing vegetables the past season, and, if the individual has never grown vegetables, the reason why they did not grow vegetables. Information obtained in this section enabled identification of which individuals are gardeners, challenges faced by gardeners, and reasons why individuals do not garden.

The section on "foods you eat" contained one Likert-scale question and two multiple-choice questions, gathering information on the average frequency that certain foods are eaten and how many servings of fruit and how many servings of vegetables are eaten on a typical day. Information gathered in this section was used to determine which individuals eat the USDA (Guthrie, 2014) recommended amount of fruits (two servings) and vegetables (three servings).

The section on "physical activity" contained five open-ended questions and gathered information about the frequency and intensity of PA. Questions included how many days a week moderate physical activities are performed for at least ten minutes, the number of minutes spent on moderate physical activities per day on days these activities are performed, how many days a week vigorous physical activities are performed for at least ten minutes, the number of minutes spent on vigorous physical activities per day on days these activities are performed, and, in a typical week, how many days the individual participates in community-sponsored physical activities. Information obtained in this section was used to determine which individuals met the weekly recommended amount of PA which is 150 minutes moderate activity per week, 75 minutes vigorous activity per week, or a combination of moderate and vigorous activity.

The section on "health" contained two multiple-choice questions and two open-ended questions. This section gathered information about how each individual perceives their health, how they perceive their health compared to the rest of the community, how many days they were limited in usual activities in the past 30 days as a result of poor physical health, and the major impairment or health problem that limits daily activities if daily activities are limited because of impairments or health problems. Information gathered in this section was used to determine how individuals perceive their health, as well as how they perceive their health compared to the rest of the community, and the major reasons for health problems interfering with daily activities.

The "household" section contained five multiple-choice questions and four open-ended questions, gathering information on the individual's gender, age, highest education level obtained, employment status, how many adults and children live in the household, whether the

current residence is rented or owned, household yearly income before taxes, and any additional comments regarding gardening, eating FV, and health. This information was used to determine demographic profile of individuals and the overall survey participants.

Fall 2013

In 2013 the survey was altered by the 2012 research team and then distributed as the "Vegetable Consumption and Physical Health Survey – PBPN Harvest Feast 2013" in November as tribal members entered the Bingo Hall to participate in the PBPN's Harvest Feast. Questions regarding traditional foods were removed from the survey, and health behaviors and indicators became the focus.

As incentive for filling out and returning surveys, tribal members were allowed to choose from a variety of items, including t-shirts, notecards, reusable grocery bags, and gardening fact sheets. They were also entered into a raffle drawing for Haskell University memorabilia and various gardening supplies at the end of the Harvest Feast. The survey was distributed to tribal members, 103 of which returned the survey. Surveys were not used if they were not accompanied with a signed consent form, were filled out by individuals under the age of 18, or were filled out by individuals who were not members of the PBPN. Also, if the age of the member filling out the survey could not be determined, then the survey was not used. Any survey that had been filled out by an individual who had also taken the Fall 2012 survey was not used, to eliminate skewed data through duplication of participants. This brought the total number of usable surveys to 71.

Questions covered information pertaining to 1) gardening, 2) foods you eat, 3) physical activity, 4) health and 5) household. There were fifteen multiple-choice questions and ten open-ended questions.

The section on "gardening" contained three multiple-choice questions, and gathered information on whether the individual participated in the spring gardening workshop, whether they had a vegetable garden during the past summer, and, if they did not have a vegetable garden during the summer, what was the major reason they did not have a vegetable garden. Information gathered in this section enabled identification of which individuals are gardeners and provided information about why individuals do not garden.

The section on "foods you eat" contained four multiple-choice questions. It asked participants how many servings of fruit and how many servings of vegetables they eat on a

typical day, as well as what type of fruits and what types of vegetables they most often eat. This section identified who ate daily recommended amount of fruits (2 servings) and daily recommended amount of vegetables (3 servings), as recommended by the USDA (Guthrie, 2014).

The "physical activity" section contained four open-ended questions that asked how many days a week moderate physical activities are performed for at least ten minutes, the number of minutes spent on moderate physical activities per day on days when these activities are performed, how many days a week vigorous physical activities are performed for at least ten minutes, and the number of minutes spent on vigorous physical activities per day on days when these activities are performed. This information was used to determine if individuals met the weekly recommended amount of PA which is 150 minutes moderate activity per week, 75 minutes vigorous activity per week, or a combination of moderate and vigorous activity as recommended by the Office of Disease Prevention and Health Promotion (2015).

The "health" section in the Fall 2013 survey was identical to the "health" section in the Fall 2012 survey and obtained the same information.

The section on "household" contained six multiple-choice questions and four open-ended questions. This section gathered information on individual respondents gender, age, highest level of education obtained, employment status, how many adults and children live in the household, if they live on the reservation, if they have land suitable for gardening, household yearly income before taxes, and if there were any additional comments regarding gardening, eating FV, and health. This information was used to determine the demographics of each individual, as well as the demographics of everyone who participated by taking the survey.

Spring 2014

The research team altered the survey a second time in April 2014, changing the focus to gardening activity and efficacy. The new survey, "Gardening and Health Survey", was then distributed to tribal members as they entered the Bingo Hall for the Spring Gardening Workshop. Questions pertained to 1) gardening, 2) physical activity, 3) health and 4) household. There were twelve multiple-choice questions, ten open-ended questions, and three Likert-scale questions.

Tribal members could choose from a variety of vegetable seeds as incentive for filling out and returning the surveys. They were also entered into a drawing for tomato plants, pepper plants, and blackberry plants. Surveys that were returned without a signed consent form or were

filled out by individuals under the age of 18 were not used. If the age of the member filling out the survey could not be determined, then the survey was not used. Also, surveys that had been filled out by individuals who had also filled out a survey in Fall 2012, Fall 2013, or both Fall 2012 and Fall 2013, were not used in order to eliminate skewed data from duplication of participants. The number of usable surveys was 44

The "gardening" section contained five multiple-choice questions, one open-ended question, and three Likert-scale questions. These questions gathered information about whether the individual gardened as a child, if their family gardened while they were growing up, if they had a vegetable garden last year, if they plan to have a vegetable garden this year, the number of years they have grown vegetables, why they do or do not eat the vegetables they grow, how many times a week they spend doing various gardening activities and how many minutes each time, how certain they are of their abilities to do various gardening activities, and self-efficacy scores for gardening, PA, and FV consumption. For purposes of this study, the self-efficacy questions were not used, thus will not be further discussed. Information gathered in this section was used to identify which individuals were gardeners and if they received the recommended amount of PA through gardening activities as recommended by the Office of Disease Prevention and Health Promotion (2015) which is 150 minutes for moderate physical activities, 75 minutes for vigorous physical activities, or a combination of moderate and vigorous physical activities.

The "physical activity" section in the Spring 2014 survey was identical to the "physical activity" section in the Fall 2013 survey and was used to obtain the same information.

The "health" section in the Spring 2014 survey was identical to the "health" section in the Fall 2012 and Fall 2013 surveys, and obtained the same information.

The "household" section contained five multiple-choice questions and three open-ended questions, obtaining information about the individual's age, gender, highest level of education obtained, employment status, whether or not they live on the reservation, how many adults and children live in the home, and household yearly income before taxes. This information was used to determine demographic information for each individual and the whole of those who participated in the survey.

Statistical Methods

Rationale for Coding Questions

Since the study was conducted during the course of three years with the same population, the PBPN, some participants had taken two or all three of the surveys. To remove risk of skewed data from having multiple surveys from one individual, the first survey that each individual filled out was used, and later surveys by the same individual were not used in analysis.

The change in purpose of each survey, as well as better understanding of which questions to ask and how to ask them, resulted in a choice of different answers to the same questions from year to year. For example, when asked the level of education completed, one answer that participants of the Fall 2012 survey could choose was "bachelor's degree or higher" and in a similar manner participants of the Fall 2013 and Spring 2014 surveys could choose "college 4 years or more (college graduate)" for their answer. In such instances, similar answers were combined, and in this case the resulting answer, for purposes of data analysis, was listed as "bachelor's degree, college graduate, 4+ years of college".

Additionally, some answers given were sparse, and therefore were combined with other answers to reduce sparseness in the statistical analysis. Employment levels are such an example, where all participants who are employed, whether "self-employed" or "employed for wages", were simply listed as "employed".

While some questions asked for one response, some participants gave two or more responses, and to exclude these responses would eliminate data and restrict knowledge gained. When several participants included two or more responses, these responses are listed as "2+" responses. Such is the case when participants were asked the type of fruit most often eaten, and many participants listed two or more when choosing from "canned," "fresh," "dried," or "frozen."

Coding Questions

For classifying gardeners and non-gardeners, two questions were used. From the Fall 2012 survey the question "Did you have a garden last year?" was used, while from the Fall 2013 and Spring 2014 surveys the question "How many years have you grown vegetables?" was used. The change to "How many years have you grown vegetables?" was made after the Fall 2012

survey to differentiate gardeners from non-gardeners because it included individuals who may have gardened for several years but were not able to have a garden the preceding season. We also wanted to clearly identify those that grew vegetables, recognizing that someone may say yes to "did you garden last year" that grew only flowers.

When grouping answers in response to "What is the major reason you do not grow vegetables?" many participants indicated more than one reason, while other reasons were only indicated once or twice. These answers were coded as indicated in Table 3-1.

Table 3-1 How responses for why participants do not grow vegetables were categorized.

No Knowledge	No Land/ Space	No Interest	No Time	Health	2+ Reasons	Other
	• No land/ space • Can't have gardens in the 4th cluster		• No time • Late frost		• No land/ space • No time • No knowledge • No interest • Poor health	• No tiller • Age • Preparing the soil • Animals eat it • Just moved • Spouse passed away

Responses to the question "How is your health in general?" were coded as "5" for "excellent," "4.4" for "very good," "3.4" for "good," "2" for "fair," and "1" for "poor," for standardization (Ware, Kosinski, Turner-Bowker, & Gandek, 2002).

"What is the major impairment or health problem that limits your activities?" was an open-ended question that resulted in several responses. While a few responses were given multiple times, most responses were given once. To reduce sparsity, similar responses were grouped together in the following categories: "pain," "joints," "organs," "back and hip." Additionally, when two or more responses were given, these were categorized as "2+ reasons," and if a response did not fit in with other response groups then it was categorized as "other." Some participants did not indicate the health problem or impairment that limits them, even though they indicated that they are limited in activities due to health problems or impairments, and they were categorized as "no reason given." Table 3-2 lists responses according to category.

Table 3-2 How responses for limitations in activities due to health problems or impairments were categorized.

Pain	Joints	Organs	Back and Hip	2+ Reasons	Other
• Pain • Fibromyalgia	• Arthritis • Bad Knees • Bad Ankle • Walking Problem • Bending and Kneeling	• Asthma • Lung Disorder • COPD • Kidney • Heart Problem	• Back Pain • Hip Problem	• Fibromyalgia • Cancer • Diabetes • Heavy Smoker • Blind • No Kidneys • Weight • Age • Shingles • Arthritis • Asthma	• Medication • Broken Bone • Cancer • Depression/ Anxiety • Incomplete Quadriplegic • Tiredness • Weight • Hearing Loss – Imbalance • Age

Some responses to the question "How would you compare your health to the health of the rest of the community in general?" were coded to three categories. "My health is excellent compared to the rest of the community" was coded to be the same as "my health is better than the rest of the community". "My health is significantly worse than the rest of the community" was coded to be the same as "my health is worse than the rest of the community."

Age groups were formed from Erik Erikson's theory of psychosocial stages, with "young adult" including individuals 18 to 39 years of age, "middle adulthood" including individuals 40 to 64 years of age, and "older adult" including individuals 65 years of age or older (Erikson, 1985; McLeod, 2013). While individuals who are 18 years of age are usually categorized as "adolescent" in Erikson's psychosocial stages, since they are the only "adolescents" whose surveys were used they were categorized as "young adults" to decrease sparsity.

The question "what is the highest grade of school or year of college you have completed?" offered different response options for each survey. To standardize responses across surveys they were categorized as three responses: "no schooling through high school," "some college or technical school (1-3 years)," and "bachelor's degree, college graduate, 4+ years of college." Responses are listed in Table 3-3, with all response options that participants had to choose from across the three surveys.

Table 3-3 Education choices from different surveys were categorized for consistency as "No Schooling through High School," "Some College or Technical School (1-3 years)," "Bachelor's Degree, College Graduate, 4+ Years of College."

No Schooling through High School	Some College or Technical School (1-3 years)	Bachelor's Degree, College Graduate, 4+ Years of College
• Elementary (K – 6th Grade) • Middle School (6th – 8th Grade) • Never Attended School or Only Attended Kindergarten • Grades 1 through 8 (Elementary School) • Grades 9 through11 (Some High School) • Grade 12 or GED (High School Graduate)	• Associate's Degree or Two Years of College • College 1 Year to 3 Years (Some College or Technical School or Associate's Degree)	• Bachelor's Degree or Higher • College 4 Years or More (College Graduate)

When asked current employment status, responses also varied across the survey years and were combined to unify responses and reduce sparsity. Responses that were categorized as "employed" included "currently working," "employed for wages," and "self-employed," while responses categorized as "retired" included "retired," "retired and self-employed," "retired and employed for wages," and "retired and unable to work." If participants marked "homemaker" or "student" then these responses were grouped as "homemaker or student" because they are not employed or retired, nor are they unemployed. "Other" responses include "temporarily laid off," "unemployed," "permanently disabled," "out of work for 1 year or more," "out of work for less than 1 year," "unable to work," "employed for wages and student," and "other."

Responses from the question "what was the major challenge you faced when growing vegetables this season?" were placed into 4 groups: 1) "Weather," included "water," "drought," and "heat,"; 2) "pests, diseases, weeds,"; 3) "other," which included "lack of knowledge," "lack of experience," and "needed help," and 4) "2+ challenges" which included at least two of "watering," "drought," "pests," "diseases," "heat/high temperature," "animals," "lack of experience," "lack of knowledge," "needed help," and "old age."

When asked "On days you eat fresh fruit, what type do you most often eat?," participants were supposed to mark only one type of fruit. However, because many participants marked two or more types of fruit, these responses were categorized as "2+ selected" and included "fresh fruit," "frozen fruit," "canned fruit in natural juice," "canned fruit in syrup," and "dried fruit."

Likewise, when asked "On days you eat vegetables, what type do you most often eat?," participants were supposed to mark only one type of vegetable but many marked two or more types of vegetables. When multiple types of vegetables were marked these were categorized as "2+ selected" and included "fresh," "frozen," and "canned."

When participants were asked "Why do you eat the fruits and/or vegetables that you grow?," several responses were given. These responses were grouped by similarity and are shown in Table 3-4. Responses that did not have similarities to other responses were categorized in "other," and when two or more responses were listed these were categorized as "2+ reasons given."

Table 3-4 Responses pertaining to why participants eat the fresh fruits and vegetables they grow were categorized as "No Reason Given," "Taste," "Health," "Other," and 2+ Reasons Given."

No Reason Given	Taste	Health	Other	2+ Reasons Given
	• Taste Better • Like them Better than Store Bought • They are Good to Eat • Love Eating Fresh-Homegrown Vegetables	• No Chemicals • That's the Purpose of the Garden • They are fresh • For Health and Wellness	• Want to Know Where my Food Came from • Heirloom for Seed Saving/No GMOs • Low Cost • No one Else was Growing Corn in Oklahoma • Feeling of Accomplishment	• Fresh • Know Who Grew Them • Health • Low Cost • Taste Better • No Chemicals • They Take Time and Effort • No GMOs • More Convenient/Easy Access • Can Lots of Them • My Grandpa had a Garden

Four questions were used to determine if participants met the 2008 PA Guidelines (Centers for Disease Control and Prevention, 2009). The number of days each participant did moderate activity and how many minutes they spent doing these activities on these days was used to determine if participants met the PA recommendations through MPA. The number of days each participant did vigorous activity and how many minutes they spent doing these activities on these days was used to determine if participants meet PA recommendations through VPA. A combination of MVPA combined was also used to determine if participants meet recommended levels of PA. If participants indicated that they participated in more than 480 minutes (8 hours) of leisure-time PA, then this data was coded as missing data, since such a high amount of leisure-time PA is not likely to be realistic. When participants indicated a range of days per week, or minutes per day, that they participate in PA, then the smallest number in the given range was used for analysis.

Fruit and vegetable intake was compared to 2010 Dietary Guidelines for Americans (Center for Nutrition Policy and Promotion, 2015a; Center for Nutrition Policy and Promotion, 2015b) to determine if participants ate the recommended amount of FV. Two or more servings of fruit were determined as meeting the fruit recommendation, three or more servings of vegetables were determined as meeting the vegetable recommendation, and a combination of two or more servings of fruit and three or more servings of vegetables was determined as meeting the FV recommendations. While these are not the current recommendation for all populations, they are still conservative recommendations for improved health, with one such indication increased FV benefits found by Liu et al. (2000), that increased FV consumption decreased risk for CVD.

The number of people living in a household and the yearly household income before taxes were compared to Poverty Thresholds (United States Department of Health and Human Services, 2013), which shows the highest number of household residents that can live below a set household yearly income level and still not live in poverty.

In order to determine if recommended PA levels were met through gardening, an adapted survey by Stewart et al. (2001) was used to determine how often various gardening activities were performed each week, and how much time was spent in an activity each time it was performed. The amount of weekly time was calculated for each gardening activity, then depending on the intensity of each gardening activity, whether moderate or vigorous, it was determined if PA was met through gardening activities.

Data Analysis

The survey coding was entered into a Microsoft® Excel document. This data was then imported from Excel into SAS software 9.4 (SAS Institute Inc., 2015). SAS software was used to create frequency, contingency and pivot tables for data analysis, and perform the sequential analysis.

A survey design was used to investigate the fixed effects of gardening, gender, and age group were further analyzed using SAS software. Responses from questions fell into the following forms: binomial, multinomial, and continuous. Binomial and multinomial questions of interest included meeting guidelines for fruit consumption, vegetable consumption, and PA; general health; health compared to the rest of the community; education level; and poverty status. Preliminary investigation deemed that it was acceptable to pool data across survey years. Pooling survey data helped to alleviate potential problems of sparseness, missing fixed effect combinations per year.

Binomial responses for questions of interest were analyzed using binary logit models through Proc Logistic. Multinomial responses for questions of interest were analyzed through Proc Logistic using cumulative logit models for questions about perceived health, and generalized logit models for the question about highest education level achieved. Multinomial output used a set-to-zero constraint by specifying baseline reference levels for each main effect in the class option. Continuous responses for questions of interest were analyzed using Proc GLM. Preliminary models included only the fixed effects, then forward selection was used to determine whether to include any two-way interactions to the base model. Preplanned contrasts were coded to investigate specific questions of interest. Mosaic and interaction effect plots were created inside SAS software to visualize the predicted probabilities. Due to missing data for non-gardening males from one year of survey data (Spring 2014), the fixed effects for PA recommendations met through gardening activities had to be flattened into one combined treatment variable.

Significance of results were tested through several means. Type III Tests of Fixed Effects were used to test the significance of individual fixed effects: gardening, gender, and age group. Pairwise comparisons were used to determine which fixed effects were most significant when compared to other fixed effects. For all tests, a 0.05 p-value was used.

Chapter 4 - Results

Demographics

A total of 203 surveys were usable, including 88 from Fall 2012, 71 from Fall 2013 and 44 from Spring 2014, accounting for 27.69% of PBPN tribal members who live in the area (United States Department of the Interior, 2014). As shown in Table 4-1, there were slightly more gardeners than non-gardeners, more female participants than male, and while there were more MA than YA and OA, participants were fairly equally distributed among age groups.

Table 4-1 The number of participants categorized as gardener or non-gardener; male or female; YA, MA or OA[z]; having no school through high school, some college or technical school, college graduate or higher; and above or below poverty level.

Gardener (n = 198)	**Participants**
Gardener (n = 117)	59.09%
Non Gardener (n = 81)	40.91%
Gender (n = 203)	
Male (n = 64)	31.53%
Female (n = 139)	68.47%
Age Group (n = 200)	
Young Adult (n = 73)	36.50%
Mature Adult (n = 85)	42.50%
Older Adult (n = 42)	21.00%
Education Level (n = 199)	
No School through High School Graduate (n = 85)	42.71%
Some College or Technical School (n = 70)	35.18%
College Graduate or Higher, 4+ Years of College (n = 44)	22.11%
Poverty Status (n = 151)	
Above Poverty Level (n = 103)	68.21%
Below Poverty Level (n = 48)	31.79%

[z]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

Significant differences were found for education levels among age groups, particularly between young adults (YA) and mature adults (MA), as well as MA and older adults

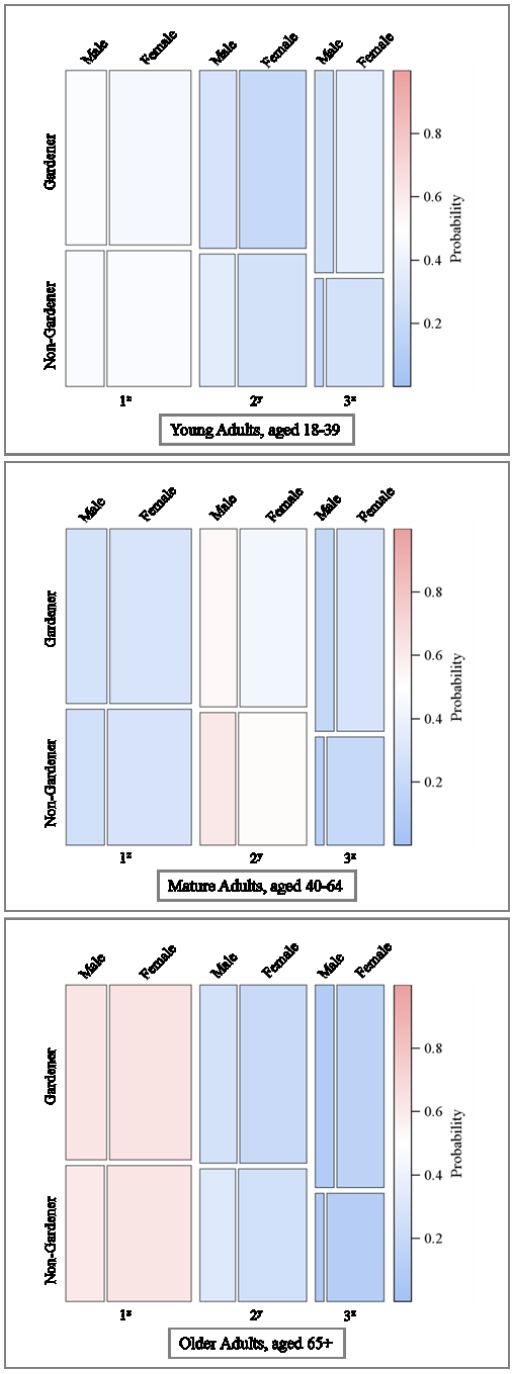
(OA) (Table 4-2). This difference can be seen in Figure 4-1, showing probability of YA receiving some college or technical school is low when compared to the MA, who have a higher probability of receiving some college or technical school. And the difference between MA and OA is explained by the probability of OA only receiving no school through high school is high when compared to MA, who have a lower probability of only receiving no school through high school. There were no significant differences among gardeners and non-gardeners or males and females in education levels (Table 4-2). Additionally, no significant differences for poverty status were found among gardening, gender, or age groups.

Table 4-2 P-values for two-way interactions between education and poverty levels, and the main factors of gardeners and non-gardeners, males and females, and YA, MA, and OA[z].

	Gardener	Gender	Age Group	YA & MA	YA & OA	MA & OA
Education	0.4667	0.3172	**0.0012***	**0.0073***	0.1322	**0.0019***
Poverty	0.1094	0.3488	0.3734	0.2179	0.8293	0.2621

[z]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

*Significance of p=0.05



[z]1 = no schooling through high school

[y]2 = some college or technical school (1-3 years)

[x]3 = bachelor's degree, college graduate, 4+ years of college

Figure 4-1 Probability of highest grade of school or year of college completed by age group, categorized as gardeners or non-gardeners, and males or females.

Gardening

About half the participants of the Fall 2012 and Fall 2013 surveys were gardeners, compared to the majority of Spring 2014 participants who were gardeners (Figure 4-2). Nearly a third of participants had never grown vegetables (Figure 4-3). More participants fit into this category than any other, though 36 (90.0%), the majority of them, participated in the Fall 2012 survey compared to only 4 (10.0%) who participated in the Spring 2014 survey. Among the participants who indicated that they had never grown vegetables, no land/space was the most indicated reason, followed by no time, 2+ reasons, and no knowledge (Figure 4-4).

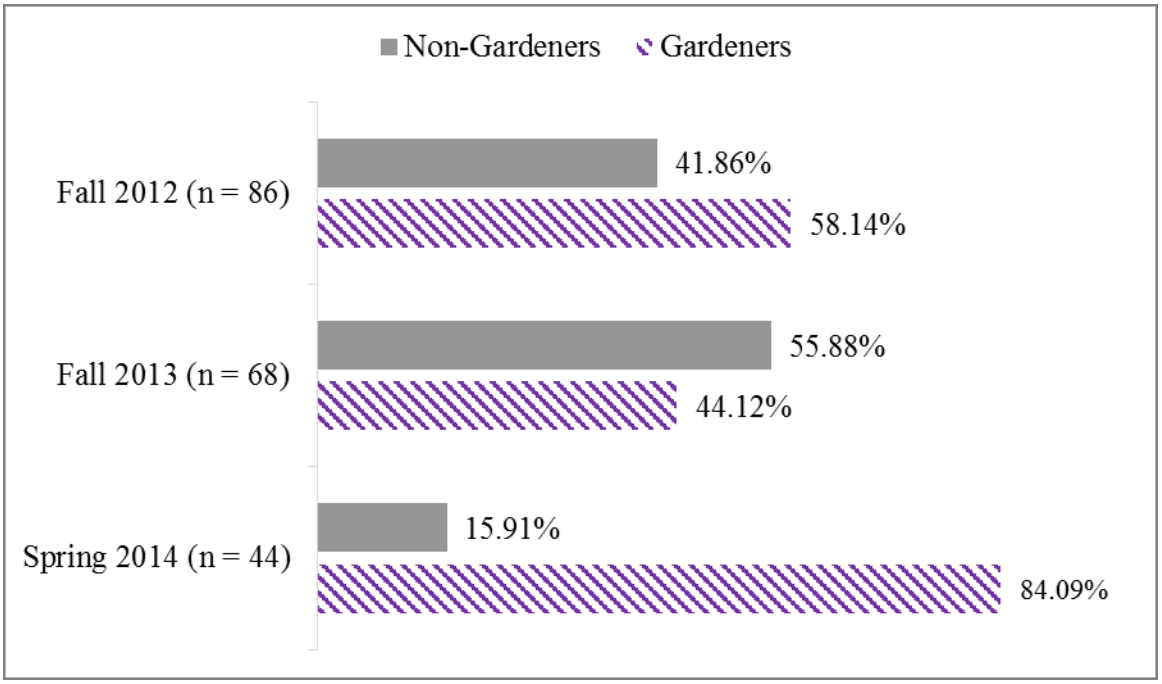


Figure 4-2 Percentage of gardeners per survey taken.

The second largest group of participants consisted of those who had grown vegetables more than ten years, closely followed by the group of participants who had gardened one to five years (Figure 4-3). However, when participants indicated that the past year was their first year growing vegetables, they were also indicating that they had grown vegetables for one year, and could be categorized as having grown vegetables one to five years. When these two groups are

combined, this creates the second largest category, following the category of those who had never grown vegetables (Figure 4-3).

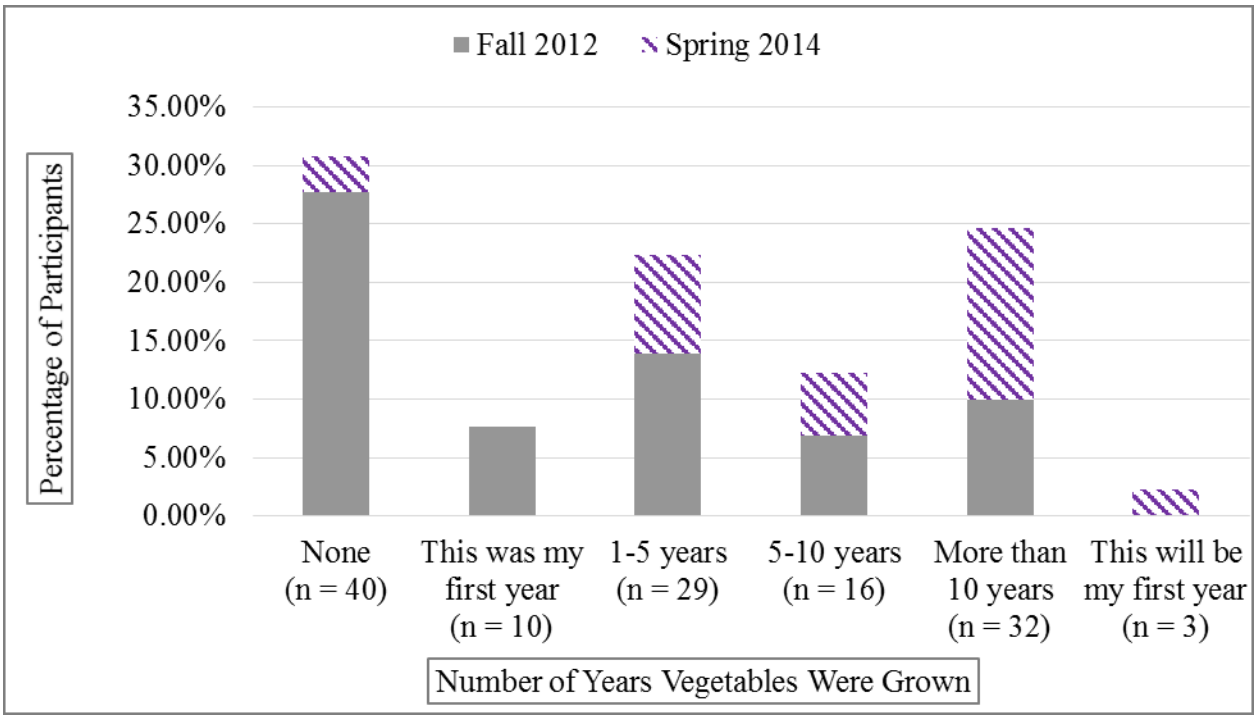


Figure 4-3 The percentage of participants according to the number of years that they have grown vegetables.

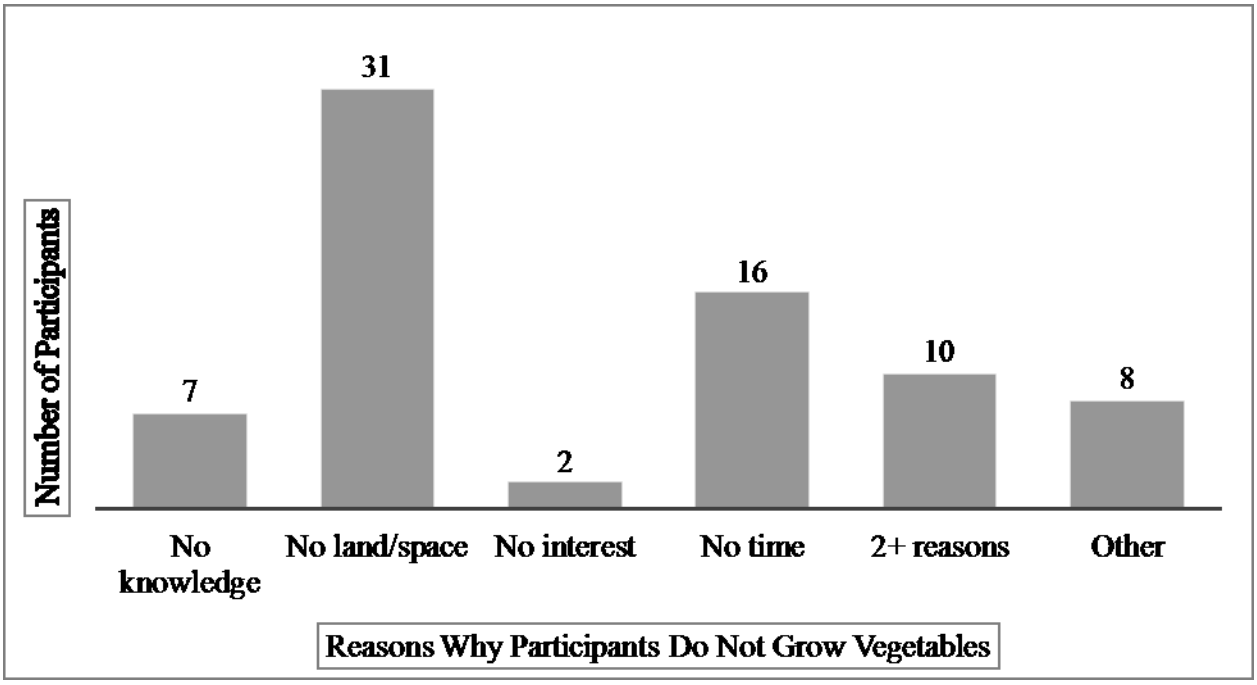


Figure 4-4 Number of non-gardener participants categorized by reasons they do not grow vegetables.

Health

As shown in Table 4-3, significant difference was found between gardeners and non-gardeners in meeting the recommended FV intake and PA level guidelines. Gardeners are nearly three times as likely as non-gardeners to meet the FV and PA recommendations (Table 4-4).

There was no significant differences between gardeners and non-gardeners, males and females, or age groups, in how health was perceived in general, or how health was perceived compared to the rest of the community. Additionally, there was no difference for the combined health indicators in meeting fruit intake recommendations, vegetable intake recommendations, and PA level guidelines when factoring for gender or age group (Table 4-3).

Table 4-3 P-values for two-way interactions between health indicators and the main factors of gardeners and non-gardeners, males and females, and YA. MA, and OA[z].

Health	Gardener	Gender	Age Group
Health in General	0.7766	0.0697	0.7926
Health compared to the community	0.4025	0.2288	0.1508
Meets fruit, vegetable and PA guidelines[y]	**0.0233***	0.1368	0.3995

[z]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

[y]Fruit guidelines = 2+ servings of fruit per day; Vegetable guidelines = 3+ servings per day; PA guidelines = 150+ minutes of moderate physical activity per week, or 75+ minutes of vigorous physical activity per week, or an equivalent combination of moderate and vigorous physical activity per week

*Significance of p=0.05

Table 4-4 Number of total participants, as well as participants categorized as gardeners and non-gardeners who met fruit intake recommendations[z], vegetable intake recommendations[y], and PA level recommendations[x].

Meets fruit, vegetable and physical activity guidelines	Total	Gardener	Non Gardener
Meets guidelines	23	17	6
Does not meet guidelines	126	61	65
Missing	10		

[z]Fruit intake recommendations = 2+ servings of fruit per day

[y]Vegetable intake recommendations = 3+ servings per day

[x]PA level recommendations = 150+ minutes of moderate physical activity per week, or 75+ minutes of vigorous physical activity per week, or an equivalent combination of moderate and vigorous physical activity per week

The majority of survey participants perceived their health to be good, very good, or excellent (Figure 4-5). Most participants perceived their health as comparable to the rest of the community, or better than the rest of the community (Figure 4-6). For participants who indicated that they were restricted in daily activities due to health impairments, the main limitations of

daily activities due to health impairments consisted of joint problems, followed by organ problems, and back and hip problems (Figure 4-7).

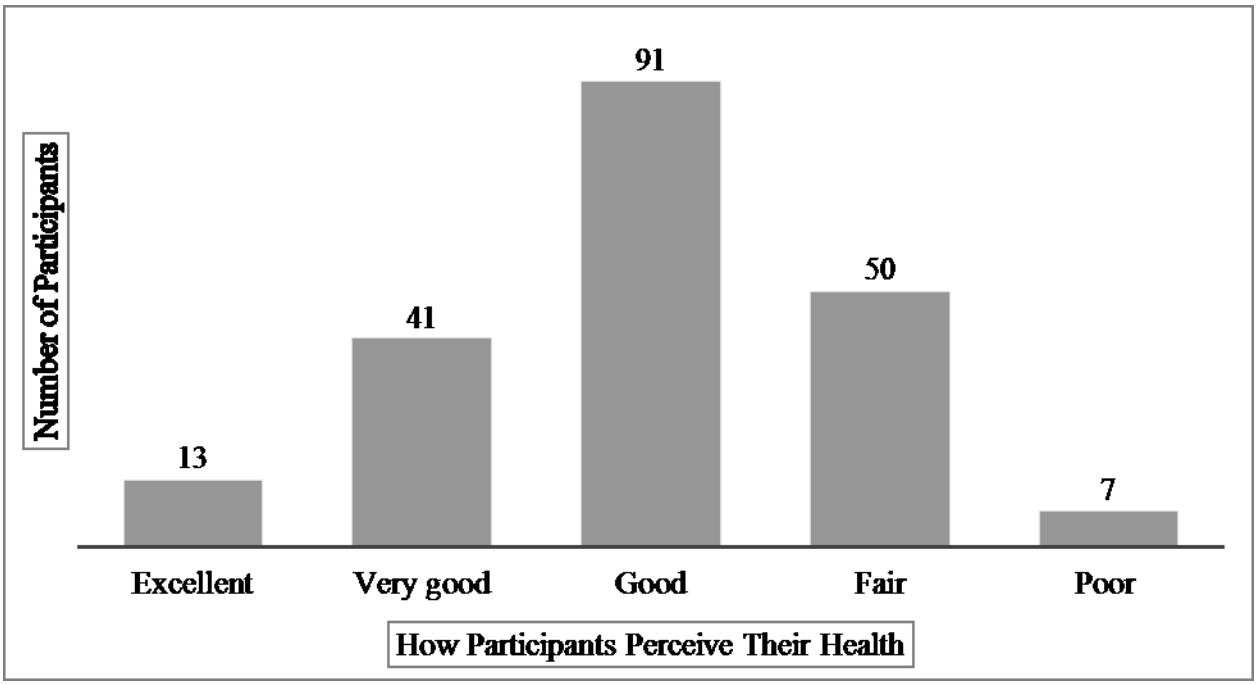


Figure 4-5 Number of participants who self-reported their health as excellent, very good, good, fair, or poor.

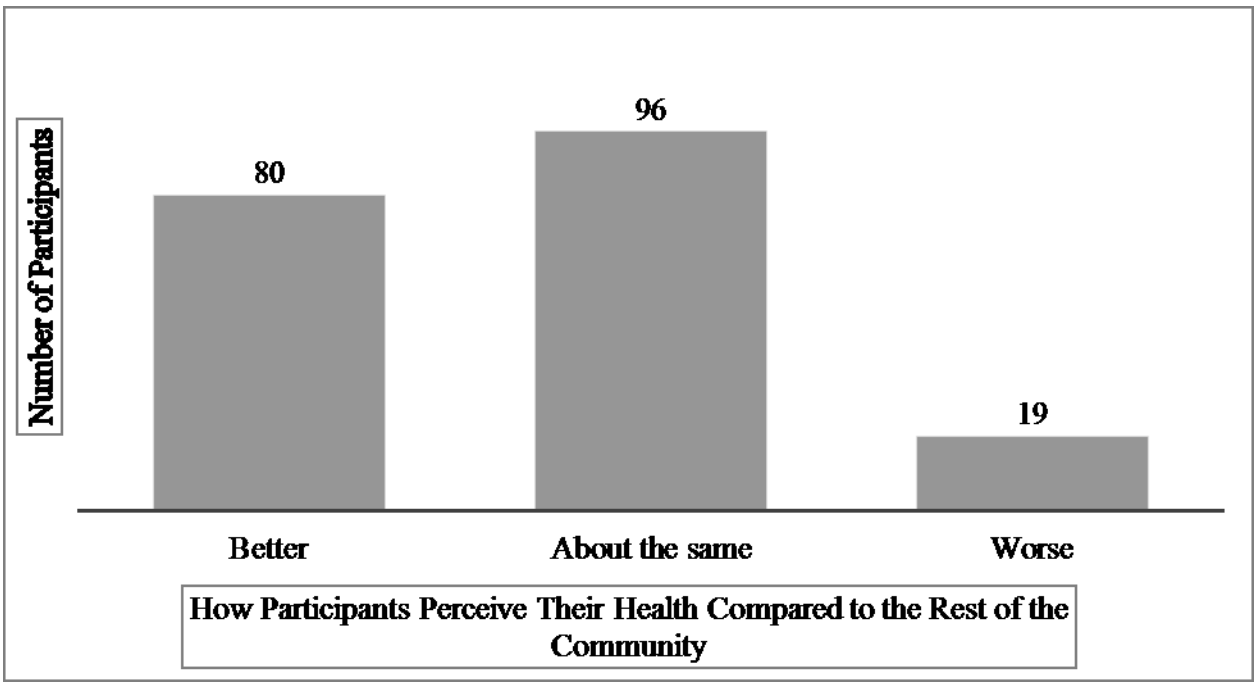


Figure 4-6 Number of participants who perceived their health as better than, about the same as, or worse than the rest of the community in general.

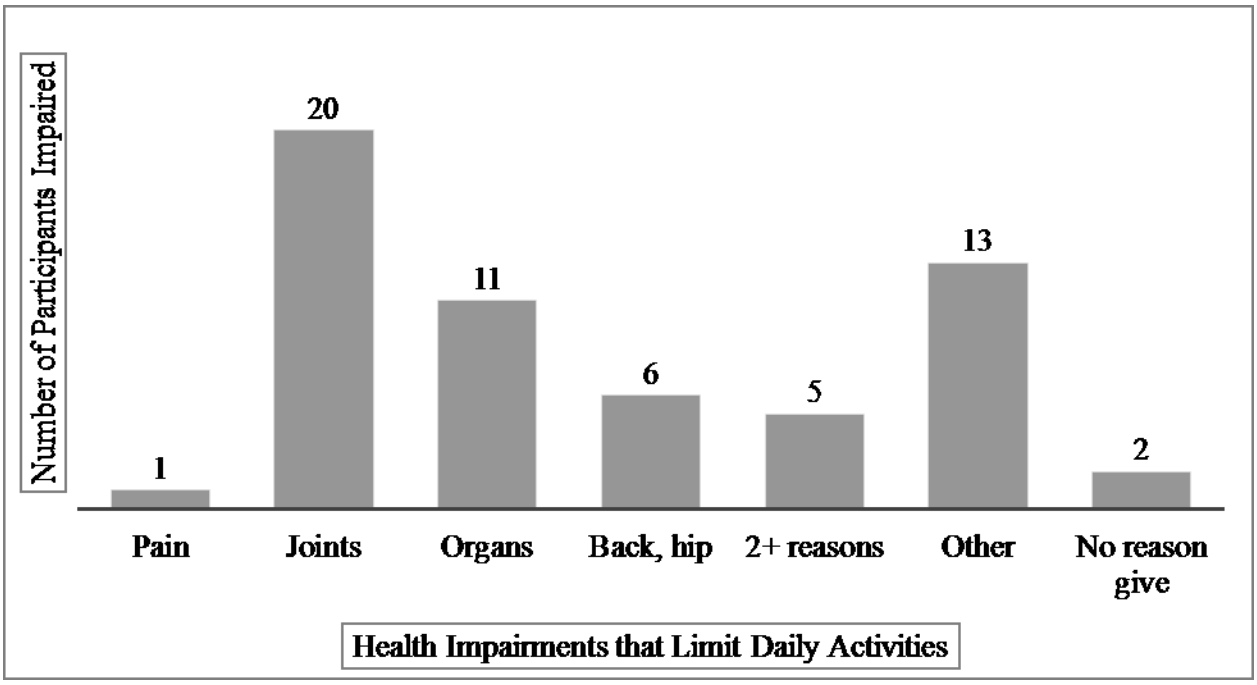


Figure 4-7 Number of participants limited in daily activities due to various health impairments.

Fruits and Vegetables

There were significant differences found between males and females, and YA and MA, in meeting daily fruit recommendations (Table 4-5). Significant differences were found between gardeners and non-gardeners, males and females, and YA and MA for meeting daily vegetable recommendations (Table 4-5). In meeting both daily FV recommendations, significant differences were found between gardeners and non-gardeners, and males and females (Table 4-5).

Table 4-5 P-values for two-way interactions between FV[z] recommendations met and the main factors of gardeners and non-gardeners, males and females, and YA, MA, and OA[y].

Fruits and Vegetables	Gardener	Gender	Age Group	YA & MA	YA & OA	MA & OA
Ate recommended amount of fruit	0.0756	**0.0061***	0.0558	0.5708	**0.0182***	0.0626
Ate recommended amount of vegetables	**0.0167***	**0.0392***	0.0566	**0.0290***	0.0998	0.9000
Ate recommended amount of fruit and vegetables	**0.0174***	**0.0486***	0.3145	0.1563	0.3125	0.8890

[z]FV recommendations = 2 servings of fruit per day, 3 servings of vegetables per day

[y]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

*Significance of p=0.05

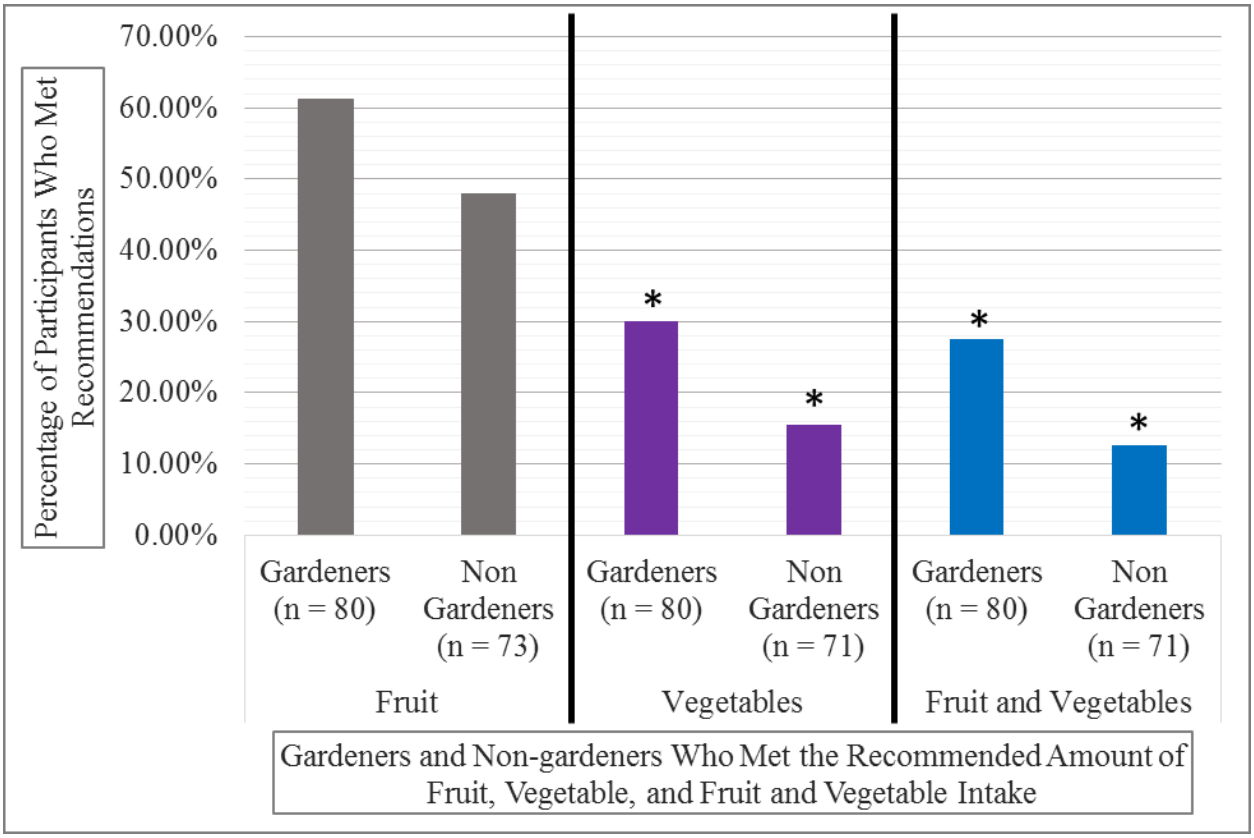


Figure 4-8 Percentage of gardeners and non-gardeners who met the daily recommended amount of fruit intake[z], vegetable intake[y], and FV intake[x].

[z]Recommended amount of fruit intake = 2+ servings per day

[y]Recommended amount of vegetable intake = 3+ servings per day

[x]FV = fruit and vegetable

*Significance p=0.05

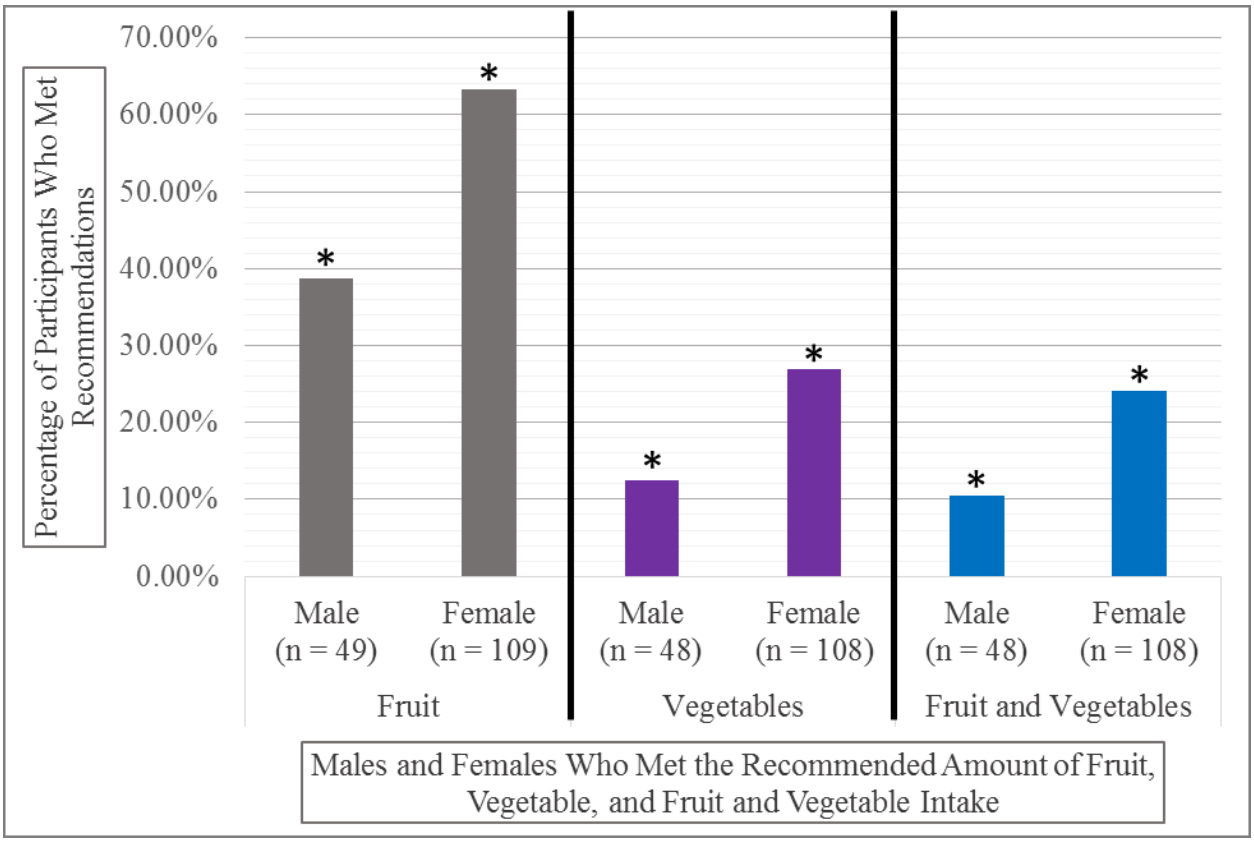


Figure 4-9 Percentage of males and females who met the daily recommended amount of fruit intake[z], vegetable intake[y], and FV intake[x].

[z]Recommended amount of fruit intake = 2+ servings per day

[y]Recommended amount of vegetable intake = 3+ servings per day

[x]FV = fruit and vegetable

Significane p=0.05

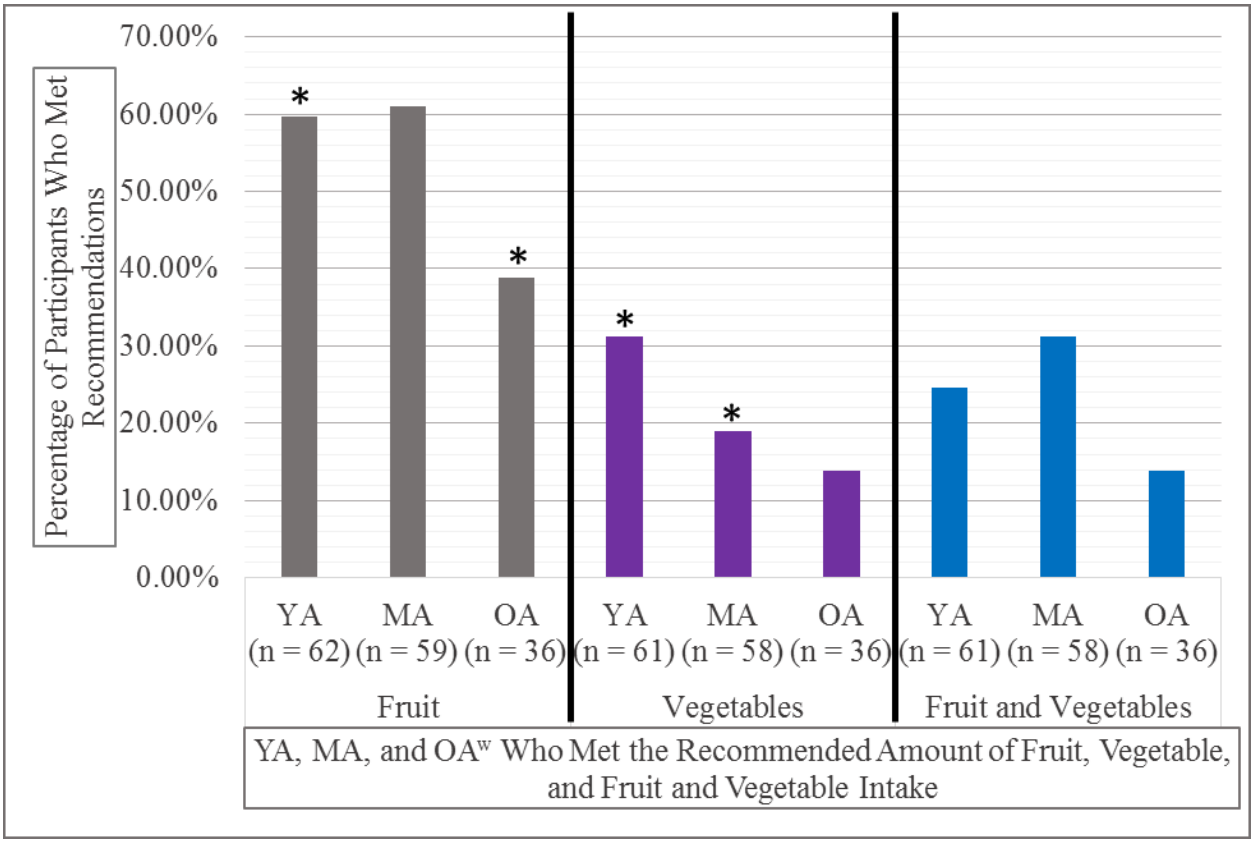


Figure 4-10 Percentage of YA, MA, and OA[z] who met the daily recommended amount of fruit intake[y], vegetable intake[x], and FV intake[w].

[z]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

[y]Recommended amount of fruit intake = 2+ servings per day

[x]Recommended amount of vegetable intake = 3+ servings per day

[w]FV = fruit and vegetable

Significance p=0.05

Women were more likely than men to meet the daily recommended amount of fruit intake (Figure 4-9). While MA were more likely than YA to eat the daily recommended amount of vegetables, YA are significantly more likely than OA to eat the daily recommended amount of fruit (Figure 4-10). Even though gardeners were more likely to eat fruits than non-gardeners (Figure 4-8), this difference was not significant (Table 4-5). The probability of such differences can easily be seen in Figure 4-11, with higher probabilities, such as gardeners, women, YA, and

MA, represented by darker pinks, and lower probabilities, such as non-gardeners, men, and OA, represented by darker blues.

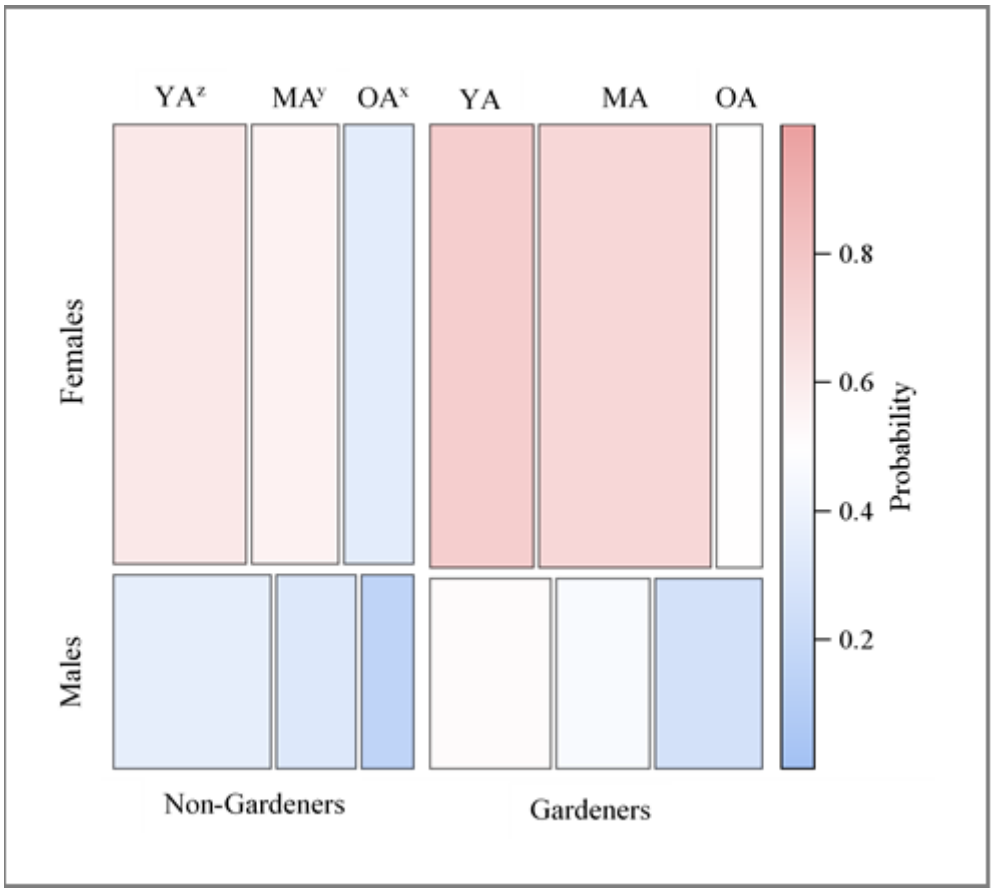


Figure 4-11 Probability that participants eat the daily recommended amount of fruit (2+ servings), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

Gardeners were twice as likely as non-gardeners to meet the vegetable recommendations (Figure 4-8), and females more than twice as likely as males to meet the daily vegetable recommendations (Figure 4-9). Young adults were more likely to meet vegetable recommendations than OA and significantly more likely than MA to meet vegetable recommendations (Figure 4-10). The probability of such differences can easily be seen in Figure

4-12, with higher probabilities, such as gardeners, females, and YA, represented by lighter blues or the absence of blue, and lower probabilities, such as non-gardeners, males, MA, and OA, represented by darker blues.

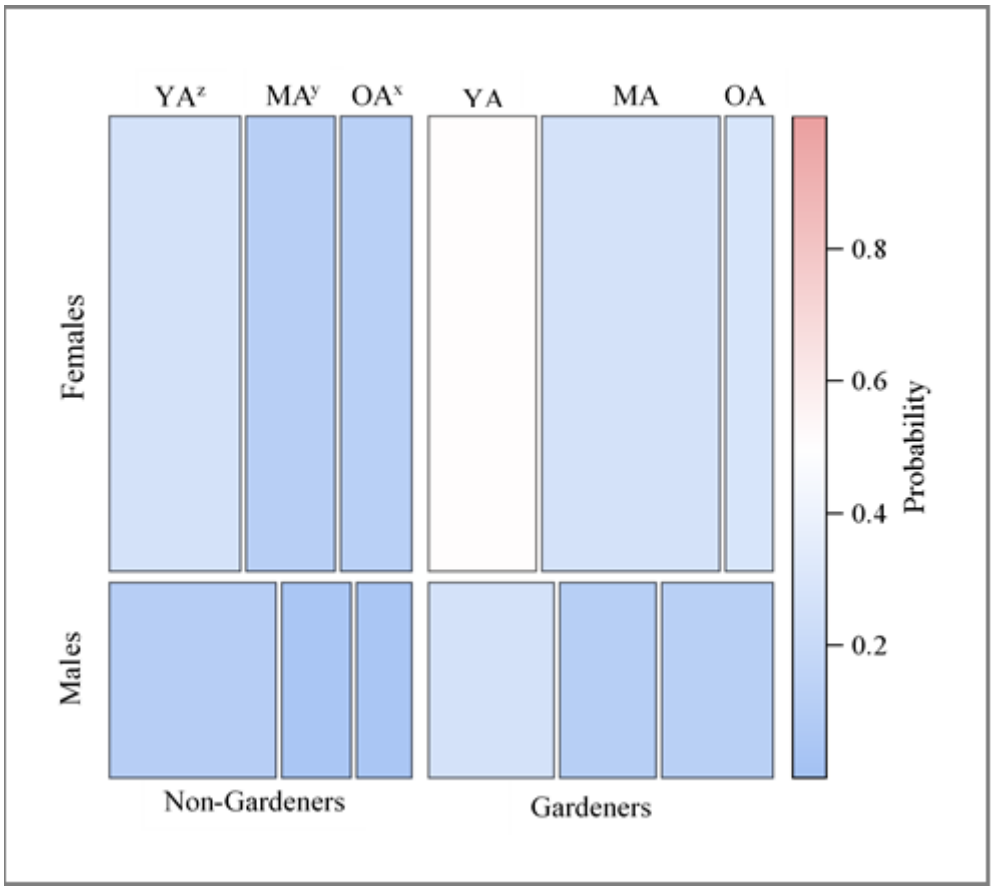


Figure 4-12 Probability that participants eat the daily recommended amount of vegetables (3+ servings), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

Gardeners (Figure 4-8) and females (Figure 4-9) were more than twice as likely to meet the daily recommended amount of FV consumption when compared to non-gardeners and males, respectively. There were no differences for age groups in FV consumption (Table 4-5). Differences were not found for both FV intake between YA and MA, or MA and OA (Figure 4-

10). The probability of such differences can easily be seen in Figure 4-13, with higher probabilities, such as gardeners, females, and YA, represented by lighter blues or the absence of blue, and lower probabilities, such as non-gardeners, males, MA, and OA, represented by darker blues.

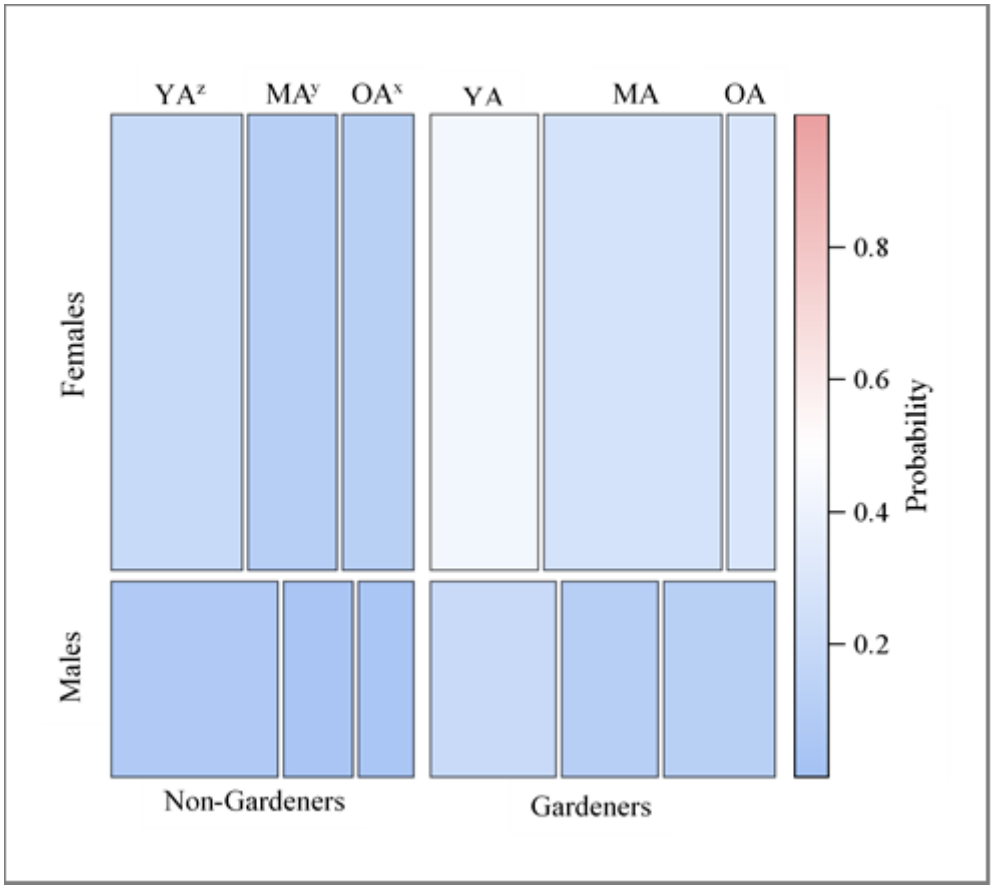


Figure 4-13 Probability that participants eat the daily recommended amount of fruit (2+ servings) and vegetables (3+ servings), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

Physical Activity

As shown in Table 4-6, significant differences can be seen between YA and OA in meeting PA recommendations through MPA, with YA being more likely than OA to meet PA recommendations through MPA (Figure 4-16). Compared to MA and OA, YA were also significantly more likely to meet PA recommendations from VPA (Table 4-6 and Figure 4-16). There were no significant differences for meeting PA from a combination of MVPA (Table 4-6). No significant differences were found between gardeners and non-gardeners (Figure 4-14) or between males and females (Figure 4-15) in meeting PA recommendations.

Table 4-6 P-values for two-way interactions between PA[z] recommendations[y] met and the main factors of gardeners and non-gardeners, males and females, and YA, MA, and OA[x].

Physical Activity	Gardener	Gender	Age Group	YA & MA	YA & OA	MA & OA
Meets recommended amount of moderate PA	0.5045	0.9784	0.1321	0.2191	**0.0499***	0.3102
Meets recommended amount of vigorous PA	0.0821	0.6138	**0.0013***	**0.0016****	**0.0035***	0.6002
Meets recommended amount of PA	0.1014	0.7811	0.1824	0.1440	0.0939	0.6273

[z]PA = physical activity

[y]PA recommendations = 150+ minutes of moderate physical activity per week, or 75+ minutes of vigorous physical activity per week, or an equivalent combination of moderate and vigorous physical activity per week

[x]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

*Significance of p=0.05

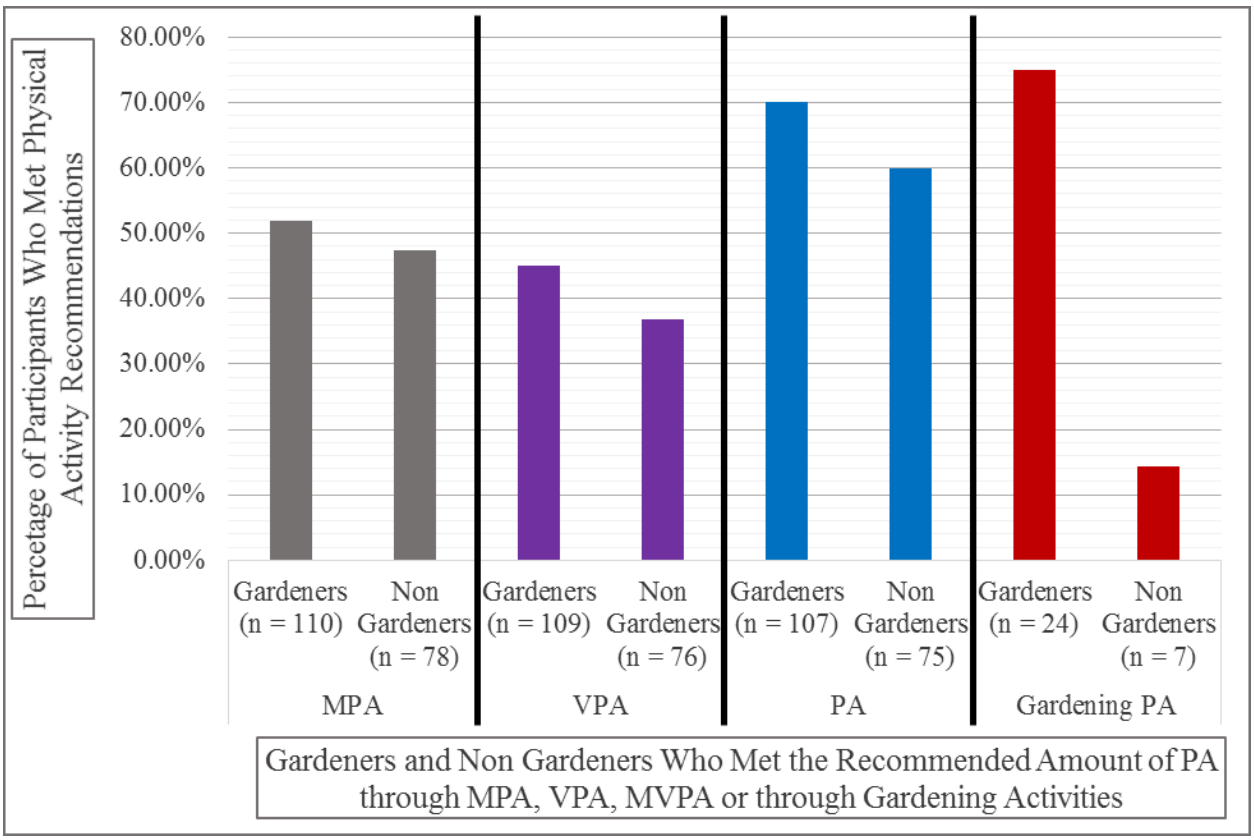


Figure 4-14 Percentage of gardeners and non-gardeners who met the weekly recommended amount of PA[z] through MPA, VPA, MVPA[y], and means of gardening.

[z]PA = physical activity;

[y]MPA = moderate physical activity, 150+ minutes of moderate physical activity per week; VPA = vigorous physical activity, 75+ minutes of vigorous physical activity per week; MVPA = moderate and vigorous physical activity, equivalent combination of moderate and vigorous physical activity per week

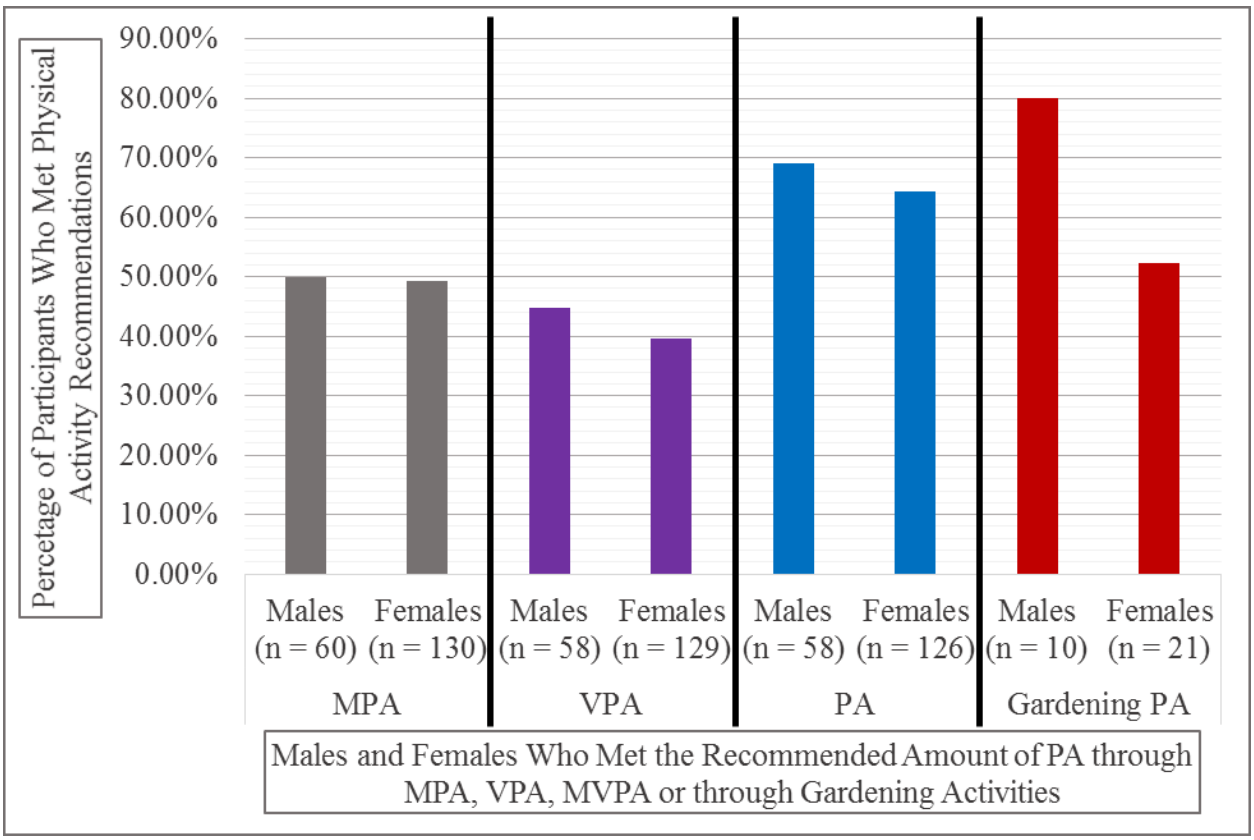


Figure 4-15 Percentage of males and females who met the weekly recommended amount of PA[z] through MPA, VPA, MVPA[y], and means of gardening.

[z]PA = physical activity;

[y]MPA = moderate physical activity, 150+ minutes of moderate physical activity per week; VPA = vigorous physical activity, 75+ minutes of vigorous physical activity per week; MVPA = moderate and vigorous physical activity, equivalent combination of moderate and vigorous physical activity per week

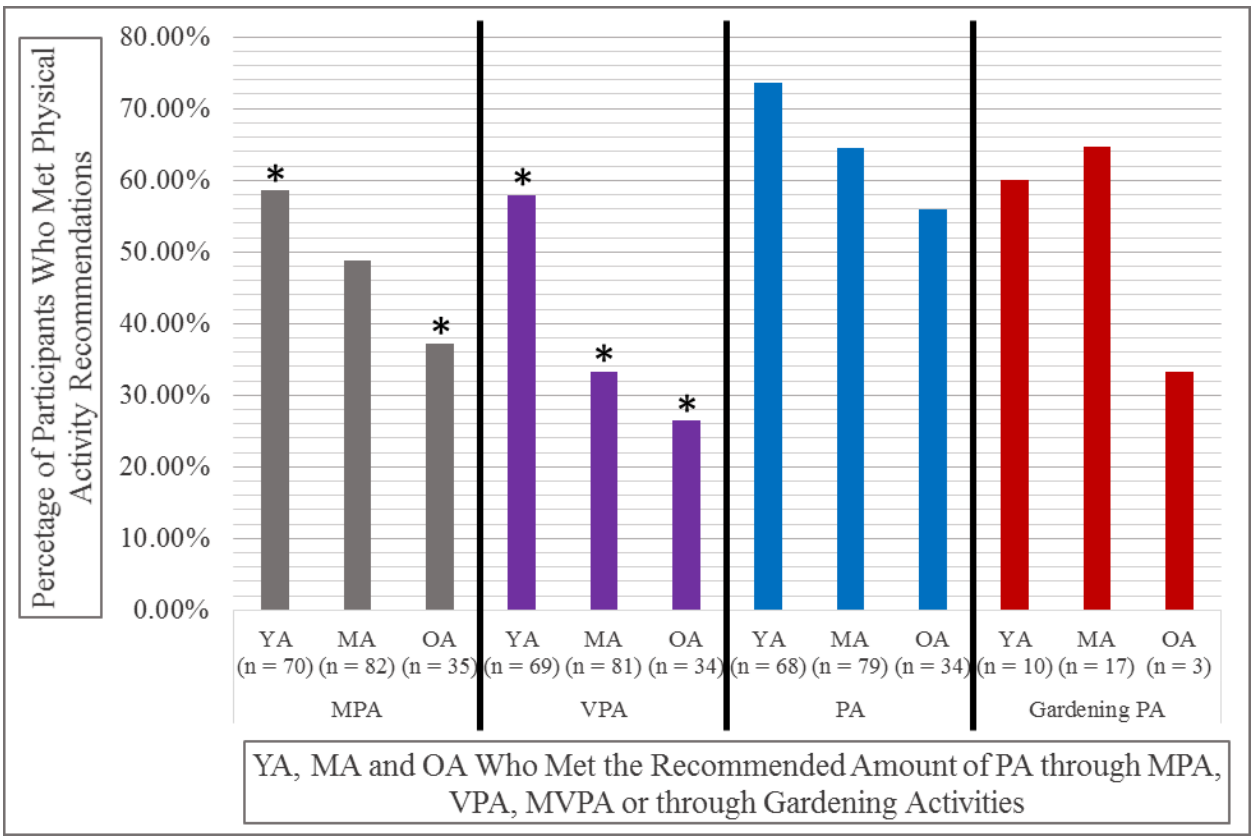


Figure 4-16 Percentage of YA, MA, and OA[z] who met the weekly recommended amount of PA[y] through MPA, VPA, MVPA[x], and means of gardening.

[z]YA = young adult, 18-39 years of age; MA = mature adult, 40-64 years of age; OA = older adult, 65 years of age and older

[y]PA = physical activity

[x]MPA = moderate physical activity, 150+ minutes of moderate physical activity per week; VPA = vigorous physical activity, 75+ minutes of vigorous physical activity per week; MVPA = moderate and vigorous physical activity, equivalent combination of moderate and vigorous physical activity per week

Significance p=0.05

The probability that YA are more likely to meet PA recommendations through MPA than MA and OA can easily be seen in Figure 4-17, with the YA's darker pink representing higher probabilities, and with MA and OA's absence of color and blues representing lower probabilities.

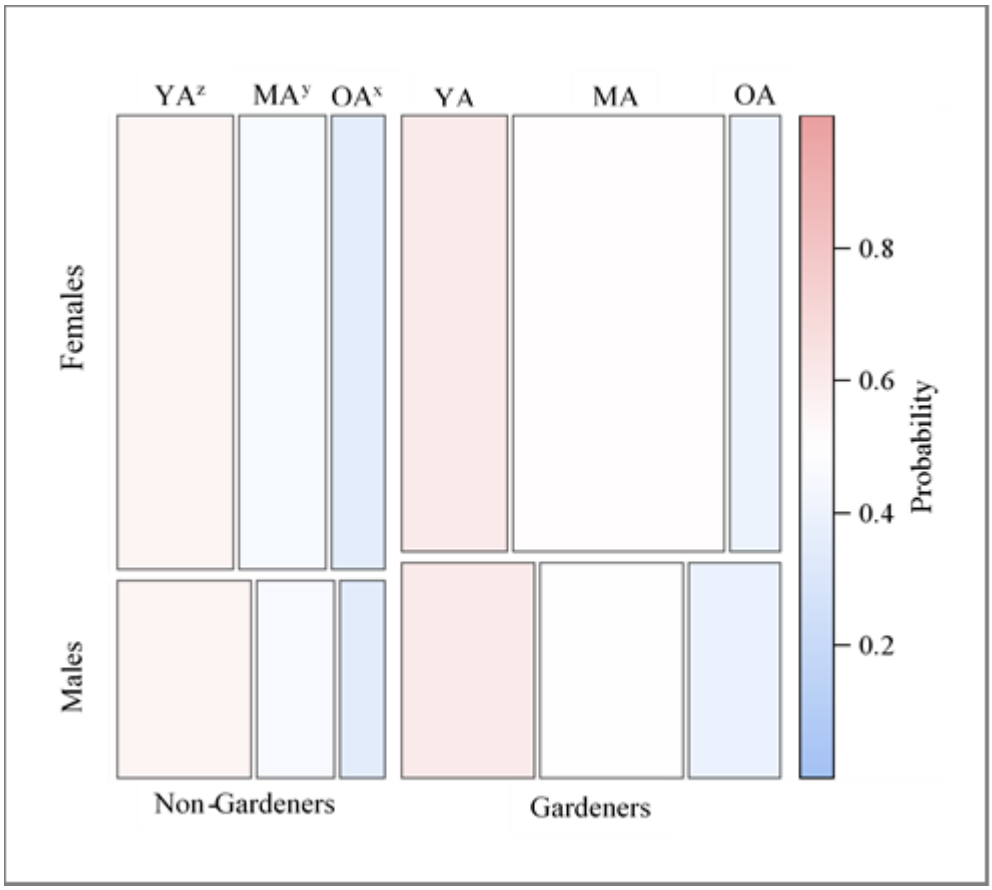


Figure 4-17 Probability that participants meet the recommended amount of weekly physical activity through moderate physical activity (150+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

The probability that YA are more likely to meet PA recommendations through VPA than MA and OA can easily be seen in Figure 4-18, with the YA's pinks representing higher probabilities, and with MA and OA's blues representing lower probabilities.

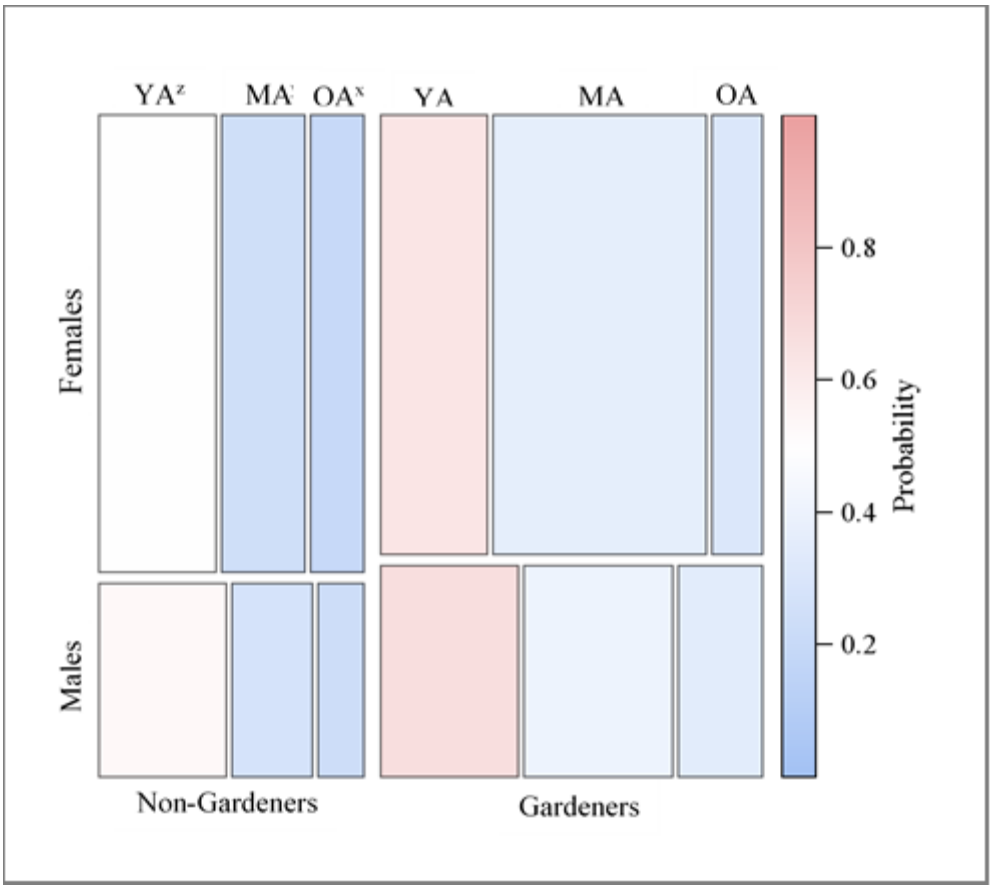


Figure 4-18 Probability that participants meet the recommended amount of weekly physical activity through vigorous physical activity (75+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

Resulting from a scarcity of data, it could not be determined if there was a significant difference between gardeners and non-gardeners, males and females, and YA, MA and OA in PA recommendations met through gardening activities. A higher percentage of gardeners (Figure 4-14), males (Figure 4-15), YA, and MA (Figure 4-16) met PA recommendations through gardening activities.

Chapter 5 - Discussion

It might seem unusual that about half the participants in 2012 and 2013 were gardeners, compared to participants in 2014, when most the participants were gardeners. Considering that the Spring 2014 participants were attending a gardening workshop when they took the survey, it is not surprising that most of these participants were gardeners. The Fall 2012 and Fall 2013 participants were not attending a gardening workshop, but instead were attending a tribal feast, so understandably there was a lower percentage of gardeners participating in the Fall 2012 and Fall 2013 surveys than there were in the Spring 2014 survey. Interestingly, PBPN participants (55%) were twice as likely to have grown vegetables compared to all American households (about 26%) (National Gardening Association, 2014a). The larger number of tribal members growing vegetables might be a result of further distance from grocery stores compared to most American households, since the reservation is located about half an hour from the closest grocery store, and most Americans live in more urban areas, which likely allows them easier access to grocery stores.

The PBPN's largest age group was MA (42.5%), followed by YA (36.5%) and OA (21.0%), unlike the general U.S. population whose largest age group is YA (48.09%), followed by MA (34.78%) and OA (17.13%) (Howden & Meyer, 2011). Comparing the largest age groups between the PBPN and U.S. is not an easy task, since the YA were categorized as ages 18-39 years old and the MA were categorized as ages 40-64 years old in the PBPN, while the U.S. YA were categorized as 18-44 years old and the MA were categorized as 45-64 years old. The difference in age group categorization might be the reason why MA were the largest age group in the PBPN and YA were the largest age group in the U.S. In both cases, the MA age group was twice the size of the OA age group.

Education level is difficult to compare between the PBPN and the general Kansas and U.S. populations. When comparing high school graduates, our surveys asked if they had some education through high school, including graduating high school, while the U.S. Census Bureau only included individuals who received a high school diploma, or its equivalent, and did not include individuals who attended school through twelfth grade but did not receive a high school diploma (United States Census Bureau, 2016b). Comparing college graduates is slightly easier, as our surveys asked participants if they had received a bachelor's degree or higher and the U.S.

Census Bureau includes all individuals who have received bachelor's, master's, professional or doctorate degrees. The difficulty in comparison is that we included all individuals aged 18 years and older who had received at least a bachelor's degree, and the U.S. Census Bureau only included individuals who were aged 25 years and older (United States Census Bureau, 2016b). Even with the PBPN including a larger age range of survey participants, only 22.11% (n = 44) of the PBPN survey participants had obtained a bachelor's degree or higher, compared to 30.3% of all Kansas residents (United States Census Bureau, 2016a), and 34.0% of U.S. residents (National Center for Education Statistics, 2015b). Though the PBPN has a lower rate of individuals receiving a Bachelor's degree or higher when compared to Kansas and the United States, they have higher rates compared to AI/AN in all IHS areas (9.6%) and AI/AN in the Oklahoma area of the IHS (13.3%) (Indian Health Service, 2008). Perhaps the PBPN has a higher rate of receiving a Bachelor's degree or higher because of their close proximity to three major universities: Kansas State University, University of Kansas, and Haskell Indian Nations University.

The differences in ages and the education level obtained prove difficult when comparing PBPN members who have received an associate's degree, some college, or technical school to the general U.S. population. Unlike the PBPN, where MA (48.19%) are more likely than YA (26.03%) and OA (25.0%) to have an associate's degree, some college, or technical school, in the general U.S. population 25-44 year olds (8.7%) and 45-64 year olds (8.5%) are more likely than OA (4.4%) to have an associate's degree, some college, or technical school (The National Center for Higher Education Management Systems, 2016). The difference in which age group is more likely to have this educational attainment might be attributed to the fact that we included 18-24 year olds in the YA age group, while 18-24 year olds were excluded from the U.S. data. Since most college students are 18-24 years old (59.8%) compared to those who are 25 years old or older (National Center for Education Statistics, 2015a), it could be that when including 18-24 year olds the YA are less likely than MA to have an associate's degree, some college, or technical school because these individuals might not have started school yet or are in school but have not finished school yet.

Increased education has been linked to increased income (Office of Occupational Statistics and Employment Projections, 2015), so it would seem logical that since fewer PBPN members have bachelor's degrees, or higher, than the general Kansas and U.S. populations, then

the PBPN would have higher poverty rates. This appears to hold true, as 31.79% (n = 48) of PBPN members who participated in the surveys lived in poverty, compared to only 13.2% (n = 365,656) of the general Kansas population in 2010 (Social, Economic, and Housing Statistics Division: Poverty, 2015) and 14.8% (n = 46.7 million) of the general U.S. population in 2014 (Social, Economic, and Housing Statistics Division: Poverty, 2015a). The PBPN poverty rate is more than twice that of the general population. However, the link between education and poverty does not show the same inverse correlation when comparing the PBPN to the AI/AN, since the PBPN has higher rates of education, but the poverty rate of the PBPN is even greater than that of AI/AN in all IHS areas (29.2%) and especially of AI/AN in the Oklahoma area of the IHS (22%) (Indian Health Service, 2008).

Reported rates of unemployment among the PBPN (4.58%) were similar to those of all races combined in the U.S. (4% men, 3.3% women) (Indian Health Service, 2008). This is quite a bit lower than AI/AN in the Oklahoma IHS area (8.8% men, 8.1% women) and even lower than AI/AN in all IHS areas (16.3% men, 13% women). Further investigation would be needed to determine if the lower unemployment rates but higher poverty rates of the PBPN are a result of many PBPN members having lower paying jobs, only working part-time jobs, or having only one income households, when compared to all U.S. residents and AI/AN of all IHS areas. It could be that the irregularities between the unemployment rates and poverty rates of the PBPN are caused by other factors all together.

Considering that higher education and higher income levels are linked with increased PA, it is surprising that 65.76% (n = 121) of PBPN survey participants reported meeting aerobic leisure-time PA compared to only 49.2% of the general U.S. population (Centers for Disease Control and Prevention, 2014a), and only 48.5% of all Kansas residents (Centers for Disease Control and Prevention, 2015b). While the PA questions are standard questions used to assess PA, they are self-reported, and it would be beneficial to measure PA levels through more accurate means to determine if PA levels are as high as participants report. If the PBPN PA levels actually are higher than the general U.S., then further investigation into what the PBPN is doing to have such a high rate of meeting PA would be helpful in determining how to help the general U.S. population meet these recommendations. Such an understanding of the reason why so many PBPN members meet PA recommendations could be particularly helpful in successfully implementing programs, education efforts, and policies that could increase PA levels among

other populations at risk for overweight/obesity and other diseases linked to low PA levels. One possibility for the higher PA levels among the PBPN participants could result from the rural setting in which the PBPN reservation resides, as green environments, nature and opportunities for outdoor recreation are important factors in an individual's health (De Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003).

Since 55.69% (n = 88) of all participants ate the recommended amount of fruit, and only 22.44% (n = 35) ate the recommended amount of vegetables, more participants have need to increase vegetable consumption than fruit consumption. The PBPN are not alone in their need to increase vegetable consumption even more than fruit consumption, as 10.4% of Kansas residents meet the daily fruit recommendations compared to only 8.3% meeting the daily vegetable recommendations in 2013 (Moore & Thompson, 2015). Nor is this need limited to Kansas residents, as residents of all states in the U.S. are more likely to meet fruit recommendations than vegetable recommendations. Overall, 13.1% of residents in the U.S. meet fruit recommendations compared to only 8.9% of residents who meet vegetable recommendations (Moore & Thompson, 2015).

Even though the focus of this study was on behavioral factors and health outcomes of gardeners in the PBPN, it is noted that health is affected by more than just diet and PA. Contextual factors, such as poverty status, rurality, and neighborhood walkability, among others, play an important role in health (Casey et al., 2008; Frank et al., 2009; Sallis et al., 2009). The PBPN reservation is located in a rural, fairly isolated area. Such an area could allow PBPN tribal members to feel safer when walking on the reservation, which could explain why the participants have such high PA levels compared to the general U.S. and Kansas populations, despite the lower education levels and higher poverty rates among the PBPN participants. Contextual factors could also explain why PBPN participants were more likely to meet FV recommendations compared to the general U.S. and Kansas populations. Further investigation into the tribe's contextual factors that affect FV consumption and PA levels are needed to better understand what truly influences these participants to be more likely to consume FV and be physically active.

While Alaimo, Packnett, Miles, & Kruger (2008) found that gardeners were more likely to eat FV than non-gardeners, the PBPN gardeners were more likely than the non-gardeners to eat vegetables, but not more likely to eat fruit. Thus, encouraging gardening might also be an

effective means for encouraging increased vegetable consumption, just as it was for middle school children who increased in likelihood to prefer vegetables when participating in a gardening program (Ratcliffe et al., 2011). It could be that PBPN gardeners are likely to eat more vegetables but not more fruit than non-gardeners because vegetables are probably grown more than fruit in home gardens. Promoting and encouraging gardening at home and in community gardens should be considered as a means to promote and encourage increased vegetable consumption among the PBPN.

Compared to PBPN men, almost twice as many PBPN women survey participants met the daily recommended amount of fruits, the daily recommended amount of vegetables and the combined daily recommended amount of FVs. While Patterson, Block, Rosenberger, Pee, & Kahle (1990) also found that women were more likely than men to eat the daily recommended amount of fruit, unlike the PBPN they found that men were more likely than women to eat the daily recommended amount of vegetables. Kimmons, Gillespie, Seymour, Serdula, & Blanck, (2009) findings were opposite of the PBPN, men were more likely to eat both FV than women. The discrepancies between the three studies in their findings whether males or females are more likely to eat FV could be a result of differences in self-reporting. Such discrepancies from self-reporting can result by differences in how questions are worded and where the questions are placed within the survey (Babbie, 2010).

Overall, YA are more likely to have healthy habits in areas of fruit consumption, vegetable consumption, and PA. They are more likely than OA to eat fruit and are more likely than MA to eat vegetables. Nielsen & Popkin (2003) found that the amount of daily food consumption is inversely related to age. The decrease in food consumption possibly results from several factors, including eating meals with fewer people, and lower hunger levels before and after meals (de Castro, 2002). Since younger adults eat more food in general, it could be that they consume more FV but do not consume a higher ratio of FV to other food groups.

Young adults are more likely than MA to meet PA recommendations through VPA. Young adults are also more likely to meet PA guidelines through either MPA or VPA than OA. The findings that PA levels of PBPN participants decrease as age increases are consistent with findings by Trost et al. (2002) that older school children are less PA than younger school children, and with findings by Evenson, Buchner, & Morland (2012) that even among OA, age is inversely related to PA levels. The decrease in PA with age might be a result from a decrease in

dopamine with age (Ingram, 2000). Decreased PA with age could also be a result from decreased energy levels and increased health impairments that occur as adults age.

Through self-reporting of gardening tasks and weekly time spent on each task showed that 75.0% (n = 18) of gardeners met the weekly recommended amount of PA through gardening activities alone, though only 70.09% (n = 75) of the gardeners reported having met weekly recommended PA through MVPA. It might be assumed that either time spent gardening is overestimated, or time spent being PA is underestimated. It appears that gardening is a viable means to be physically active among the PBPN members, just as it is for older active gardeners (Park, Shoemaker, & Haub, 2008b), and promoting and encouraging gardening might be an effective means for promoting encouraging increased PA among the PBPN.

The higher intake of vegetables among gardeners allowed for increased overall healthy lifestyles, as gardeners were then more likely to meet all the recommendations of daily FV intake and weekly PA levels. These findings are consistent with other studies, such as those done by Esmaillzadeh et al. (2006), Bazzano, Li, Joshipura, & Hu (2008), Joshipura et al. (1999) and Liu et al. (2000), which found that individuals who consume more FV tend to have overall healthy lifestyles. If the PA recommendations met through means of gardening had been used to determine if gardeners met all three of these recommendations, then the percentage of gardeners meeting all three recommendations might be even greater than that of non-gardeners. Gardening seems to be an overall effective way to increase health indicators, such as increased FV intake and increased PA levels.

Even though gardeners are more likely to eat the daily recommended amount of vegetables, the recommended amounts of both FV, and the recommended amounts of FV and PA, they are not more likely to perceive their health as good, or as better than the rest of the community. The better health habits, but not better perceived health, could be a result of health conditions that are caused more by other determinants, such as genetics, rather than diet and PA. Additionally, it might be that the gardeners' health overall is better, but the gardeners know that their health can be better still, so they compare their current health to what they perceive it should be. The inconsistencies of achieving these health indicators compared to how health is perceived, also shows that reality and perception are not always the same.

The scope of this project did not warrant investigation into the interactions between perceived health, reporting of not being limited in daily activities due to impairments or poor

health, and reporting of being limited in the 30 days prior the survey due to impairments or poor health. However, further investigation into health perceptions compared to actual health is needed as the two do not seem to align. While 71.78% of PBPN participants perceived their health to be good, very good, or excellent, 31.03% reported that they are limited in their daily activities because of impairments or health problems. Additionally 38.4% of participants who reported that poor physical health kept them from doing their usual activities within the 30 days previous the survey. The participants who reported poor physical health preventing them from doing their usual activities had a mean of 7.11 days in which they were not able to do their normal activities due to poor physical health. This raises the question "what do PBPN members perceive as good, very good, and excellent health?" Is perceived health related to diet and/or PA levels? Is there a correct perception of what healthy diets and PA levels are? Is perceived health related to impairments or health problems? If so, then why do so many of the PBPN participants perceive their health as good, very good, or excellent, yet many are limited in their daily activities because of impairments or health problems?

The differences in perceived health and limitations in daily activities because of impairments and poor health raise new questions about perceived health and health indicators. High levels of PA (Trost et al., 2003) and FV intake (Ello-Martin et al., 2007) have shown to decrease overweight/obesity, along with other diseases linked to overweight/obesity. Are PBPN members who report meeting PA recommendations, as well as those who report meeting FV recommendations, less likely than other PBPN members to report being limited in daily activities due to impairments or health problems? Are PBPN members who meet recommendations reporting fewer days that poor health prevented them from doing usual activities when compared to PBPN members who do not meet recommendations? Since VPA seems to have a more positive impact on overweight/obesity than MPA (Janssen et al., 2005), are PBPN members who meet PA recommendations through VPA less likely than members who meet recommendations through MPA to report being limited in usual daily activities due to impairments or health problems? Do those who meet PA recommendations through VPA report fewer days that poor health prevented them from doing usual activities? Sedentary time is inversely related to weight and HDL cholesterol (Cliff et al., 2013; Henson et al., 2013), and though questions about sedentary time were not asked for this study, it would be interesting to investigate if sedentary time has an influence on health indicators. Are highly sedentary PBPN members just as likely as

members who are not highly sedentary to report their health as good, very good, or excellent? Are highly sedentary PBPN members more likely to be limited in usual daily activities due to impairments or health problems? Are highly sedentary members more likely to report a higher number of days that poor health prevented them from doing usual activities?

Limitations of the Study

First, the participants in this study were a sample of convenience, using the tribal Harvest Feast and spring gardening workshops as the means through which the surveys were distributed and collected. Those who attend these events are not a true representation of the PBPN population, as many tribal members do not live on or near the reservation. Also, it is believed that those who attend and are involved in PBPN events are usually the healthiest members of the PBPN.

Second, as the purpose of the survey was changed each year the questions in the survey also changed to address the purpose of the survey. Additionally, some questions remained similar, but as understanding increased then the questions or answers changed slightly. The changes between surveys made analysis difficult as different answers had to be combined to ask one question. This can be seen in the example of defining which participants were gardeners. The question "Did you have a garden last year?" was asked in Fall 2012 and Spring 2014, and the question "How many years have you grown vegetables?" was asked in Fall 2013 and Spring 2014. Neither of the questions could be used across all three surveys to determine which participants were gardeners, so "Did you have a garden last year?" was used for the Fall 2012 survey, and since the question "How many years have you grown vegetables?" included gardeners who have gardened for ten or more years but did not garden the previous year, this question was used for the Fall 2013 and Spring 2014 surveys.

Third, participants were asked to self-report how many days a week they did MPA and VPA for at least ten minutes, and how many minutes each day that they did these PA. Likewise, they were asked to self-report how many servings of FV that they typically eat on a daily basis. Discrepancies in reported PA levels and FV intake compared to actual levels of PA and FV intake are not uncommon, as is observed in the fact that only 70.09% (n = 75) of gardeners reported meeting the weekly recommendation for PA, but through gardening tasks alone 75.0% (n = 18) of gardeners were meeting the weekly recommendation for PA.

Chapter 6 - Conclusions

While the PBPN have similar disparities in education, unemployment levels, and poverty levels when compared to the general U.S. population, some of these disparities are not as severe as they are for all AI/AN in IHS areas. The PBPN members are more likely to have Bachelor's degrees and less likely to live in poverty compared to all AI/AN. However, PBPN members are more likely than AI/AN to be unemployed.

The largest age group of the PBPN was MA, while the largest age group of all races combined in the U.S. was YA. When compared to the general U.S. population, PBPN members were more likely to garden, to eat the daily recommended amount of FV, and to meet the weekly recommended amount of PA. Among the PBPN members, women were more likely than men to meet FV recommendations. Likewise, PBPN YA were more likely than MA and OA to have positive health indicators in the areas of FV consumption and PA levels.

The purpose in surveying members of the PBPN was to determine if tribal members who garden are more likely to have healthier habits of FV intake and PA levels, as well as better perceived health than members who do not garden. Among the PBPN, gardening is a predictor for some healthy habits, but not for all healthy habits, as gardeners are more likely to eat the recommended amount of vegetables, but are not more likely to eat the recommended amount of fruit or meet the recommended amount of PA. The likelihood that gardeners are more likely to meet vegetable recommendations leads to them being more likely to meet both FV recommendations, as well as FV and PA recommendations.

Healthy habits and health perceptions do not always align, as shown that gardeners are more likely to meet vegetable, FV, and FV and PA recommendations than non-gardeners, but do not perceive their health to be better. Differences in health perceptions and reality can also be seen in that the majority of PBPN tribal members reported their health as good, very good, or excellent, and yet a third of the members reported that they are limited in daily activities due to impairments or poor health. Again, discrepancies can be seen, as many gardeners met recommended PA levels through gardening tasks, but when reporting PA, fewer participants indicated meeting recommended PA levels compared to meeting recommended PA levels through gardening activities, again showing that perception and actuality are not always the same.

To better understand the link between gardening and healthy behaviors, as well as gardening and self-health perceptions, there are several ways in which research could move forward. While gardeners reported average daily servings of FV consumed and average weekly PA levels, it would be beneficial to have participants keep a log of food consumed and participation in PA, to more accurately determine who meets FV and PA recommendations. It would be interesting to track health indicators such as vegetable consumption and PA levels, to see if they increase when non-gardeners start and continue to garden. If health indicators increase with gardening, then the promoting of gardening could also promote healthier lifestyles. On a broader spectrum, it would be wise for future research to see if these results ring true for other AI/AN tribes, other races, and other geographic locations such as urban and rural.

This study has shown that the PBPN participants are more likely than the general U.S. and Kansas populations to meet FV and PA recommendations, yet many still fall short of meeting the FV and PA recommendations. The PBPN Tribal Council can further encourage tribal members to be physically active and increase FV consumption by creating a sub council that sets goals for the tribe and promotes infrastructure and activities that encourage, and allow, tribal members to more easily achieve these goals. To increase FV consumption, the council might consider policies focusing on local food, such as creating a farmer's market on the reservation or creating a Community Supported Agriculture program. Additionally, the council could strengthen, support and promote the three community gardens currently on the reservation, in which building awareness of the gardens and increasing participation is essential. The council might also consider promoting FV consumption among the youth, which they could accomplish by utilizing the Youth Center community garden for recreational and educational purposes, by introducing the youth to a variety of FV snacks at the Youth Center, and by providing cooking classes at the Youth Center. In addition to promoting FV consumption, the sub council could also encourage and promote increased PA levels. Creating walking and biking paths on the reservation could make outdoor PA more accessible and safe. The PBPN Health and Wellness Center's Diabetes Program provides several group physical activities in hopes to reduce the incidence of diabetes among tribal members, and a sub council could further raise awareness of and promote these group activities. Additional tribal activities that might encourage PA among PBPN members could include creating sports teams, such as basketball, to have intramural

competitions within the tribe. Such intramural sports could be created for adults, and others could be created for youth.

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Appendix A - Abbreviations

AI/AN	- American Indian/Alaska Native
BMI	- Body Mass Index
BRFSS	- Behavioral Risk Factor Surveillance System
CDC	- Centers for Disease Control and Prevention
CVD	- Cardiovascular Disease
DM	- Diabetes mellitus
FV	- Fruit and Vegetable
HHS	- Health and Human Services
IHS	- Indian Health Services
MET	- Metabolic Equivalent
MPA	- Moderate Physical Activity
MVPA	- Moderate and Vigorous Physical Activity
NHANES	- National Health and Nutrition Examination Survey
NHIS	- National Health Interview Survey
PA	- Physical Activity
PBPN	- Prairie Band Potawatomi Nation
U.S.	- United States of America
USDA	- United States Department of Agriculture
VPA	- Vigorous Physical Activity
WC	- Waist Circumference

Appendix B - Fall 2012 Survey

Vegetable Consumption and Physical Health Survey

A. <u>Information on Gardening</u>

1. Did you participate in the pre-season vegetable gardening workshop held last March *(at the Rock Building)? (<u>Mark one</u>)*

- ○ Yes
- ○ No

Yes	N = 12
No	N = 75
Missing	N = 0

2. How many years have you grown vegetables? *(<u>Please select one answer)</u>*

- ○ None - ***skip to Question 5.***
- ○ This was my 1st year
- ○ 1-5 years
- ○ 5-10 years
- ○ More than 10 years

None	N = 36
This was my 1st year	N = 10
1-5 years	N = 18
5-10 years	N = 7
More than 10 years	N = 13
Missing	N = 2

3. What vegetables did you grow this year? *(Select all that apply)*

- ○ Beans
- ○ Beets
- ○ Corn
- ○ Cucumbers
- ○ Cabbage
- ○ Cauliflower/ Broccoli
- ○ Cantaloupe
- ○ Carrots
- ○ Eggplant
- ○ Onions
- ○ Peas
- ○ Peppers
- ○ Potatoes
- ○ Squash – winter (including pumpkins)
- ○ Squash – summer (including Zucchini)
- ○ Salad greens
- ○ Tomatoes
- ○ Watermelons

Other

……

……..

Beans	N = 13	Salad greens	N = 7
Beets	N = 4	Tomatoes	N = 41
Corn	N = 19	Watermelons	N = 16
Cucumbers	N = 17	Chives	N = 1
Cabbage	N = 4	Grapes	N = 1
Cauliflower/Broccoli	N = 2	Parsley	N = 1
Cantaloupe	N = 6	Peppers, hot	N = 1
Carrots	N = 7	Rhubarb	N = 2
Eggplant	N = 2	Strawberries	N = 1
Onions	N = 17	Sweet Potatoes	N = 1
Peas	N = 5	None this year – last year tomatoes, peppers, cucumber, cantaloupe	N = 1
Peppers	N = 31	Drought – none	N = 1
Potatoes	N = 9	Did not grow this year	N = 1
Squash – winter	N = 13	NA	N = 37
Squash – summer	N = 13	Missing	N = 4

4. What was the major challenge you faced when growing vegetables this season?

……
……
……
……

Not really any – worked out well	N = 1	Weather	N = 1
None	N = 1	Water, sun	N = 1
Didn't grow	N = 1	No rain – high water bill	N = 1
Drought and even watering	N = 1	Too hot	N = 1
The drought	N = 1	Dry weather	N = 2
Water and more rain	N = 1	Keeping it watered, drought	N = 1
Brn hot	N = 1	Water	N = 2
It was so dry and my first year gardening without my dad	N = 1	Keeping it watered. It was a hot summer.	N = 1
Having to water all the time	N = 1	Keeping up with weeds	N = 1
Dry season	N = 1	Had a colony of blister beetles take over all of my melons	N = 1
Drought	N = 4	Blister beetles and water	N = 1
Heat, no rain	N = 1	Weeding	N = 1
Water & too much sun & some animals	N = 1	Rust on leaves, bugs	N = 1
Hot weather, not enough water	N = 1	Bugs	N = 1
Drought, getting tilled up	N = 1	Rabbits eating them	N = 1
Dry/ hot weather	N = 1	Needed help setting it up; neighbors crop dusted	N = 1
Needed rain	N = 1	Getting garden plowed	N = 1
Dry weather/ heat	N = 1	First year, not sure what to do	N = 1
The lack of water	N = 1	Too old	N = 1
No rain, corn smut	N = 1	Time	N = 1
Drought, tomato hornworms	N = 1	NA	N = 33
Frozen crops	N = 1	Missing	N = 6
Dryness	N = 1		

From Question 4, go to Question 6.

5. If you answered 'none' for question 2, what is the major reason you do not grow vegetables?

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No land for a garden	N = 1	Time available. Schedule.	N = 1
No space	N = 5	I work full-time & a part time job	N = 1
No good garden area	N = 1	No time or knowledge	N = 1
Did not have room	N = 1	Don't know how to grow	N = 1
Live in the city with no space to grow. No time (this is the major reason). My mom does it.	N = 1	Too many school activities and family meetings	N = 1
I rent, no suitable place to plant!	N = 1	Recently moved back here	N = 1
No plot	N = 1	Time	N = 2
I live in apartments and nowhere to grow	N = 1	Every time I try to grow something, an animal eats it	N = 1
No place to garden	N = 1	Not my thing	N = 1
Rental property	N = 1	Old age, 83 years old, limited work habits	N = 1
No room for a garden	N = 1	Elder	N = 1
No garden	N = 1	Getting the garden soil prepared	N = 1
No land	N = 1	It's my grandpa's and mine	N = 1
Live in an apartment	N = 1	Have no interest in gardening/planting	N = 1
We rent a house	N = 1	My husband passed away	N = 1
I don't know how to	N = 1	NA	N = 45
I don't have time to grow vegetables	N = 1	Missing	N = 4
No knowledge	N = 1		

B. Information on fruits & vegetables

6. When you go shopping what type of fruits do you ***usually*** purchase? *(Mark one)*

- ○ Fresh
- ○ Frozen
- ○ Canned, in natural juice
- ○ Canned, in syrup
- ○ I do not buy fruits

Fresh	N = 59	Frozen, Canned in syrup	N = 1
Frozen	N = 0	Fresh, Frozen, Canned in natural juice	N = 7
Canned, in natural juice	N = 2	Fresh, Frozen, Canned in syrup	N = 2
Canned, in syrup	N = 0	Fresh, Canned in natural juice, Canned in syrup	N = 1
I do not buy fruits	N = 0	Fresh, Frozen, Canned in natural juice, Canned in syrup	N = 4
Fresh, Frozen	N = 2	Missing	N = 1
Fresh, Canned in natural juice	N = 8		

7. When you go shopping what type of vegetables do you ***usually*** purchase? *(Mark one)*

- ○ Fresh
- ○ Frozen
- ○ Canned
- ○ I do not buy vegetables

Fresh	N = 41	Fresh, Frozen	N = 3
Frozen	N = 2	Fresh, Canned	N = 12
Canned	N = 11	Fresh, Frozen, Canned	N = 12
I do not buy vegetables	N = 1	Missing	N = 2

8. Where do you ***usually*** get fruits & vegetables from? *(Mark one)*

- ○ Grocery store
- ○ Convenience store
- ○ Farmers market
- ○ Community garden
- ○ Home garden
- ○ Neighbor or family
- ○ Other

Grocery store	N = 41	Grocery store, Farmers market, Community garden	N = 1
Convenience store	N = 0	Grocery store, Farmers market, Home garden	N = 9
Farmers market	N = 6	Grocery store, Farmers market, Neighbor or family	N = 3
Community garden	N = 1	Grocery store, Farmers market, Community garden, Home garden	N = 1
Home garden	N = 2	Grocery store, Farmers market, Community garden, Neighbor or family	N = 1
Neighbor or family	N = 0	Grocery store, Farmers market, Home garden, Neighbor or family	N = 2
Other - commods	N = 1	Grocery store, Farmers market, Neighbor or family, Other	N = 1
Grocery store, Farmers market	N = 8	Grocery store, Convenience store, Farmers market, Home garden, Other – local farmer	N = 1
Grocery store, Home garden	N = 1	Grocery store, Convenience store, Farmers market, Neighbor or family, Other	N = 1
Grocery store, Neighbor or family	N = 2	Grocery store, Farmers market, Community garden, Home garden, Neighbor or family	N = 2
Grocery store, Other	N = 1	Missing	N = 2

C. Information about the foods you eat

9. For each food listed, put a check showing how often on average you ate that item during the past year.

	Never	Once a week	2-4 per week	5-6 per week	Daily	Once a month	Once in 3 months	Once a year	Missing
Fresh Tomatoes	N = 4	N = 28	N = 26	N = 11	N = 5	N = 7	N = 0	N = 0	N = 6
Onions	N = 10	N = 21	N = 24	N = 7	N = 12	N = 1	N = 3	N = 1	N = 8
Raw Cucumbers (not including pickles)	N = 10	N = 32	N = 13	N = 5	N = 2	N = 11	N = 5	N = 2	N = 7
Melons	N = 0	N = 29	N = 11	N = 4	N = 2	N = 15	N = 8	N = 0	N = 18
Sweet or Hot Peppers (green, red, or yellow)	N = 16	N = 18	N = 18	N = 6	N = 4	N = 11	N = 2	N = 2	N = 10
Summer Squash/Zucchini	N = 19	N = 21	N = 6	N = 2	N = 1	N = 20	N = 6	N = 3	N = 9
Winter Squash	N = 31	N = 9	N = 7	N = 1	N = 0	N = 11	N = 4	N = 5	N = 19
Okra	N = 39	N = 3	N = 3	N = 1	N = 1	N = 12	N = 10	N = 5	N = 13
Cooked Greens (such as spinach, turnip, collard, or kale)	N = 27	N = 15	N = 7	N = 3	N = 1	N = 16	N = 7	N = 4	N = 7
Raw Greens (such as spinach, turnip, collard, or kale)	N = 27	N = 12	N = 10	N = 3	N = 3	N = 15	N = 6	N = 4	N = 7
French fries, home fries, hash browned potatoes, or tater tots	N = 3	N = 26	N = 31	N = 5	N = 1	N = 14	N = 2	N = 0	N = 5
Baked, boiled, or mashed potatoes	N = 1	N = 35	N = 27	N = 5	N = 2	N = 11	N = 2	N = 0	N = 4
Baked goods (such as cookies, cakes, or brownies)	N = 3	N = 34	N = 21	N = 4	N = 4	N = 13	N = 3	N = 0	N = 5

Please make sure you have placed a check mark in each row.

A serving of <u>fruit</u> is equal to:	**A serving of <u>vegetables</u> is equal to:**
1 medium piece of fresh fruit	1 medium carrot or other fresh vegetable
½ cup (4 oz.) of fruit salad	1 small bowl of green salad
¼ cup of raisins, apricots or other dried fruit	½ cup (4 oz.) of fresh or cooked vegetables
6 oz. of 100% orange, apple or grape juice	¾ cup (6 oz.) of vegetable soup
<u>Do not count</u> fruit punch, lemonade, Gatorade, Sunny Delight or fruit drink	<u>Do not count</u> French fries, onion rings, potato chips or fried okra

Instructions: Please answer the following questions about what **you** eat.

	0 None	**1 serving**	**2 servings**	**3 servings**	**4 servings or more**
10. On a <u>typical day</u>, how many servings of fruit do you eat?	◯	◯	◯	◯	◯
11. On a <u>typical day</u>, how many servings of vegetables do you eat?	◯	◯	◯	◯	◯

	0 - None	1 serving	2 servings	3 servings	4 servings or more	Missing
On a <u>typical day</u>, how many servings of fruit do you eat?	N = 3	N = 39	N = 31	N = 9	N = 4	N = 1
On a <u>typical day</u>, how many servings of vegetables do you eat?	N = 0	N = 30	N = 36	N = 14	N = 5	N = 2

D. Information about traditional foods

12. Over the past year did you eat any of the following **traditional foods?**

	Yes	No	Missing
Corn	N = 84	N = 1	N = 2
Fish	N = 68	N = 14	N = 4
Gooseberries	N = 51	N = 31	N = 4
Indian beans	N = 47	N = 30	N = 9
Milkweed	N = 65	N = 18	N = 4
Pawpaws	N = 28	N = 50	N = 8
Squash	N = 66	N = 18	N = 3
Wild potatoes	N = 30	N = 45	N = 12
Wild game	N = 64	N = 18	N = 5
Wild onions	N = 33	N = 44	N = 9
Wild rice	N = 62	N = 18	N = 6
Wild strawberries	N = 44	N = 37	N = 6

Please make sure you have placed a check in each row.

13. Over the past year how often did you eat **traditional foods?** *(Mark one)*

- ○ Occasionally (Once a season)
- ○ Regularly (2-3 times per week during the season)
- ○ Often (2-3 times per week all year)
- ○ Primarily during ceremonies/powwows

Occasionally (Once a season)	N = 22
Regularly (2-3 times per week during the season)	N = 23
Often (2-3 times per week all year)	N = 3
Primarily during ceremonies/ powwows	N = 35
Primarily during ceremonies/powwows/holidays	N = 1
Missing	N = 3

14. Over the past year how often did you drink **traditional Indian/wild teas?** *(Mark one)*

- o Occasionally (Once a season)
- o Regularly (2-3 times per week during the season)
- o Often (2-3 times per week all year)
- o Primarily during ceremonies/powwows

Occasionally (Once a season)	N = 40
Regularly (2-3 times per week during the season)	N = 7
Often (2-3 times per week all year)	N = 1
Primarily during ceremonies/ powwows	N = 31
None	N = 1
Missing	N = 7

E. Information about your activities

Instructions: We are interested in two types of physical activity – vigorous and moderate. Vigorous activities cause large increases in breathing or heart rate, while moderate activities cause small increases in breathing or heart rate. In the following section, please think about the physical activities **you** do in a typical week.

15. How many days per week do you do **moderate activities**, such as brisk walking, bicycling, vacuuming, gardening or anything else that causes some increase in breathing or heart rate for at least 10 minutes? **Do not include physical activity done for work.**

☐ Days per week

- o Mark if 0 days per week *and skip to Question 17*

16. On days when you do **moderate activities** for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

☐ Hours ☐ Minutes

Days per week	Hours & Minutes per day	
0 Days	0 Hours, 00 Minutes	N = 4
0 Days	NA	N = 10
1 Day	0 Hours, 10 Minutes	N = 3
1 Day	0 Hours, 15 Minutes	N = 1
1 Day	0 Hours, 30 Minutes	N = 1
1 Day	1 Hour, 00 Minutes	N = 1
1 Day	1 Hour, 30 Minutes	N = 1
1 Day	3 Hours, 00 Minutes	N = 1
1-2 Days	1 Hour, 30 Minutes	N = 1
2 Days	0 Hours, 10 Minutes	N = 1
2 Days	0 Hours, 20 Minutes	N = 1

2 Days	0 Hours, 30 Minutes	N = 3
2 Days	0 Hours, 45 Minutes	N = 3
2 Days	1 Hour, 00 Minutes	N = 1
2 Days	1-2 Hours, 00 Minutes	N = 1
2 Days	1 Hour, 30 Minutes	N = 1
2 Days	3 Hours, 00 Minutes	N = 1
2-3 Days	0 Hours, 30 Minutes	N = 1
3 Days	0 Hours, 20 Minutes	N = 5
3 Days	0 Hours, 30 Minutes	N = 5
3 Days	0 Hours, 45 Minutes	N = 1
3 Days	1 Hour, 00 Minutes	N = 6
3 Days	2 Hours, 00 Minutes	N = 2
3 Days	0 Hours, 150 Minutes	N = 1
4 Days	0 Hours, 15 Minutes	N = 1
4 Days	0 Hours, 55 Minutes	N = 1
4 Days	1 Hour, 00 Minutes	N = 2
4 Days	1 Hour, 15 Minutes	N = 1
4 Days	2 Hours, 00 Minutes	N = 1
4 Days	4 Hours, 00 Minutes	N = 1
5 Days	0 Hours, 30 Minutes	N = 2
5 Days	1 Hour, 00 Minutes	N = 3
5 Days	2 Hours, 00 Minutes	N = 3
5 Days	5 Hours, 00 Minutes	N = 1
6 Days	2 Hours, 10 Minutes	N = 1
6 Days	3 Hours, 20 Minutes	N = 1
7 Days	0 Hours, 20 Minutes	N = 1
7 Days	0 Hours, 30 Minutes	N = 2
7 Days	1 Hour, 00 Minutes	N = 3
7 Days	1 Hour, 30 Minutes	N = 1
7 Days	1 Hour, 40 Minutes	N = 1
7 Days	2 Hours, 00 Minutes	N = 1
Missing		N = 4

17. How many days per week do you do **vigorous activities** such as running, aerobics, heavy yard work or anything else that causes large increases in breathing or heart rate for at least 10 minutes? **Do not include physical activity done for work.**

☐ Days per week

○ Mark if 0 days per week and *skip to Question 19*

18. On days when you do **vigorous activities** for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

☐ Hours ☐ Minutes

Days per week	Hours & Minutes per day	
0 Days	0 Hours, 00 Minutes	N = 8
0 Days	0 Hours, 15 Minutes	N = 1
0 Days	NA	N = 19
1 Day	0 Hours, 10 Minutes	N = 2
1 Day	0 Hours, 15 Minutes	N = 1
1 Day	0 Hours, 20 Minutes	N = 2
1 Day	0 Hours, 30 Minutes	N = 4
1 Day	1 Hour, 00 Minutes	N = 2
1 Day	2 Hours, 00 Minutes	N = 1
1 Day	4 Hours, 00 Minutes	N = 1
2 Days	0 Hours, 00 Minutes	N = 2
2 Days	0 Hours, 20 Minutes	N = 1
2 Days	0 Hours, 30 Minutes	N = 5
2 Days	0 Hours, 45 Minutes	N = 3
2 Days	1 Hour, 00 Minutes	N = 4
2 Days	1 Hour, 30 Minutes	N = 1
2 Days	2 Hour, 00 Minutes	N = 1
2 Days	4 Hour, 00 Minutes	N = 1
3 Days	0 Hours, 40 Minutes	N = 1
3 Days	0 Hours, 45 Minutes	N = 1
3 Days	1 Hour, 00 Minutes	N = 6
3 Days	1 Hour, 30 Minutes	N = 1
3 Days	2 Hour, 00 Minutes	N = 1
3 Days	2 Hour, 20 Minutes	N = 1
3 Days	3 Hour, 00 Minutes	N = 1
4 Days	1 Hour, 00 Minutes	N = 1
4 Days	1 Hour, 25 Minutes	N = 1
5 Days	0 Hours, 30 Minutes	N = 1
5 Days	1-2 Hours, 00 Minutes	N = 1
5 Days	1 Hour, 30 Minutes	N = 1
5 Days	2 Hour, 00 Minutes	N = 1

5 Days	5 Hour, 30 Minutes	N = 1
7 Days	1 Hour, 30 Minutes	N = 1
Missing		N = 8

19. In a typical week, how many days do you participate in **community-sponsored physical activity** *(zumba, walks, chair exercises)*?

☐ Days per week

0 Days	N = 43	5 Days	N = 2
1 Day	N = 16	7 Days	N = 1
2 Days	N = 3	1 (ish)	N = 1
3 Days	N = 9	Missing	N = 11
4 Days	N = 1		

F. Information about your health

20. Would you say that in general your health is *(Mark one)*

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

Excellent	N = 4	Fair	N = 26
Very Good	N = 16	Poor	N = 3
Good	N = 37	Missing	N = 1

21. During the ***past 30 days*,** how many days did poor physical health keep you from doing your usual activities, such as self-care, work, gardening or recreation?

☐ Days

0 Days	N = 47	10 Days	N = 4
1 Day	N = 3	14 Days	N = 2
2 Days	N = 5	15 Days	N = 3
3 Days	N = 3	21 Days	N = 1
4 Days	N = 4	28 Days	N = 1
5 Days	N = 5	30 Days	N = 1
6 Days	N = 1	31 Days	N = 1
7 Days	N = 3	Missing	N = 6

22. Are you limited in any way in daily activities because of any impairment or health problem? *(Mark one)*

○ Yes, if yes, what is the major impairment or health problem that limits your activities?

_____

○ No

No	N = 49	Yes – bad lungs – for now	N = 1
Yes – arthritis	N = 4	Yes – my PCOS annoys the heck out of me	N = 1
Yes – rheumatoid arthritis	N = 1	Yes – no kidneys	N = 1
Yes – DJD knees	N = 1	Yes – Internal infection	N = 1
Yes – walking	N = 1	Yes – recently had a stroke	N = 1
Yes – 3 weeks with sciatic nerve irritation in hip	N = 1	Yes - asthma	N = 2
Yes – arthurish	N = 2	Yes – heart & asthma	N = 1
Yes – hip pain	N = 1	Yes – pregnancy	N = 1
Yes – lower back pain	N = 1	Yes – no energy	N = 1
Yes – knee problem	N = 1	Yes – just overweight	N = 1
Yes – back injury	N = 1	Yes – 83 years of age – limited	N = 1
Yes – knee	N = 1	Yes – Elder age 79	N = 2
Yes – my foot	N = 1	Yes – no reason given	N = 2
Yes – COPD & bad knees	N = 1	Missing	N = 5
Yes - COPD	N = 1		

23. How would you compare your health to the health of the rest of the community in general? *(Mark one)*

○ My health is excellent compared to the rest of the community
○ My health is better compared to the rest of the community
○ My health is about the same as the rest of the community
○ My health is worse than the rest of the community
○ My health is significantly worse than the rest of the community

My health is excellent compared to the rest of the community	N = 4
My health is better compared to the rest of the community	N = 28
My health is about the same as the rest of the community	N = 40
My health is worse than the rest of the community	N = 10
My health is significantly worse than the rest of the community	N = 2
Missing	N = 3

G. Information about you and your household

24. What is your gender? *(Mark one)*

- ○ Male
- ○ Female

Male	N = 23
Female	N = 64
Missing	N = 0

25. What is your age? ☐

18 years old	N = 2	52 years old	N = 1
19 years old	N = 1	54 years old	N = 1
20 years old	N = 1	55 years old	N = 2
21 years old	N = 3	57 years old	N = 2
22 years old	N = 1	58 years old	N = 1
24 years old	N = 2	59 years old	N = 3
25 years old	N = 3	60 years old	N = 1
27 years old	N = 5	61 years old	N = 1
28 years old	N = 1	62 years old	N = 1
29 years old	N = 1	63 years old	N = 5
30 years old	N = 1	65 years old	N = 3
33 years old	N = 2	66 years old	N = 5
34 years old	N = 4	67 years old	N = 1
36 years old	N = 2	68 years old	N = 1
37 years old	N = 1	69 years old	N = 1
38 years old	N = 1	70 years old	N = 1
39 years old	N = 2	71 years old	N = 1
41 years old	N = 3	73 years old	N = 2
42 years old	N = 1	74 years old	N = 1
43 years old	N = 2	75 years old	N = 2
44 years old	N = 1	78 years old	N = 2
45 years old	N = 1	79 years old	N = 1
47 years old	N = 1	83 years old	N = 1
49 years old	N = 1	87 years old	N = 1
51 years old	N = 1	Missing	N = 1

26. How many adults ***(over the age of 18)*** are currently living in your home? ☐

0 Adults	N = 9	4 Adults	N = 10
1 Adult	N = 14	5 Adults	N = 3
2 Adults	N = 40	Missing	N = 1
3 Adults	N = 10		

27. How many children ***(under the age of 18)*** are currently living in your home? ☐

0 Kids	N = 38	6 Kids	N = 0
1 Kid	N = 12	7 Kids	N = 0
2 Kids	N = 15	8 Kids	N = 4
3 Kids	N = 7	9 Kids	N = 1
4 Kids	N = 6	Missing	N = 1
5 Kids	N = 3		

28. What is the highest grade of school or year of college you have completed?
Mark the highest category you have completed.

- ○ Elementary (K – 6th Grade)
- ○ Middle School (6th – 8th Grade)
- ○ High School (9th – 12th Grade)
- ○ Associates Degree or Two Years of College
- ○ Bachelor's Degree or Higher

Elementary (K – 6th Grade)	N = 1
Middle School (6th – 8th Grade)	N = 4
High School (9th – 12th Grade)	N = 37
Associates Degree or Two Years of College	N = 23
Bachelor's Degree or Higher	N = 20
Masters Degree	N = 1
Missing	N = 1

29. Do you or your family own the place where you are living now, or do you rent? *(Mark one)*

- ○ Own
- ○ Rent

Own	N = 50
Rent	N = 34
Tribal owned	N = 1
Missing	N = 2

30. Are you currently working?

- ○ Yes
- ○ No, if No, what is your situation? *(Mark one)*
  - ○ Temporarily laid off
  - ○ Unemployed
  - ○ Retired
  - ○ Permanently disabled
  - ○ Homemaker
  - ○ Student
  - ○ Other

Yes – currently working	N = 38	No – student	N = 9
No – temporarily laid off	N = 1	No – other	N = 3
No – unemployed	N = 2	No – no reason given	N = 3
No – retired	N = 22	No – Retired, permanently disabled	N = 1
No – permanently disabled	N = 3	Missing	N = 1
No – homemaker	N = 4		

31. If you added together the yearly incomes, before taxes, of all the members of your household for last year, what would the total be? *(Mark one)*

- ○ $ 0 - $ 9,999
- ○ $ 10,000 - $ 19,999
- ○ $ 20,000 - $ 29,999
- ○ $ 30,000 - $ 39,999
- ○ $ 40,000 - $ 49,999
- ○ Over $ 50,000

$0 - $9,999	N = 13	$40,000 - $49,999	N = 7
$10,000 - $19,999	N = 6	Over $50,000	N = 18
$20,000 - $29,999	N = 19	Missing	N = 9
$30,000 - $39,999	N = 15		

32. Is there anything else you would like to comment on regarding gardening, eating fruits and vegetables, or your health?

* Having recipes printed so can take home for those without internet access	
* I enjoyed the gardening presentation and it was a good incentive to continue gardening.	
* I love to be outdoors eating tomatoes	
* Having a master's degree merits it's own "x"	
* Thanks for this survey	
* I've drastically changed my diet and exercise in March 2012 and am trying to "return to a healthy past!"	
* my health is fairly good at this time.	
* Need to find a way to get rid of the blister beetle colony in my yard :)	
* gardening was very fun, watching seeds grow into fruits & veggies. Kids loved to help water and care for garden also.	
* Eat fruits almost everyday!	
* What does income have to do with Native food?	
* would like to be introduced to more fruits & alternative ways to eat/serve etc.	
* I would like to learn more and be involved w/ spring planting and all through the year. (email and phone number included)	
* Almost blind & no kidneys make activities difficult	
* You're doing a good job We just need to get active!	
* need insurance!	
* It would be nice if the Diabetes Program could put current Diabetes info. On PBPN Website	
* Composting or maintaining good soil?	
* promotes good and strong mind, body and spirit	
* I love veggies/fruits ;)	
* need more activity in garden.	
* I love vegetables!!!	
* I am borderline Diabetic - need healthy suggestions	
* I'm done & happy :)	
No	N = 13
Missing	N = 50

Thank you for your participation!

Appendix C - Fall 2013 Survey

Vegetable Consumption and Physical Health Survey – PBPN Harvest Feast 2013

A. <u>Information on Gardening</u>

1. Did you participate in the pre-season vegetable gardening workshop held last April *(at the Rock Building)? (<u>Mark one</u>)*

- ○ Yes
- ○ No

Yes	N = 26
No	N = 70
Missing	N = 1

2. Did you have a vegetable garden this year?

- ○ Yes ***If yes, skip to Section B***
- ○ No

Yes	N = 47
No	N = 48
Missing	N = 2

3. If you answered 'No' for question 2, what is the major reason you do not grow vegetables? *(Mark one)*

- ○ No knowledge
- ○ No land/ space
- ○ No interest
- ○ No time

Other

……

……

No knowledge	N = 4	No land/space, no time	N = 4
No land/ space	N = 14	No knowledge, no time	N = 1
No interest	N = 0	No knowledge, no land/space	N = 1
No time	N = 12	No time, other – late frost	N = 1
Other – no reason given	N = 1	No time, other – lazy	N = 1
Other – 75 years old	N = 1	No interest, other - handicap	N = 1
Other – no tiller	N = 1	No land/space, no time, other – on Tribal Council	N = 1
Other – can't have gardens in 4th cluster	N = 1	No knowledge, no interest, no time - probably	N = 1
Other – not sure how to start one	N = 1	Missing	N = 8
Other – I didn't have a garden	N = 1		

B. Information about the foods you eat

A serving of fruit is equal to:	**A serving of vegetables is equal to:**
1 medium piece of fresh fruit	1 medium carrot or other fresh vegetable
½ cup (4 oz.) of fruit salad	1 small bowl of green salad
¼ cup of raisins, apricots or other dried fruit	½ cup (4 oz.) of fresh or cooked vegetables
6 oz. of 100% orange, apple or grape juice	¾ cup (6 oz.) of vegetable soup
Do not count fruit punch, lemonade, Gatorade, Sunny Delight or fruit drink	Do not count French fries, onion rings, potato chips or fried okra

Instructions: Please answer the following questions about what **you** eat.

	0 None	**1 serving**	**2 servings**	**3 servings**	**4 servings or more**
4. On a typical day, how many servings of fruit do you eat?	◯	◯	◯	◯	◯
5. On a typical day, how many servings of vegetables do you eat?	◯	◯	◯	◯	◯

	0 - None	1 serving	2 servings	3 servings	4 servings or more	1 or 2 servings	2 or 3 servings	Missing
On a typical day, how many servings of fruit do you eat?	N = 9	N = 28	N = 42	N = 11	N = 4	N = 1	N = 2	N = 0
On a typical day, how many servings of vegetables do you eat?	N = 5	N = 27	N = 41	N = 17	N = 4	N = 0	N = 1	N = 2

6. On days you eat fruit, what type do you <u>most often</u> eat?

- ○ Fresh fruit
- ○ Frozen fruit
- ○ Canned fruit in natural juice
- ○ Canned fruit in syrup
- ○ Dried fruit
- ○ I do not eat fruit

<u>Mark only one</u>

Fresh fruit	N = 68	Fresh, Canned in syrup	N = 2
Frozen fruit	N = 2	Fresh, Dried	N = 4
Canned fruit in natural juice	N = 8	Fresh, Frozen, Canned in natural juice	N = 1
Canned fruit in syrup	N = 4	Fresh, Canned in syrup, Dried	N = 1
Dried fruit	N = 1	Fresh, Frozen, Canned in natural juice, Canned in syrup	N = 1
I do not eat fruit	N = 1	Missing	N = 1
Fresh, Frozen	N = 3		

7. On days you eat vegetables, what type do you <u>most often</u> eat?

- ○ Fresh
- ○ Frozen
- ○ Canned
- ○ I do not eat vegetables

<u>Mark only one</u>

Fresh vegetables	N = 42	Fresh, Frozen	N = 1
Frozen vegetables	N = 4	Fresh, Canned	N = 4
Canned vegetables	N = 42	Fresh, Frozen, Canned	N = 1
I do not eat vegetables	N = 3	Missing	N = 999

C. Information about your activities

Instructions: We are interested in two types of physical activity – vigorous and moderate. Vigorous activities cause large increases in breathing or heart rate, while moderate activities cause small increases in breathing or heart rate. In the following section, please think about the physical activities **you** do in a typical week.

8. How many days per week do you do **moderate activities**, such as brisk walking, bicycling, vacuuming, gardening or anything else that causes some increase in breathing or heart rate for at least 10 minutes? **Do not include physical activity done for work.**

☐ Days per week

○ Mark if 0 days per week and ***skip to Question 10***

9. On days when you do **moderate activities** for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

☐ Hours ☐ Minutes

Days per week	Hours & Minutes per day	
0 Days	0 Hours, 00 Minutes	N = 2
0 Days	0 Hours, 30 Minutes	N = 1
0 Days	NA	N = 10
1 Day	0 Hours, 10 Minutes	N = 1
1 Day	0 Hours, 15 Minutes	N = 1
1 Day	0 Hours, 30 Minutes	N = 4
1 Day	1 Hour, 00 Minutes	N = 1
1 Day	2 Hours, 0 Minutes	N = 1
1-2 Days	2 Hours, 00 Minutes	N = 1
2 Days	0 Hours, 00 Minutes	N = 1
2 Days	0 Hours, 15 Minutes	N = 1
2 Days	0 Hours, 20 Minutes	N = 1
2 Days	0 Hours, 30 Minutes	N = 1
2 Days	1 Hour, 00 Minutes	N = 1
2 Days	1 Hour, 30 Minutes	N = 1
2 Days	2 Hours, 00 Minutes	N = 1
2 Days	Missing	N = 1
3 Days	0 Hours, 10 Minutes	N = 1
3 Days	0 Hours, 30 Minutes	N = 5
3 Days	0 Hours, 45 Minutes	N = 1
3 Days	1 Hour, 00 Minutes	N = 6
3 Days	1 Hour, 10 Minutes	N = 1
3 Days	1 Hour, 30 Minutes	N = 1
3 Days	1 Hours, 40 Minutes	N = 1

3 Days	2 Hours, 00 Minutes	N = 2
3 Days	3 Hours, 00 Minutes	N = 1
3 Days	4 Hours, 00 Minutes	N = 1
3-4 Days	0 Hours, 30 Minutes	N = 1
3-4 Days	1 Hour, 00 Minutes	N = 1
4 Days	0 Hours, 10-15 Minutes	N = 1
4 Days	0 Hours, 30 Minutes	N = 1
4 Days	0 Hours, 40 Minutes	N = 1
4 Days	0 Hours, 45 Minutes	N = 1
4 Days	1 Hour, 30 Minutes	N = 1
4 Days	2 Hours, 00 Minutes	N = 1
4 Days	12 Hours, 00 Minutes	N = 1
5 Days	0 Hours, 30 Minutes	N = 1
5 Days	0 Hours, 40 Minutes	N = 1
5 Days	1 Hour, 00 Minutes	N = 4
5 Days	1 Hour, 30 Minutes	N = 1
5 Days	2 Hours, 00 Minutes	N = 3
5 Days	2 Hours, 30 Minutes	N = 1
5 Days	4 Hours, 00 Minutes	N = 1
5 Days	5 Hours, 00 Minutes	N = 2
5 Days	8 Hours, 00 Minutes	N = 1
5 Days	Missing	N = 2
5-6 Days	0 Hours, 10 Minutes	N = 1
6 Days	1 Hour, 00 Minutes	N = 1
6 Days	4 Hours, 00 Minutes	N = 1
6 Days	7 Hours, 00 Minutes	N = 1
6 Days	8 Hours, 00 Minutes	N = 1
7 Days	0 Hours, 20 Minutes	N = 1
7 Days	1 Hour, 00 Minutes	N = 1
7 Days	2 Hours, 00 Minutes	N = 1
7 Days	3 Hour, 00 Minutes	N = 2
7 Days	4 Hours, 00 Minutes	N = 3
7 Days	5 Hour, 00 Minutes	N = 1
7 Days	7 Hours, 00 Minutes	N = 1
7 Days	8 Hours, 00 Minutes	N = 1
7 Days	10 Hours, 00 Minutes	N = 1
7 Days	?	N = 1
11 Days	0 Hours, 15 Minutes	N = 1
Missing		N = 2

10. How many days per week do you do **vigorous activities** such as running, aerobics, heavy yard work or anything else that causes large increases in breathing or heart rate for at least 10 minutes? **Do not include physical activity done for work.**

☐ Days per week

○ Mark if 0 days per week and ***skip to Question 12***

11. On days when you do **vigorous activities** for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

☐ Hours ☐ Minutes

Days per week	Hours & Minutes per day	
0 Days	0 Hours, 00 Minutes	N = 8
0 Days	0 Hours, 10 Minutes	N = 1
0 Days	0 Hours, 30 Minutes	N = 1
0 Days	1 Hour, 30 Minutes	N = 1
0 Days	5 Hours, 00 Minutes	N = 1
0 Days	6 Hours, 00 Minutes	N = 1
0 Days	NA	N = 28
1 Day	0 Hours, 10 Minutes	N = 1
1 Day	0 Hours, 15 Minutes	N = 1
1 Day	0 Hours, 20 Minutes	N = 1
1 Day	0 Hours, 40 Minutes	N = 2
1 Day	1 Hour, 00 Minutes	N = 3
1 Day	2 Hours, 00 Minutes	N = 3
1 Day	Missing	N = 1
2 Days	0 Hours, 00 Minutes	N = 1
2 Days	0 Hours, 30 Minutes	N = 3
2 Days	1 Hour, 00 Minutes	N = 4
2 Days	1 Hour, 30 Minutes	N = 1
2 Days	2 Hours, 00 Minutes	N = 3
2 Days	6 Hours, 00 Minutes	N = 1
2 Days	8 Hours, 00 Minutes	N = 1
3 Days	0 Hours, 20 Minutes	N = 1
3 Days	0 Hours, 30 Minutes	N = 2
3 Days	0 Hours, 45 Minutes	N = 3
3 Days	1 Hour, 00 Minutes	N = 1
3-4 Days	1 Hour, 00 Minutes	N = 1
4 Days	0 Hours, 45 Minutes	N = 1
4 Days	1 Hour, 30 Minutes	N = 1
4 Days	2 Hours, 00 Minutes	N = 1
4 Days	7 Hours, 00 Minutes	N = 1
5 Days	0 Hours, 30 Minutes	N = 1

5 Days	1 Hour, 00 Minutes	N = 1
5 Days	2 Hours, 00 Minutes	N = 2
5 Days	8 Hours, 00 Minutes	N = 2
6 Days	1 Hour, 00 Minutes	N = 1
6 Days	2 Hours, 00 Minutes	N = 1
6 Days	Missing	N = 1
7 Days	1 Hour, 00 Minutes	N = 1
7 Days	1 Hour, 30 Minutes	N = 1
7 Days	3 Hours, 00 Minutes	N = 1
7 Days	?	N = 1
Missing	0 Hours, 20 Minutes	N = 1
Missing		N = 4

D. Information about your health

12. Would you say that in general your health is *(Mark one)*

- ○ Excellent
- ○ Very Good
- ○ Good
- ○ Fair
- ○ Poor

Excellent	N = 6	Poor	N = 2
Very Good	N = 15	I do not know	N = 1
Good	N = 47	Missing	N = 0
Fair	N = 26		

13. During the ***past 30 days***, how many days did poor physical health keep you from doing your usual activities, such as self-care, work, gardening or recreation?

☐ Days

0 Days	N = 52	10 Days	N = 2
1 Day	N = 6	15 Days	N = 1
2 Days	N = 12	20 Days	N = 1
3 Days	N = 3	21 Days	N = 1
4 Days	N = 1	25 Days	N = 1
5 Days	N = 6	30 Days	N = 1
6 Days	N = 1	Missing	N = 7
7 Days	N = 1		

14. Are you limited in any way in daily activities because of any impairment or health problem? *(Mark one)*

○ Yes, if yes, what is the major impairment or health problem that limits your activities?

_____

○ No

No	N = 72	Yes – rheumatoid arthritis	N = 1
Yes – no reason give	N = 1	Yes – COPD	N = 1
Yes – pain	N = 1	Yes – arthritis, fibromyalgia, stage one breast cancer	N = 1
Yes – incomplete quadriplegic	N = 1	Yes – obesity	N = 1
Yes – asthma	N = 1	Yes – shingles flare-up – pain and itching, arthritis	N = 1
Yes – need replacement on both knees	N = 1	Yes – hearing loss – imbalance	N = 1
Yes – arthritis	N = 2	Yes – chronic pain, trouble walking (pain)	N = 1
Yes – bad knees	N = 2	Yes – new knees	N = 1
Yes – tiredness	N = 1	Yes – blind, no kidneys	N = 1
Yes – rest	N = 1	Missing	N = 4
Yes – too heavy, old	N = 1		

15. How would you compare your health to the health of the rest of the community in general? *(Mark one)*

○ My health is excellent compared to the rest of the community
○ My health is better compared to the rest of the community
○ My health is about the same as the rest of the community
○ My health is worse than the rest of the community
○ My health is significantly worse than the rest of the community

My health is excellent compared to the rest of the community	N = 8
My health is better compared to the rest of the community	N = 27
My health is about the same as the rest of the community	N = 52
My health is worse than the rest of the community	N = 6
My health is significantly worse than the rest of the community	N = 0
I do not know	N = 1
Missing	N = 3

E. Information about you and your household

16. What is your gender? *(Mark one)*

- ○ Male
- ○ Female

Male	N = 30
Female	N = 66
Missing	N = 0

17. What is your age? ☐

18 years old	N = 2	52 years old	N = 1
23 years old	N = 1	54 years old	N = 2
24 years old	N = 2	55 years old	N = 2
26 years old	N = 3	56 years old	N = 2
27 years old	N = 1	58 years old	N = 2
28 years old	N = 6	59 years old	N = 3
29 years old	N = 5	61 years old	N = 2
30 years old	N = 4	62 years old	N = 2
31 years old	N = 1	63 years old	N = 3
33 years old	N = 1	64 years old	N = 4
34 years old	N = 2	65 years old	N = 4
35 years old	N = 5	66 years old	N = 1
37 years old	N = 3	67 years old	N = 2
38 years old	N = 1	69 years old	N = 2
40 years old	N = 1	70 years old	N = 1
41 years old	N = 2	71 years old	N = 1
42 years old	N = 1	73 years old	N = 1
43 years old	N = 1	74 years old	N = 3
44 years old	N = 1	75 years old	N = 1
45 years old	N = 2	76 years old	N = 1
48 years old	N = 6	77 years old	N = 2
50 years old	N = 1	Missing	N = 1
51 years old	N = 2		

18. How many adults ***(over the age of 18)*** are currently living in your home? ☐

0 Adults	N = 10	4 Adults	N = 4
1 Adult	N = 19	5 Adults	N = 8
2 Adults	N = 42	Missing	N = 2
3 Adults	N = 12		

☐

19. How many children ***(under the age of 18)*** are currently living in your home?

0 Kids	N = 44	5 Kids	N = 4
1 Kid	N = 15	7 Kids	N = 4
2 Kids	N = 13	13 Kids	N = 1
3 Kids	N = 10	Missing	N = 3
4 Kids	N = 3		

20. What is the highest grade of school or year of college you have completed?
Mark the highest category you have completed.

- ○ Never attended school or only attended kindergarten
- ○ Grades 1 through 8 (Elementary)
- ○ Grades 9 through 11 (Some high school)
- ○ Grade 12 or GED (High school graduate)
- ○ College 1 year to 3 years (Some college or technical school)
- ○ College 4 years or more (College graduate)

Never attended school or only attended kindergarten	N = 0
Grades 1 through 8 (Elementary)	N = 1
Grades 9 through 11 (Some high school)	N = 5
Grade 12 or GED (High school graduate)	N = 27
College 1 year to 3 years (Some college or technical school)	N = 46
College 4 years or more (College graduate)	N = 17
Missing	N = 1

21. Do you live on the PBPN reservation? *(Mark one)*

- ○ Yes
- ○ No

Yes	N = 61
No	N = 35
Missing	N = 1

22. Do you have access to land suitable for gardening? *(Mark one)*

- ○ Yes
- ○ No

Yes	N = 73
No	N = 23
I don't know	N = 1
Missing	N = 0

23. Are you currently..? *(Mark one)*

- ○ Employed for wages
- ○ Self employed
- ○ Out of work for 1 year or more
- ○ Out of work for less than 1 year
- ○ A homemaker
- ○ Student
- ○ Retired
- ○ Unable to work

Employed for wages	N = 52	Unable to work	N = 7
Self employed	N = 0	Employed for wages, Retired	N = 2
Out of work for 1 year or more	N = 3	Self-employed, Retired	N = 1
Out of work for less than 1 year	N = 3	Retired, Unable to work	N = 2
A homemaker	N = 8	Employed for wages, Self-employed, A homemaker	N = 1
Student	N = 1	Missing	N = 0
Retired	N = 17		

24. If you added together the yearly incomes, before taxes, of all the members of your household for last year, what would the total be? *(Mark one)*

- ○ $ 0 - $ 9,999
- ○ $ 10,000 - $ 14,999
- ○ $ 15,000 - $ 19,999
- ○ $ 20,000 - $ 24,999
- ○ $ 25,000 - $ 29,999
- ○ $ 30,000 - $ 39,999
- ○ $ 40,000 - $ 49,999
- ○ Over $ 50,000

$0 - $9,999	N = 13	$30,000 - $39,999	N = 7
$10,000 - $14,999	N = 13	$40,000 - $49,999	N = 14
$15,000 - $19,999	N = 10	Over $50,000	N = 17
$20,000 - $24,999	N = 15	Missing	N = 5
$25,000 - $29,999	N = 2		

25. Is there anything else you would like to comment on regarding gardening, eating fruits and vegetables, or your health?

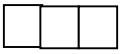
* More community education on natural foods, processed foods as well, vegetable juicing, eating well and living well. Must combine with financial stability, personal wealth, retirement goals, etc. It's all included in a good/excellent life plan.	
* More people should do it if possible	
* We need to eat more vegetables and fruit.	
* I/we eat both fresh& canned fruit. Gardening is a task we grow fresh wild strawberries our little patch is productive.	
* Really enjoy fresh tomatoes	
* Fruits and veggies are good for you!	
* Indians like to EAT!!!	
* The plants that I received from garden program was successful	
* Nothing further at this time	
* I need to start to learn how to garden better	
* more information	
* very important	
* I enjoy the cycle from gardening to harvest.	
* After taking this survey, I feel like I need to take better care of myself.	
* I love food!!!	
* loved winning Blackberry bushes last year	
* I would like more info on how to start my own garden!	
* Need more help on using Roto Tiller. Can use more dirt!	
* I like gardening teaching my grandchildren on how to plant and when to pick	
* I appreciate all the PBPN does to promote healthy eating & healthy lifestyles	
* Considering my health. I have my good days & not so good days.	
* Need more healthful foods	
No	N = 16
Missing	N = 58

Thank you for your participation!

Appendix D - Spring 2014 Survey

GARDENING AND HEALTH SURVEY

A. Information about your gardening:



1. Did you garden as a child?
   - Yes
   - No

Yes	N = 42
No	N = 16
Missing	N = 0

2. Did your family have a vegetable garden while you were growing up?
   - Yes
   - No

Yes	N = 44
No	N = 13
Missing	N = 1

3. Did you have a vegetable garden last year?
   - Yes
   - No

Yes	N = 36
No	N = 22
Missing	N = 0

4. Do you plan to have a vegetable garden this year?
   - Yes
   - No

Yes	N = 51
No	N = 5
Maybe	N = 1
Missing	N = 1

5. How many years have you grown vegetables? (*Please select one answer*)
    - None – ***skip to Question 8, on page 3***
    - This will be my first year
    - 1-5 years
    - 5-10 years
    - More than 10 years

None	N = 6	5-10 years	N = 12
This will be my first year	N = 4	More than 10 years	N = 22
1-5 years	N = 14	Missing	N = 0

6. Do you eat the fresh fruits and vegetables that you grow?
    - Yes: Why do you eat the fruits and/or vegetables that you grow?
      _____
      _____.
    - No: Why don't you eat the fruits and/or vegetables that you grow?
      _____
      _____.

Yes – no reason given	N = 9	Yes – that's why I/we grow them	N = 2
Yes – I want to eat food that I know where it came from. I love eating healthy!	N = 1	Yes – Love eating fresh homegrown vegetables	N = 1
Yes – No chemicals!	N = 1	Yes – Because they taste better!	N = 1
Yes – taste better	N = 2	Yes – They're free	N = 1
Yes – That's purpose of garden	N = 1	Yes – Organic and flavorful	N = 1
Yes – They are fresh and I know who grew them.	N = 1	Yes – Like fresh vegetables better than store	N = 1
Yes – For health & wellness	N = 1	Yes – Because I was hungry & because no one else grew corn in Oklahoma.	N = 1
Yes - Tomatoes, onions, okra, cucumber	N = 1	Yes – I plan to – Because they took a lot of time & effort & they aren't genetically modified. Also I hear they taste better.	N = 1
Yes – No pesticides	N = 1	Yes – Taste better than store – save money – better health	N = 1
Yes – Know they are fresh	N = 1	Yes – Cheaper and more convenient	N = 1
Yes – Healthy, low cost	N = 1	Yes – fresh vegetables and easy access	N = 1
Yes – I use Heirloom strains and save the seeds for the next year. No GMO's.	N = 1	Yes – they are better quality & free	N = 1
Yes – Healthy	N = 1	Yes – fresh & can lots of them	N = 1
Yes – healthier, cheaper	N = 1	Yes – accomplishment	N = 1

Yes – That's why we grow them. They taste better fresh.	N = 1	Yes – taste better/ fresh	N = 1
Yes – taste better, cheaper than store bought	N = 1	Yes – My grandpa had a huge garden, and I have enjoyed fresh fruit/vegs.	N = 1
Yes – They are good	N = 1	Yes – Fresh, taste better than store bought	N = 1
Yes – They are good to eat	N = 1	Yes – to be healthy	N = 1
Yes – Good	N = 1	No – no reason given	N = 0
Yes – They are good for me & that's why I grow them	N = 1	No – Haven't grown any	N = 1
Yes – green beans, zucchini, corn	N = 1	No – haven't grown any yet	N = 1
Yes – taste so good and much better than store bought	N = 1	Missing	N = 0

Continued on next page

7. Instructions:
   1) Select the column that indicates, on average, **HOW MANY TIMES A WEEK** you perform a specified gardening activity during the growing season.

   2) Please write the number of minutes of **HOW LONG**, on average, you usually spent doing each gardening activity.

Home Gardening Activities in the Last Month	How Many Times Each Week Activity Is Done								How Long Each Time the Activity Is Done
	0	1	2	3	4	5	6	7	In Minutes
Example: *Weeding, cultivating the garden*			√						35
Digging, spading, composting									
Tilling a garden									
Planting seedlings, shrubs									
Walking while applying fertilizer or seeding a lawn									
Watering the lawn or garden while standing or walking									
Weeding, cultivating the garden									
Gardening in general									
Picking up yard, picking flowers or vegetables									
Walking while gathering gardening tools									
Mowing the yard									

Digging, spading, composting		
Days per week	Minutes per day	
0 Days	30 minutes	N = 1
0 Days	60 minutes	N = 1
0 Days	NA	N = 12
1 Day	10 minutes	N = 2
1 Day	15 minutes	N = 1
1 Day	20 minutes	N = 5
1 Day	30 minutes	N = 1
1 Day	35 minutes	N = 1
1 Day	45 minutes	N = 1
1 Day	Missing	N = 2
2 Days	10 minutes	N = 1
2 Days	20 minutes	N = 1
2 Days	30 minutes	N = 2
2 Days	35 minutes	N = 1
2 Days	10-60 minutes	N = 1
2 Days	60 minutes	N = 1
2 Days	Missing	N = 1
3 Days	20 minutes	N = 1
3 Days	60 minutes	N = 1
4 Days	Missing	N = 1
5 Days	60 minutes	N = 1
7 Days	Missing	N = 1
Missing		N = 17

Tilling a garden		
Days per week	Minutes per day	
0 Days	0 minutes	N = 1
0 Days	30 minutes	N = 1
0 Days	NA	N = 15
1 Day	20 minutes	N = 1
1 Day	30 minutes	N = 4
1 Day	35 minutes	N = 1
1 Day	40 minutes	N = 1
1 Day	60 minutes	N = 4
1 Day	120 minutes	N = 2
1 Day	Missing	N = 6
2 Days	3 minutes	N = 1
2 Days	10 minutes	N = 1
2 Days	20 minutes	N = 1
2 Days	60 minutes	N = 1
2 Days	120 minutes	N = 1
Missing		N = 17

Planting seedlings, shrubs		
Days per week	Minutes per day	
0 Days	30 minutes	N = 1
0 Days	NA	N = 8
1 Day	10 minutes	N = 2
1 Day	20 minutes	N = 2
1 Day	30 minutes	N = 1
1 Day	35 minutes	N = 1
1 Day	45 minutes	N = 1
1 Day	60 minutes	N = 2
1 Day	120 minutes	N = 2
1 Day	60-180 minutes	N = 1
1 Day	Missing	N = 11
2 Days	10 minutes	N = 1
2 Days	20 minutes	N = 1
2 Days	30 minutes	N = 2
2 Days	40 minutes	N = 1
2 Days	45 minutes	N = 1
2 Days	120 minutes	N = 1
2 Days	Missing	N = 1
3 Days	120 minutes	N = 1
3 Days	Missing	N = 1
Missing		N = 16

Walking while applying fertilizer or seeding a lawn		
Days per week	Minutes per day	
0 Days	30 minutes	N = 1
0 Days	130 minutes	N = 1
0 Days	NA	N = 18
1 Day	5 minutes	N = 1
1 Day	10 minutes	N = 2
1 Day	15 minutes	N = 1
1 Day	20 minutes	N = 2
1 Day	25 minutes	N = 1
1 Day	30 minutes	N = 2
1 Day	35 minutes	N = 1
1 Day	45 minutes	N = 2
1 Day	Missing	N = 6
2 Days	220 minutes	N = 1
2 Days	Missing	N = 2
3 Days	20 minutes	N = 1
Missing		N = 16

Watering the lawn or garden while standing or walking		
Days per week	Minutes per day	
0 Days	NA	N = 10
1 Day	10 minutes	N = 1
1 Day	15 minutes	N = 1
1 Day	20 minutes	N = 1
1 Day	30 minutes	N = 2
1 Day	35 minutes	N = 1
1 Day	Missing	N = 3
2 Days	10 minutes	N = 1
2 Days	15 minutes	N = 2
2 Days	30 minutes	N = 3
2 Days	60 minutes	N = 1
2 Days	Missing	N = 2
3 Days	15 minutes	N = 2
3 Days	10-20 minutes	N = 1
3 Days	40 minutes	N = 1
3 Days	60 minutes	N = 1
3 Days	Missing	N = 1
4 Days	20 minutes	N = 1
4 Days	30 minutes	N = 1
4 Days	90 minutes	N = 1
5 Days	Missing	N = 1
7 Days	30 minutes	N = 1
7 Days	60 minutes	N = 2
7 Days	Missing	N = 1
Missing		N = 16

Weeding, cultivating the garden		
Days per week	Minutes per day	
0 Days	NA	N = 8
1 Day	10 minutes	N = 3
1 Day	15 minutes	N = 2
1 Day	30 minutes	N = 1
1 Day	35 minutes	N = 1
1 Day	40 minutes	N = 1
1 Day	60-180 minutes	N = 1
1 Day	Missing	N = 1
2 Days	15 minutes	N = 1
2 Days	20 minutes	N = 2
2 Days	30 minutes	N = 3
2 Days	60 minutes	N = 2
2 Days	Missing	N = 4
3 Days	15 minutes	N = 1
3 Days	30 minutes	N = 1

3 Days	45 minutes	N = 1
3 Days	90 minutes	N = 1
3 Days	120 minutes	N = 1
3 Days	Missing	N = 2
4 Days	15 minutes	N = 1
4 Days	60 minutes	N = 1
5 Days	Missing	N = 1
7 Days	30 minutes	N = 1
7 Days	Missing	N = 1
Missing		N = 15

Gardening in general		
Days per week	Minutes per day	
0 Days	NA	N = 6
1 Day	10 minutes	N = 2
1 Day	20 minutes	N = 1
1 Day	30 minutes	N = 1
1 Day	35 minutes	N = 1
1 Day	40 minutes	N = 1
1 Day	Missing	N = 1
2 Days	15 minutes	N = 1
2 Days	20 minutes	N = 1
2 Days	30 minutes	N = 4
2 Days	120 minutes	N = 2
3 Days	30 minutes	N = 1
3 Days	60 minutes	N = 2
3 Days	60-120 minutes	N = 1
3 Days	Missing	N = 4
4 Days	30 minutes	N = 1
4 Days	Missing	N = 1
5 Days	60 minutes	N = 1
5 Days	Missing	N = 2
6 Days	10 minutes	N = 1
7 Days	60 minutes	N = 1
7 Days	60-90 minutes	N = 1
7 Days	Missing	N = 2
Missing	30 minutes	N = 1
Missing		N = 18

Picking up yard, picking flowers or vegetables		
Days per week	Minutes per day	
0 Days	NA	N = 7
1 Day	10 minutes	N = 1
1 Day	20 minutes	N = 2
1 Day	30 minutes	N = 2
1 Day	35 minutes	N = 1
1 Day	10-60 minutes	N = 1
1 Day	60 minutes	N = 1
1 Day	Missing	N = 1
2 Days	5 minutes	N = 1
2 Days	10 minutes	N = 2
2 Days	15 minutes	N = 2
2 Days	20 minutes	N = 1
2 Days	30 minutes	N = 2
2 Days	45 minutes	N = 1
2 Days	60 minutes	N = 1
2 Days	70 minutes	N = 1
2 Days	Missing	N = 1
3 Days	30 minutes	N = 2
3 Days	60 minutes	N = 2
3 Days	60-120 minutes	N = 1
3 Days	Missing	N = 4
4 Days	20 minutes	N = 1
4 Days	20-30 minutes	N = 1
4 Days	30 minutes	N = 1
4 Days	60 minutes	N = 1
5 Days	Missing	N = 2
6 Days	60 minutes	N = 1
7 Days	10 minutes	N = 1
7 Days	60 minutes	N = 1
7 Days	Missing	N = 2
Missing		N = 10

Walking while gathering gardening tools		
Days per week	Minutes per day	
0 Days	NA	N = 9
1 Day	10 minutes	N = 2
1 Day	20 minutes	N = 3
1 Day	30 minutes	N = 1
1 Day	35 minutes	N = 1
1 Day	Missing	N = 1
2 Days	10 minutes	N = 1
2 Days	15 minutes	N = 3
2 Days	20 minutes	N = 1

2 Days	30 minutes	N = 1
2 Days	Missing	N = 3
3 Days	10 minutes	N = 1
3 Days	30 minutes	N = 4
3 Days	Missing	N = 3
4 Days	20 minutes	N = 1
6 Days	60 minutes	N = 1
7 Days	10 minutes	N = 1
7 Days	Missing	N = 2
Missing	10 minutes	N = 1
Missing		N = 18

Mowing the yard		
Days per week	Minutes per day	
0 Days	0 minutes	N = 1
0 Days	NA	N = 15
1 Day	30 minutes	N = 1
1 Day	35 minutes	N = 1
1 Day	40 minutes	N = 2
1 Day	60 minutes	N = 3
1 Day	90 minutes	N = 3
1 Day	120 minutes	N = 2
1 Day	180 minutes	N = 1
1 Day	230 minutes	N = 1
1 Day	240 minutes	N = 1
1 Day	240-300 minutes	N = 1
1 Day	Missing	N = 6
2 Days	180 minutes	N = 1
2 Days	240 minutes	N = 1
2 Days	Missing	N = 1
3 Days	30 minutes	N = 1
3 Days	Missing	N = 1
4 Days	30 minutes	N = 1
7 Days	Missing	N = 1
Missing		N = 13

Continued on next page

8. Instructions: *Whether you currently garden or not*, please read each statement carefully and indicate, by putting a check mark in the column, how SURE you are in your abilities to do the following activities. Please make sure you have a check mark for every statement.

	Not at all sure					Completely sure	Missing
	0	1	2	3	4	5	
How sure are you that you can plan a garden?	N = 5	N = 5	N = 7	N = 7	N = 8	N = 24	N = 2
How sure are you that you can grow a plant that produces a fruit or vegetable that you like to eat?	N = 5	N = 4	N = 7	N = 5	N = 8	N = 27	N = 2
How sure are you that you can grow more than one kind of plant?	N = 2	N = 4	N = 6	N = 9	N = 10	N = 25	N = 2
How sure are you that you can weed a garden, to help plants grow?	N = 3	N = 2	N = 3	N = 7	N = 11	N = 29	N = 3
How sure are you that you can water a garden, so it will stay alive?	N = 2	N = 3	N = 0	N = 14	N = 7	N = 31	N = 1
How sure are you that you can identify insects and diseases in a garden?	N = 15	N = 7	N = 13	N = 10	N = 3	N = 7	N = 3
How sure are you that you can grow fruits and vegetables in containers?	N = 7	N = 5	N = 9	N = 5	N = 11	N = 19	N = 2
How sure are you that you can harvest a ripe fruit or vegetable?	N = 3	N = 5	N = 5	N = 8	N = 11	N = 25	N = 1

Continued on next page

9. Instructions: Check the column that indicates how CERTAIN you are **IN YOUR ABILITIES** to do the following **IN THE NEXT 10 WEEKS**. Please make sure you have a check mark for each statement.

	Not at all certain					Completely certain	Missing
	0	1	2	3	4	5	
I can garden for 30 minutes or more on 1 day in a week	N = 2	N = 3	N = 3	N = 7	N = 4	N = 32	N = 7
I can garden for 30 minutes or more on 2 days in a week	N = 4	N = 4	N = 4	N = 8	N = 5	N = 25	N = 8
I can garden for 30 minutes or more on 3 days in a week	N = 7	N = 3	N = 8	N = 11	N = 4	N = 16	N = 8
I can garden for 30 minutes or more on 4 days in a week	N = 13	N = 6	N = 11	N = 7	N = 4	N = 9	N = 8
I can garden for 30 minutes or more on 5 days in a week	N = 16	N = 6	N = 8	N = 8	N = 0	N = 10	N = 10
I can eat 1 serving of fruits and vegetables each day	N = 1	N = 3	N = 3	N = 2	N = 5	N = 38	N = 6
I can eat 2 servings of fruits and vegetables each day	N = 2	N = 3	N = 2	N = 6	N = 4	N = 34	N = 7
I can eat 3 servings of fruits and vegetables each day	N = 5	N = 6	N = 5	N = 5	N = 6	N = 23	N = 8
I can eat 4 servings of fruits and vegetables each day	N = 5	N = 8	N = 8	N = 6	N = 4	N = 18	N = 9
I can eat 5 servings of fruits and vegetables each day	N = 6	N = 11	N = 7	N = 6	N = 4	N = 17	N = 7
I can be physically active for 30 minutes or more on 1 day in a week	N = 2	N = 2	N = 4	N = 0	N = 7	N = 32	N = 11

I can be physically active for 30 minutes or more on 2 days in a week	N = 3	N = 4	N = 7	N = 1	N = 7	N = 27	N = 9
I can be physically active for 30 minutes or more on 3 days in a week	N = 5	N = 4	N = 4	N = 6	N = 6	N = 25	N = 8
I can be physically active for 30 minutes or more on 4 days in a week	N = 4	N = 6	N = 9	N = 3	N = 10	N = 20	N = 6
I can be physically active for 30 minutes or more on 5 days in a week	N = 4	N = 6	N = 9	N = 3	N = 10	N = 20	N = 6

B. Information about your physical activity

Instructions: We are interested in two types of physical activity – vigorous and moderate. *Vigorous activities* cause large increases in breathing or heart rate, while *moderate activities* cause small increases in breathing or heart rate. In the following section, please think about the physical activities **you** do in a typical week.

10. How many days per week do you do **moderate activities**, such as brisk walking, bicycling, vacuuming, gardening or anything else that causes some increase in breathing or heart rate for at least 10 minutes? **Do not include physical activity done for work.**

    ☐ Days per week

    ○ Mark if 0 days per week and ***skip to Question 12***

11. On days when you do **moderate activities** for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

    ☐ Hours ☐ Minutes

Days per week	Hours & Minutes per day	
0 Days	NA	N = 4
1 Day	0 Hours, 10 Minutes	N = 1
1 Day	0 Hours, 15 Minutes	N = 1
1 Day	1 Hour, 00 Minutes	N = 1

1 Day	1 Hour, 20 Minutes	N = 1
2 Days	0 Hours, 20 Minutes	N = 2
2 Days	0 Hours, 30 Minutes	N = 4
2 Days	1 Hour, 00 Minutes	N = 1
2 Days	2 Hours, 00 Minutes	N = 1
3 Days	0 Hours, 10 Minutes	N = 1
3 Days	0 Hours, 20 Minutes	N = 1
3 Days	0 Hours, 30 Minutes	N = 3
3 Days	0 Hours, 45 Minutes	N = 1
3 Days	1 Hour, 00 Minutes	N = 3
3 Days	1 Hour, 30 Minutes	N = 1
3 Days	3 Hours, 00 Minutes	N = 2
3 Days	4 Hours, 00 Minutes	N = 1
4 Days	0 Hours, 15 Minutes	N = 1
4 Days	0 Hours, 20 Minutes	N = 1
4 Days	0 Hours, 30 Minutes	N = 1
4 Days	1 Hour, 00 Minutes	N = 4
4 Days	1 Hour, 30 Minutes	N = 1
4 Days	2 Hours, 00 Minutes	N = 1
5 Days	0 Hours, 10 Minutes	N = 1
5 Days	0 Hours, 30 Minutes	N = 3
5 Days	1 Hour, 00 Minutes	N = 2
5 Days	1 Hour, 30 Minutes	N = 1
5 Days	2 Hours, 30 Minutes	N = 1
5 Days	4 Hours, 00 Minutes	N = 1
5 Days	Missing	N = 1
6 Days	0 Hours, 30 Minutes	N = 1
6 Days	0 Hours, 45 Minutes	N = 1
6 Days	2 Hours, 00 Minutes	N = 1
7 Days	0 Hours, 45 Minutes	N = 1
7 Days	0 Hours, 60 Minutes	N = 1
7 Days	1 Hour, 00 Minutes	N = 2
7 Days	2 Hours, 30 Minutes	N = 1
7 Days	6 Hours, 00 Minutes	N = 1
7 Days	7 Hours, 00 Minutes	N = 1
Missing		N = 0

12. How many days per week do you do **vigorous activities** such as running, aerobics, heavy yard work or anything else that causes large increases in breathing or heart rate for at least 10 minutes? **Do not include physical activity done for work.**

☐ Days per week

○ Mark if 0 days per week and ***skip to Question 14 on next page***

13. On days when you do **vigorous activities** for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

☐ Hours ☐ Minutes

Days per week	Hours & Minutes per day	
0 Days	0 Hours, 30 Minutes	N = 2
0 Days	0 Hours, 00 Minutes	N = 3
0 Days	NA	N = 13
1 Day	0 Hours, 10 Minutes	N = 1
1 Day	0 Hours, 15 Minutes	N = 2
1 Day	0 Hours, 30 Minutes	N = 2
1 Day	1 Hour, 00 Minutes	N = 1
1 Day	1 Hour, 30 Minutes	N = 1
1 Day	2 Hours, 00 Minutes	N = 1
1 Day	3 Hours, 00 Minutes	N = 1
2 Days	0 Hours, 10 Minutes	N = 1
2 Days	0 Hours, 20 Minutes	N = 1
2 Days	0 Hours, 30 Minutes	N = 2
2 Days	1 Hour, 00 Minutes	N = 2
2 Days	1 Hour, 30 Minutes	N = 4
2 Days	2 Hours, 00 Minutes	N = 1
2 Days	3 Hours, 20 Minutes	N = 1
3 Days	0 Hours, 30 Minutes	N = 2
3 Days	0 Hours, 40 Minutes	N = 1
3 Days	1 Hour, 00 Minutes	N = 2
3 Days	2 Hours, 00 Minutes	N = 1
3 Days	6 Hours, 00 Minutes	N = 1
4 Days	1 Hour, 00 Minutes	N = 3
4 Days	5 Hours, 00 Minutes	N = 1
5 Days	0 Hours, 20 Minutes	N = 1
5 Days	0 Hours, 40 Minutes	N = 1
5 Days	1 Hour, 00 Minutes	N = 1
5 Days	1 Hour, 30 Minutes	N = 1
5 Days	2 Hours, 00 Minutes	N = 1
6 Days	0 Hours, 10 Minutes	N = 1
7 Days	0 Hours, 20 Minutes	N = 1
7 Days	24 Hours, 00 Minutes	N = 1
Missing		N = 0

C. Information about your health

14. Would you say that in general your health is *(Mark one)*
    - ○ Excellent
    - ○ Very Good
    - ○ Good
    - ○ Fair
    - ○ Poor

Excellent	N = 4	Fair	N = 8
Very Good	N = 17	Poor	N = 3
Good	N = 26	Missing	N = 0

15. During the ***past 30 days*,** how many days did poor physical health keep you from doing your usual activities, such as self-care, work, gardening or recreation?

    ☐ Days

0 Days	N = 40	6 Days	N = 1
2 Days	N = 3	10 Days	N = 2
3 Days	N = 2	14 Days	N = 1
4 Days	N = 3	20 Days	N = 1
5 Days	N = 2	Missing	N = 3

16. Are you limited in any way in daily activities because of any impairment or health problem? *(Mark one)*

    - ○ Yes: What is the major impairment or health problem that limits your activities?

      _____

    - ○ No

No	N = 39	Yes – knee has been giving me problems	N = 1
Yes - Medication	N = 2	Yes – I do dialysis twice a week for 3 hours…	N = 1
Yes – some knee joint problems	N = 1	Yes – Rheumatoid arthritis	N = 1
Yes – Back & Knee issues, Fibromyalgia	N = 1	Yes – prostate cancer stage 4	N = 1
Yes – sprained ankle	N = 1	Yes – back pain	N = 1
Yes – Bad knees	N = 1	Yes – knees	N = 1
Yes – Back injury	N = 1	Yes – Depression, Anxiety	N = 1
Yes – Diabetes/ heavy smoker	N = 1	Yes – bending and kneeling	N = 1
Yes – Broken right femur	N = 1	Missing	N = 1
Yes - arthritis	N = 1		

17. How would you compare your health to the health of the rest of the community in general? *(Mark one)*
    - ○ My health is excellent compared to the rest of the community
    - ○ My health is better compared to the rest of the community
    - ○ My health is about the same as the rest of the community
    - ○ My health is worse than the rest of the community
    - ○ My health is significantly worse than the rest of the community

My health is excellent compared to the rest of the community	N = 9
My health is better compared to the rest of the community	N = 19
My health is about the same as the rest of the community	N = 23
My health is worse than the rest of the community	N = 6
My health is significantly worse than the rest of the community	N = 0
Missing	N =1

D. Information about you and your household:

18. What is your gender? (*Mark One*)
    - ○ Male
    - ○ Female

Male	N = 19
Female	N = 39
Missing	N = 0

19. What is your age? ☐

19 years old	N = 1	56 years old	N = 2
28 years old	N = 1	57 years old	N = 2
29 years old	N = 3	59 years old	N = 1
31 years old	N = 1	60 years old	N = 2
33 years old	N = 2	61 years old	N = 3
34 years old	N = 1	62 years old	N = 2
35 years old	N = 2	63 years old	N = 1
36 years old	N = 2	64 years old	N = 4
37 years old	N = 2	65 years old	N = 1
43 years old	N = 5	66 years old	N = 1
44 years old	N = 1	67 years old	N = 2
46 years old	N = 2	70 years old	N = 1
49 years old	N = 1	74 years old	N = 1
50 years old	N = 1	77 years old	N = 1
52 years old	N = 2	80 years old	N = 1
53 years old	N = 2	91 years old	N = 1
55 years old	N = 2	Missing	N = 0

20. How many adults **(*over the age of 18*)** are currently living in your home? ☐

0 Adults	N = 5	3 Adults	N = 10
1 Adult	N = 8	4 Adults	N = 2
2 Adults	N = 32	Missing	N = 1

21. How many children **(*under the age of 18*)** are currently living in your home? ☐

0 Kids	N = 24	5 Kids	N = 1
1 Kid	N = 13	6 Kids	N = 2
2 Kids	N = 7	7 Kids	N = 2
3 Kids	N = 8	Missing	N = 1

22. Do you live on or off the PBPN tribal reservation?
    - ○ I live on the reservation
    - ○ I live off the reservation

I live on the reservation	N = 38
I live off the reservation	N = 19
Missing	N = 1

23. What is the highest grade of school or year of college you have completed? *Mark the highest category you have completed*
    - ○ Never attended school or only attended kindergarten
    - ○ Grades 1 through 8 (Elementary School)
    - ○ Grades 9 through 11 (Some High School)
    - ○ Grade 12 or GED (High school graduate)
    - ○ College 1 year to 3 years (Some college or technical school or Associate's Degree)
    - ○ College 4 years or more (College graduate)

Never attended school or only attended kindergarten	N = 0
Grades 1 through 8 (Elementary School)	N = 0
Grades 9 through 11 (Some High School)	N = 2
Grade 12 or GED (High school graduate)	N = 16
College 1 year to 3 years (Some college or technical school or Associate's Degree)	N = 24
College 4 years or more (College graduate)	N = 15
Missing	N = 1

24. Are you currently….? *(Mark one)*
    - Employed for wages
    - Self-employed
    - Out of work for less than 1 year
    - Out of work for 1 year or more
    - A homemaker
    - Student
    - Retired
    - Unable to work

Employed for wages	N = 35	Unable to work	N = 1
Self-employed	N = 1	Employed for wages, Student	N = 1
Out of work for less than 1 year	N = 1	Employed for wages, Retired	N = 1
Out of work for 1 year or more	N = 0	Out of work for 1 year or more, Unable to work	N = 1
A homemaker	N = 1	Retired, Unable to work	N = 2
Student	N = 0	Missing	N = 1
Retired	N = 13		

25. If you added together the yearly incomes, before taxes, of all the members of your household for last year, what would the total be? (Mark one)
    - $0-$9,999
    - $10,000-$19,999
    - $20,000-$29,999
    - $30,000-$39,999
    - $40,000-$49,999
    - Over $50,000

$0 - $9,999	N = 4	$40,000 - $49,999	N = 11
$10,000 - $19,999	N = 10	Over $50,000	N = 16
$20,000 - $29,999	N = 5	Missing	N = 2
$30,000 - $39,999	N = 10		

Thank you!

Appendix E - SAS Code

SAS Code:

```
*************************************************************************;
* Chandalar Randall Project: Gardening Survey (Potawatomi Native Tribe) *;
*************************************************************************;

/*
Notes: Finalized SAS code for anlaysis with Gardening Survey
       Binomial: Ran Binary Logit Models (Questions #7, 9, 10, 13, 16-18, 34, & 54) using Proc Logistic
       Multinomial: Ran Cumulative (Questions #19 & 24B) & Generalized (Question #31) Logit Models using
Proc Logistic
       Continuous: Ran General Linear Models (Questions #55-58) using Proc GLM
*/


/* SAS Analysis */

ods rtf file = "C:\Users\bloedow\Documents\Consulting\Clients\Chandalar Randall (Spring 2015-
Present)\Analysis\
                    SAS Output\Statistical Analysis on Gardening Survey (11_10_15).doc";

title 'Gardening Survey_Potawatomi Native Tribe (Chandalar Randall)';


/* Master Data Set */
  title2 'Master Data';

  *Imports the Master Gardening Survey Dataset from Excel into SAS;
    proc import out=Master
      datafile='C:\Users\bloedow\Documents\Consulting\Clients\Chandalar Randall (Spring 2015-Present)\Data\
                    Master Data\Master Data Sheet (11_09_15 NB).xlsx'
      dbms=xlsx
      replace;
      sheet="Complete";
      getnames=yes;
    run;

  *Removes Respondents the Master Gardening Survey Dataset;
```

```
data Master;
  set Master;
  where Question_2=0;
    if Question_1=1 then Year="F2012";
    if Question_1=2 then Year="F2013";
    if Question_1=3 then Year="S2014";
run;
```

```
*Prints out the Master Gardening Survey Dataset;
  proc print data=Master noobs;
    title3 'Print-out of the Master Gardening Survey Dataset';
  run;


*One-Way Frequency & Contingency Tables of Questions from Master Gardening Survey Dataset;
  proc freq data=Master;
    tables Question_3--Question_58;
    tables Question_4B*Question_25 Question_4B*Question_27 Question_25*Question_27 / norow nocol;
    tables Question_4B*Question_25*Question_27 / norow nocol;
    by Year;
    title3 'One-Way Frequency & Contingency Tables (Original Dataset)';
  run;
```

```
  *Recodes the Master Gardening Survey Dataset;
    data Master_Recode;
      set Master;
      array Test(*) _numeric_;
      do i = 1 to dim(Test);
        if Test[i]=999 then Test[i]=.;
        if Test[i]=888 then Test[i]=.;
      end;
      drop i;
        if Question_4B~=. & Question_25~=. & Question_27~=.
        then Trt=put(Question_4B,z1.)||"_"||put(Question_25,z1.)||"_"||put(Question_27,z1.);
    run;

    proc sort data=Master_Recode;
      by Year Question_4B Question_25 Question_27;
    run;

  *Prints out the Recoded Master Gardening Survey Dataset;
    proc print data=Master_Recode noobs;
      title3 'Print-out of the Recoded Master Gardening Survey Dataset';
    run;


  *Contingency Tables Across Survey Years of Questions from Recoded Master Gardening Survey Dataset;
    proc freq data=Master_Recode;
      tables Year*(Question_4B Question_25 Question_27) / norow nocol;
      tables Year*(Question_7 Question_9 Question_10 Question_13 Question_16 Question_17 Question_18
Question_19B
             Question_24B Question_31 Question_32 Question_34 Question_54) / norow nocol;
      title3 'Contingency Tables (Recoded Dataset)';
      title4 'Across Survey Years';
    run;
```

```
  *Creates Master Recoded Gardening Survey Dataset for All Years;
    data Master_Recode_AllYrs;
      set Master_Recode;
    run;

  *Creates Master Recoded Gardening Survey Dataset for Fall 2012 & 2013;
    data Master_Recode_F12F13;
      set Master_Recode;
      where Year~="S2014";
    run;

  *Creates Master Recoded Gardening Survey Dataset for Spring 2014;
    data Master_Recode_S14;
      set Master_Recode;
      where Year="S2014";
    run;


  *One-Way Frequency & Contingency Tables of Questions from Recoded Master Gardening Survey Dataset;
    proc freq data=Master_Recode_AllYrs;
      tables Question_3 Question_4B--Question_29 Question_31--Question_35;
      tables Question_4B*Question_25 Question_4B*Question_27 Question_25*Question_27 / norow nocol;
      tables Question_4B*Question_25*Question_27 / norow nocol;
      tables (Question_4B Question_25 Question_27)*(Question_7 Question_9 Question_10 Question_13
               Question_16--Question_18 Question_19B Question_24B Question_31 Question_32 Question_34) /
norow nocol;
      where  Year="F2012";
      title3 'One-Way Frequency & Contingency Tables (Recoded Dataset)';
      title4 'Survey Year: Fall 2012';
    run;

    proc means data=Master_Recode_AllYrs;
      var Question_11 Question_12 Question_14 Question_15 Question_26 Question_28 Question_29;
      by Year Question_4B Question_25 Question_27;
      where Year~="F2012";
      title3 'Pivot Tables (Recoded Dataset)';
      title4 'Survey Year: Fall 2012';
    run;
```

```
  *One-Way Frequency & Contingency Tables of Questions from Recoded Master Gardening Survey Dataset;
      proc freq data=Master_Recode_AllYrs;
        tables Question_4--Question_34 Question_36--Question_38;
        tables Question_4B*Question_25 Question_4B*Question_27 Question_25*Question_27  / norow nocol;
        tables Question_4B*Question_25*Question_27 / norow nocol;
        tables (Question_4B Question_25 Question_27)*(Question_7 Question_9 Question_10 Question_13
               Question_16--Question_18 Question_19B Question_24B Question_31 Question_32 Question_34) /
norow nocol;
        where  Year="F2013";
        title3 'One-Way Frequency & Contingency Tables (Recoded Dataset)';
        title4 'Survey Year: Fall 2013';
      run;

      proc means data=Master_Recode_AllYrs;
        var Question_11 Question_12 Question_14 Question_15 Question_26 Question_28 Question_29;
        by Year Question_4B Question_25 Question_27;
        where Year="F2013";
        title3 'Pivot Tables (Recoded Dataset)';
        title4 'Survey Year: Fall 2013';
      run;


  *One-Way Frequency & Contingency Tables of Questions from Recoded Master Gardening Survey Dataset;
      proc freq data=Master_Recode_AllYrs;
        tables Question_3--Question_4B Question_11--Question_17 Question_19--Question_34 Question_39--
Question_58;
        tables Question_4B*Question_25 Question_4B*Question_27 Question_25*Question_27 / norow nocol;
        tables Question_4B*Question_25*Question_27 / norow nocol;
        tables (Question_4B Question_25 Question_27)*(Question_13 Question_16 Question_17 Question_19B
Question_19B
               Question_24B Question_31 Question_32 Question_34 Question_54) / norow nocol;
        where  Year="S2014";
        title3 'One-Way Frequency & Contingency Tables (Recoded Dataset)';
        title4 'Survey Year: Spring 2014';
      run;

      proc means data=Master_Recode_AllYrs;
        var Question_11 Question_12 Question_14 Question_15 Question_26 Question_28 Question_29
Question_55--Question_58;
        by Year Question_4B Question_25 Question_27;
```

```
        where  Year="S2014";
        title3 'Pivot Tables (Recoded Dataset)';
        title4 'Survey Year: Spring 2014';
      run;




  /* Binomial Responses */

    %macro Logistic_Bin_Stat(Set,Response);

      title2 "Data: &Set";
      title3 "Response: &Response";

      proc freq data=&Set;
        tables Year*&Response / norow nocol;
        tables &Response*(Question_4B Question_25 Question_27) / nocol;
        tables Year*&Response*(Question_4B Question_25 Question_27) / norow nocol;
        title4 'Contigency Tables';
      run;

      proc tabulate data=&Set;
        class Year Question_4B Question_25 Question_27;
        var &Response;
        table Year*Question_4B*Question_25*Question_27 all, &Response*(sum n)*f=z3.
&Response*(mean)*f=z6.4;
        where Trt~="" & &Response~=.;
        title4 'Summary Tables';
      run;

      proc tabulate data=&Set;
        class Question_4B Question_25 Question_27;
        var &Response;
        table Question_4B*Question_25*Question_27 all, &Response*(sum n)*f=z3. &Response*(mean)*f=z6.4;
        where Trt~="" & &Response~=.;
        title4 'Summary Tables';
        ods output Table=Table_&Response;
```

```
  run;

%mend Logistic_Bin_Stat;
```

```
%macro Logistic_Bin_Analysis(Set,Response);

  proc logistic data=&Set;
    class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
    model &Response(Event='1') = Question_4B Question_25 Question_27 / link=logit scale=none aggregate;
    contrast 'Age Group (Young vs Mature)' Question_27 1 -1;
    contrast 'Age Group (Young vs Older)'  Question_27 1  0;
    contrast 'Age Group (Mature vs Older)' Question_27 0  1;
    effectplot Mosaic;
    effectplot interaction(plotby=Question_25) / CLM CONNECT;
    output out=predict pred=prob;
    title4 'Logistic_Large Sample Approx. Analysis (Binomial)';
    run;

  proc logistic data=&Set exactonly;
    class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
    model &Response(Event='1') = Question_4B Question_25 Question_27 / link=logit;
    exact 'Exact Test' intercept Question_4B Question_25 Question_27 / estimate=both;
    title4 'Logistic_Exact Analysis (Binomial)';
  run;

  proc print data=predict;
    var Year Question_4B Question_25 Question_27 Trt &Response _LEVEL_ prob;
    title4 'Predicted Probabilities (Large Sample Approx.)';
  run;

  proc logistic data=&Set;
    class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
    model &Response(Event='1') = Question_4B Question_25 Question_27 Question_4B*Question_25
                                 Question_4B*Question_27 Question_25*Question_27
      / link=logit selection=forward include=3 scale=none aggregate=(Question_4B Question_25
Question_27);
    effectplot Mosaic;
    effectplot interaction(plotby=Question_25) / CLM CONNECT;
    title4 'Logistic_Large Sample Approx. Analysis (Binomial)';
  run;

%mend Logistic_Bin_Analysis;
```

```
    %Logistic_Bin_Stat(Master_Recode_F12F13,Question_7);
    %Logistic_Bin_Analysis(Master_Recode_F12F13,Question_7);    /* Gender Significant (p-value=0.0061)
                                                                  Rest of Factors Marginally Significant
*/
                                                               /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_F12F13,Question_9);
    %Logistic_Bin_Analysis(Master_Recode_F12F13,Question_9);    /* Gardening Significant (p-value=0.0167)
                                                                  Gender Significant (p-value=0.0392)
                                                                  Age Group Marginally Significant (p-
value=0.0566) */
                                                               /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_F12F13,Question_10);
    %Logistic_Bin_Analysis(Master_Recode_F12F13,Question_10);   /* Gardening Significant (p-value=0.0174)
                                                                  Gender Significant (p-value=0.0486) */
                                                               /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_F12F13,Question_18);
    %Logistic_Bin_Analysis(Master_Recode_F12F13,Question_18);   /* Gardening Significant (p-value=0.0233)
*/
                                                               /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_AllYrs,Question_13);
    %Logistic_Bin_Analysis(Master_Recode_AllYrs,Question_13);   /* Nothing Significant */
                                                               /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_AllYrs,Question_16);
    %Logistic_Bin_Analysis(Master_Recode_AllYrs,Question_16);   /* Age Group Significant (p-value=0.0013)
*/
```

```
                                                                    /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_AllYrs,Question_17);
    %Logistic_Bin_Analysis(Master_Recode_AllYrs,Question_17);    /* Nothing Significant */
                                                                    /* No Significant Two-Way Interactions
*/


    %Logistic_Bin_Stat(Master_Recode_AllYrs,Question_34);
    %Logistic_Bin_Analysis(Master_Recode_AllYrs,Question_34);    /* Nothing Significant */
                                                                /* Significant Gender*AgeGroup Interaction
                                                                                        (p-value=0.0376)
*/
```

```
        proc logistic data=Master_Recode_AllYrs;                    /* Age Group & Gender*AgeGroup
Significant
                                                                              (0.0344 & 0.0376
respectively) */
          class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
          model Question_34(Event='1') = Question_4B Question_25 Question_27 Question_25*Question_27
                                        / link=logit scale=none aggregate;
          *exact 'Exact Test' intercept Question_4B Question_25 Question_27 Question_25*Question_27 /
estimate=both;
          contrast 'Age Group (Young vs Mature)' Question_27 1 -1;
          contrast 'Age Group (Young vs Older)'  Question_27 1  0;
          contrast 'Age Group (Mature vs Older)' Question_27 0  1;
          effectplot Mosaic;
          effectplot interaction(plotby=Question_25) / CLM CONNECT;
            output out=predict pred=prob;
          title4 'Logistic_Main + Gender*AgeGroup Analysis (Binomial)';
        run;


    %Logistic_Bin_Stat(Master_Recode_S14,Question_54);
    *%Logistic_Bin_Analysis(Master_Recode_S14,Question_54);     /* Due to Missing information for Non-
Gardening Males */

        proc logistic data=Master_Recode_S14;                       /* Nothing Significant
                                                                       [Quasi-separation of points (Results not
trusted)] */
          class Trt(ref='0_1_2') / param=ref;
          model Question_54(Event='1') = Trt / link=logit scale=none aggregate;
          contrast 'Age: 40-64 (Gardener*Gender)'            Trt  1   0 -1  0   0 -1  0   0  1  0;
          contrast 'Female (Non-Gardener vs Gardener)'       Trt  0   1  1  1   0  0  0  -1 -1 -1;
          contrast 'Female (AgeGroup)'  Trt  0   1 -1  0   0  0  0   1 -1  0, Trt  0   1  0 -1   0  0  0
1  0 -1;
          contrast 'Gardener (Male vs Female)'               Trt  0   0  0  0   1  1  1  -1 -1 -1;
          contrast 'Gardener (AgeGroup)'  Trt  0   0  0  0   1 -1  0   1 -1  0, Trt  0   0  0  0   1  0 -1
1  0 -1;
          contrast 'Non-Gardener Female' Trt  0   1 -1  0   0  0  0   0  0  0, Trt  0   1  0 -1   0  0  0
0  0  0;
          contrast 'Gardener Male'   Trt  0   0  0  0   1 -1  0   0  0  0, Trt  0   0  0  0   1  0 -1   0
0  0;
```

```
          contrast 'Gardener Female' Trt   0  0  0   0  0  0   1 -1  0, Trt  0   0  0  0   0  0  0   1  0 -
1;
          contrast 'Female   (Gardening*AgeGroup)' Trt  0  1 -1  0   0  0  0  -1  1  0,
                                                    Trt  0  1  0 -1   0  0  0  -1  0  1;
          contrast 'Gardener (Gender*AgeGroup)'    Trt  0  0  0  0   1 -1  0  -1  1  0,
                                                    Trt  0  0  0  0   1  0 -1  -1  0  1;
            *exact 'Exact Test' intercept Trt / estimate=both;
          effectplot Mosaic;
          effectplot interaction / CLM CONNECT;
          title4 'Logistic_Main Analysis (Binomial)';
        run;
```

```
/* Multinomial Responses */

  %macro Multinomial_Stat(Set,Response);

    title2 "Data: &Set";
    title3 "Response: &Response";

    proc sort data=&Set;
      by Year Question_4B Question_25 Question_27;
    run;

    proc freq data=&Set;
        tables Year*&Response / norow nocol;
        tables &Response*(Question_4B Question_25 Question_27) / nocol;
        tables Year*&Response*(Question_4B Question_25 Question_27) / norow nocol;
        title4 'Contigency Tables';
    run;

    proc tabulate data=&Set;
        class Year Question_4B Question_25 Question_27;
        var &Response;
        table Year*Question_4B*Question_25*Question_27 all, &Response*(n)*f=z3. &Response*(mean)*f=z6.4;
        where Trt~="" & &Response~=.;
        title4 'Summary Tables';
    run;

    proc tabulate data=&Set;
        class Question_4B Question_25 Question_27;
        var &Response;
        table Question_4B*Question_25*Question_27 all, &Response*(n)*f=z3. &Response*(mean)*f=z6.4;
        where Trt~="" & &Response~=.;
        title4 'Summary Tables';
    run;

  %mend Multinomial_Stat;
```

```
   title2 "Data: Master_Recode_AllYrs";

     title3 "Response: Question_19";

      %Multinomial_Stat(Master_Recode_AllYrs,Question_19);

      /* proc logistic data=Master_Recode_AllYrs;          *Nonsignificant Year Factor;
          class Year Question_4B Question_25 Question_27;
          model Question_19(descending) = Year Question_4B Question_25 Question_27 / link=clogit;
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run; */

        proc logistic data=Master_Recode_AllYrs;             /* Nothing Significant (Gender Marginally
Significant) */
          class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
          model Question_19(descending) = Question_4B Question_25 Question_27 / link=clogit scale=none
aggregate;
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run;

        proc logistic data=Master_Recode_AllYrs;             /* Gardening, Gender, & Gardening*AgeGroup
Significant
                                                                    (0.0404, 0.0262, & 0.0085
respectively) */
          class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
          model Question_19(descending) = Question_4B Question_25 Question_27 Question_4B*Question_25
                                          Question_4B*Question_27 Question_25*Question_27
           / link=clogit selection=forward include=3 scale=none aggregate=(Question_4B Question_25
Question_27);
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run;
```

```
     title3 "Response: Question_24B";

      %Multinomial_Stat(Master_Recode_AllYrs,Question_24B);

      /* proc logistic data=Master_Recode_AllYrs;          *Nonsignificant Year Factor;
          class Year Question_4B Question_25 Question_27;
          model Question_24B(descending) = Year Question_4B Question_25 Question_27 / link=clogit;
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run; */

        proc logistic data=Master_Recode_AllYrs;             /* Nothing Significant */
          class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
          model Question_24B(descending) = Question_4B Question_25 Question_27 / link=clogit scale=none
aggregate;
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run;

        proc logistic data=Master_Recode_AllYrs;             /* Gender*AgeGroup Significant (0.0183
respectively) */
          class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
          model Question_24B(descending) = Question_4B Question_25 Question_27 Question_4B*Question_25
                                           Question_4B*Question_27 Question_25*Question_27
           / link=clogit selection=forward include=3 scale=none aggregate=(Question_4B Question_25
Question_27);
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run;
```

```
title3 "Response: Question_31";

 %Multinomial_Stat(Master_Recode_AllYrs,Question_31);

 /* proc logistic data=Master_Recode_AllYrs;          *Nonsignificant Year Factor;
     class Year Question_4B Question_25 Question_27;
     model Question_31 = Year Question_4B Question_25 Question_27 / link=clogit;
     effectplot Mosaic / at(Question_27='1' '2' '3');
     effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
     title4 'Logistic_Main Analysis (Multinomial)';
   run;

   proc logistic data=Master_Recode_AllYrs;             *Issue with Proportional Odds Assumption;
     class Question_4B Question_25 Question_27;
     model Question_31 = Question_4B Question_25 Question_27 / link=clogit;
     effectplot Mosaic / at(Question_27='1' '2' '3');
     effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
     title4 'Logistic_Main Analysis (Multinomial)';
   run; */

   proc logistic data=Master_Recode_AllYrs;             /* Age Group Significant (p-value=0.0012) */
     class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
     model Question_31 = Question_4B Question_25 Question_27 / link=glogit;
     contrast 'Age Group (Young vs Mature)' Question_27 1 -1;
     contrast 'Age Group (Young vs Older)'  Question_27 1  0;
     contrast 'Age Group (Mature vs Older)' Question_27 0  1;
     estimate 'Age Group (Young vs Mature) @ Category=1' Question_27 1 -1 / category="1";
     estimate 'Age Group (Young vs Older) @ Category=1'  Question_27 1  0 / category="1";
     estimate 'Age Group (Mature vs Older) @ Category=1' Question_27 0  1 / category="1";
     estimate 'Age Group (Young vs Mature) @ Category=2' Question_27 1 -1 / category="2";
     estimate 'Age Group (Young vs Older) @ Category=2'  Question_27 1  0 / category="2";
     estimate 'Age Group (Mature vs Older) @ Category=2' Question_27 0  1 / category="2";
     effectplot Mosaic / at(Question_27='1' '2' '3');
     effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
     title4 'Logistic_Main Analysis (Multinomial)';
   run;
```

```
      proc logistic data=Master_Recode_AllYrs;          /* No Significant Two-Way Interactions
                                                           -> Age Group Significant (p-value=0.0012) */
          class Question_4B(ref='1') Question_25(ref='2') Question_27(ref='3') / param=ref;
          model Question_31 = Question_4B Question_25 Question_27 Question_4B*Question_25
                              Question_4B*Question_27 Question_25*Question_27
           / link=glogit selection=forward include=3 scale=none aggregate=(Question_4B Question_25
Question_27);
          contrast 'Age Group (Young vs Mature)' Question_27 1 -1;
          contrast 'Age Group (Young vs Older)'  Question_27 1  0;
          contrast 'Age Group (Mature vs Older)' Question_27 0  1;
          estimate 'Age Group (Young vs Mature) @ Category=1' Question_27 1 -1 / category="1";
          estimate 'Age Group (Young vs Older) @ Category=1'  Question_27 1  0 / category="1";
          estimate 'Age Group (Mature vs Older) @ Category=1' Question_27 0  1 / category="1";
          estimate 'Age Group (Young vs Mature) @ Category=2' Question_27 1 -1 / category="2";
          estimate 'Age Group (Young vs Older) @ Category=2'  Question_27 1  0 / category="2";
          estimate 'Age Group (Mature vs Older) @ Category=2' Question_27 0  1 / category="2";
          effectplot Mosaic / at(Question_27='1' '2' '3');
          effectplot interaction(plotby=Question_25) / at(Question_27='1' '2' '3') CLM CONNECT;
          title4 'Logistic_Main Analysis (Multinomial)';
        run;
```

```
  /* Continuous Responses */

    %macro Continuous_Normal_Stat(Set,Response);

      title2 "Data: &Set";
      title3 "Response: &Response";

      proc sort data=&Set;
        by Year Question_4B Question_25 Question_27;
      run;

      proc freq data=&Set;
          tables Year*&Response / norow nocol nocum;
          tables (Question_4B Question_25 Question_27)*&Response / norow nocol;
          title4 'Contigency Tables';
      run;

      proc tabulate data=&Set;
          class Question_4B Question_25 Question_27;
          var &Response;
          table Question_4B*Question_25*Question_27 all, &Response*(n)*f=z3. &Response*(mean std min
max)*f=z6.4;
          where Trt~="" & &Response~=.;
          title4 'Summary Tables';
      run;

    %mend Continuous_Normal_Stat;
```

```
%macro Continuous_Normal_Analysis(Set,Response);

  title2 "Data: &Set";
    title3 "Response: &Response";

    proc glm data=&Set plots=all;
      class Trt;
      model &Response = Trt;
      lsmeans Trt / cl;

      contrast 'Age: 40-64 (Gardener*Gender)'            Trt  1   0 -1  0   0 -1  0   0  1  0;
      estimate 'Male 40-64 (Non-Gardener vs Gardener)'   Trt  1   0  0  0   0 -1  0   0  0  0;

      contrast 'Female (Non-Gardener vs Gardener)'       Trt  0   1  1  1   0  0  0  -1 -1 -1;
      estimate 'Female 19-39 (Non-Gardener vs Gardener)' Trt  0   1  0  0   0  0  0  -1  0  0;
      estimate 'Female 40-64 (Non-Gardener vs Gardener)' Trt  0   0  1  0   0  0  0   0 -1  0;
      estimate 'Female 65+   (Non-Gardener vs Gardener)' Trt  0   0  0  1   0  0  0   0  0 -1;

      contrast 'Female (AgeGroup)'  Trt  0   1 -1  0   0  0  0   1 -1  0, Trt  0   1  0 -1   0  0  0
1  0 -1;

      contrast 'Gardener (Male vs Female)'               Trt  0   0  0  0   1  1  1  -1 -1 -1;
      estimate 'Gardener 19-39 (Male vs Female)'         Trt  0   0  0  0   1  0  0  -1  0  0;
      estimate 'Gardener 40-64 (Male vs Female)'         Trt  0   0  0  0   0  1  0   0 -1  0;
      estimate 'Gardener 65+   (Male vs Female)'         Trt  0   0  0  0   0  0  1   0  0 -1;

      contrast 'Gardener (AgeGroup)'  Trt  0   0  0  0   1 -1  0   1 -1  0, Trt  0   0  0  0   1  0 -1
1  0 -1;

      contrast 'Non-Gardener Female' Trt  0   1 -1  0   0  0  0   0  0  0, Trt  0   1  0 -1   0  0  0
0  0  0;
      estimate 'Non-Gardener Female (19-39 vs 40-64)' Trt  0   1 -1  0   0  0  0   0  0  0;
      estimate 'Non-Gardener Female (40-64 vs 65+)'   Trt  0   1  0 -1   0  0  0   0  0  0;
      estimate 'Non-Gardener Female (40-64 vs 65+)'   Trt  0   0  1 -1   0  0  0   0  0  0;

      contrast 'Gardener Male'   Trt  0   0  0  0   1 -1  0   0  0  0, Trt  0   0  0  0   1  0 -1   0
0  0;
      estimate 'Gardener Male (19-39 vs 40-64)' Trt  0   0  0  0   1 -1  0   0  0  0;
      estimate 'Gardener Male (19-39 vs 65+)'   Trt  0   0  0  0   1  0 -1   0  0  0;
      estimate 'Gardener Male (40-64 vs 65+)'   Trt  0   0  0  0   0  1 -1   0  0  0;
```

```
        contrast 'Gardener Female' Trt   0  0  0   0  0  0   1 -1  0, Trt  0   0  0  0   0  0  0   1  0 -
1;
        estimate 'Gardener Female (19-39 vs 40-64)' Trt   0  0  0  0   0  0  0   1 -1  0;
        estimate 'Gardener Female (19-39 vs 65+)'   Trt   0  0  0  0   0  0  0   1  0 -1;
        estimate 'Gardener Female (40-64 vs 65+)'   Trt   0  0  0  0   0  0  0   0  1 -1;
```

```
      contrast 'Female   (Gardening*AgeGroup)' Trt  0  1 -1  0   0  0  0  -1  1  0,
                                               Trt  0  1  0 -1   0  0  0  -1  0  1;
      contrast 'Gardener (Gender*AgeGroup)'    Trt  0  0  0  0   1 -1  0  -1  1  0,
                                               Trt  0  0  0  0   1  0 -1  -1  0  1;


      title4 'GLM_Main Analysis (Continuous_Normal)';
    run;

%mend Continuous_Normal_Analysis;
```

```
%Continuous_Normal_Stat(Master_Recode_S14,Question_55);

    proc glm data=Master_Recode_S14 plots=all;
      class Trt;
      model Question_55 = Trt;

      lsmeans Trt / cl;
      where Question_55~=.;

      contrast 'Female (Non-Gardener vs Gardener)'       Trt  1  1  1   0  0  0  -1 -1 -1;
      estimate 'Female 19-39 (Non-Gardener vs Gardener)' Trt  1  0  0   0  0  0  -1  0  0;
      estimate 'Female 40-64 (Non-Gardener vs Gardener)' Trt  0  1  0   0  0  0   0 -1  0;
      estimate 'Female 65+   (Non-Gardener vs Gardener)' Trt  0  0  1   0  0  0   0  0 -1;

      contrast 'Female (AgeGroup)'  Trt  1 -1  0   0  0  0   1 -1  0, Trt  1  0 -1   0  0  0   1  0 -1;

      contrast 'Gardener (Male vs Female)'               Trt  0  0  0   1  1  1  -1 -1 -1;
      estimate 'Gardener 19-39 (Male vs Female)'         Trt  0  0  0   1  0  0  -1  0  0;
      estimate 'Gardener 40-64 (Male vs Female)'         Trt  0  0  0   0  1  0   0 -1  0;
      estimate 'Gardener 65+   (Male vs Female)'         Trt  0  0  0   0  0  1   0  0 -1;

      contrast 'Gardener (AgeGroup)'  Trt  0  0  0   1 -1  0   1 -1  0, Trt  0  0  0   1  0 -1   1  0 -
1;

      contrast 'Non-Gardener Female' Trt  1 -1  0   0  0  0   0  0  0, Trt  1  0 -1   0  0  0   0  0
0;
      estimate 'Non-Gardener Female (19-39 vs 40-64)' Trt  1 -1  0   0  0  0   0  0  0;
      estimate 'Non-Gardener Female (40-64 vs 65+)'   Trt  1  0 -1   0  0  0   0  0  0;
      estimate 'Non-Gardener Female (40-64 vs 65+)'   Trt  0  1 -1   0  0  0   0  0  0;

      contrast 'Gardener Male'       Trt  0  0  0   1 -1  0   0  0  0, Trt  0  0  0   1  0 -1   0  0
0;
      estimate 'Gardener Male (19-39 vs 40-64)' Trt  0  0  0   1 -1  0   0  0  0;
      estimate 'Gardener Male (19-39 vs 65+)'   Trt  0  0  0   1  0 -1   0  0  0;
      estimate 'Gardener Male (40-64 vs 65+)'   Trt  0  0  0   0  1 -1   0  0  0;

      contrast 'Gardener Female'     Trt  0  0  0   0  0  0   1 -1  0, Trt  0  0  0   0  0  0   1  0 -
1;
      estimate 'Gardener Female (19-39 vs 40-64)' Trt  0  0  0   0  0  0   1 -1  0;
      estimate 'Gardener Female (19-39 vs 65+)'   Trt  0  0  0   0  0  0   1  0 -1;
```

```
          estimate 'Gardener Female (40-64 vs 65+)'   Trt  0  0  0   0  0  0   0  1 -1;


          contrast 'Female   (Gardening*AgeGroup)' Trt  1 -1  0   0  0  0  -1  1  0, Trt  1  0 -1   0  0  0
-1  0  1;
          contrast 'Gardener (Gender*AgeGroup)'    Trt  0  0  0   1 -1  0  -1  1  0, Trt  0  0  0   1  0 -1
-1  0  1;

          title4 'GLM_Main Analysis (Continuous_Normal)';
        run;


        data Master_Recode_S14;
          set Master_Recode_S14;
            Gardener_Gender=put(Question_4B,$1.)||"_"||put(Question_25,$1.);
        run;

        proc glm data=Master_Recode_S14 plots=all;
          class Gardener_Gender Question_27;
          model Question_55 = Gardener_Gender Question_27 / SS3;

          lsmeans Gardener_Gender Question_27 / cl pdiff;
          where Question_55~=.;

          estimate 'Female (Non-Gardener vs Gardener)'   Gardener_Gender 1  0 -1;
          estimate 'Gardener (Male vs Female)'           Gardener_Gender 0  1 -1;
          contrast 'Gardener_Gender M.E.'                Gardener_Gender 1  0 -1, Gardener_Gender 0  1 -1;

          estimate 'Age Group (19-39 vs 40-64)'          Question_27 1  0 -1;
          estimate 'Age Group (19-39 vs 65+)'            Question_27 0  1 -1;
          estimate 'Age Group (40-64 vs 65+)'            Question_27 1 -1  0;
          contrast 'Age Group M.E.'                      Question_27 1  0 -1, Question_27 0  1 -1;

          title4 'GLM_Main Analysis (Continuous_Normal)';
        run;


    %Continuous_Normal_Stat(Master_Recode_S14,Question_56);
    %Continuous_Normal_Analysis(Master_Recode_S14,Question_56);    *Nothing Significant;
```

```
    %Continuous_Normal_Stat(Master_Recode_S14,Question_57);
    %Continuous_Normal_Analysis(Master_Recode_S14,Question_57);    *Nothing Significant;


    %Continuous_Normal_Stat(Master_Recode_S14,Question_58);
    %Continuous_Normal_Analysis(Master_Recode_S14,Question_58);    *Nothing Significant;



ods rtf close;
```

Appendix F - Additional Information

Of the forty-four Spring 2014 respondents, 76.7% had families who gardened while they were growing up (Figure F-1), and 70.5% gardened as a child (Figure F-2).

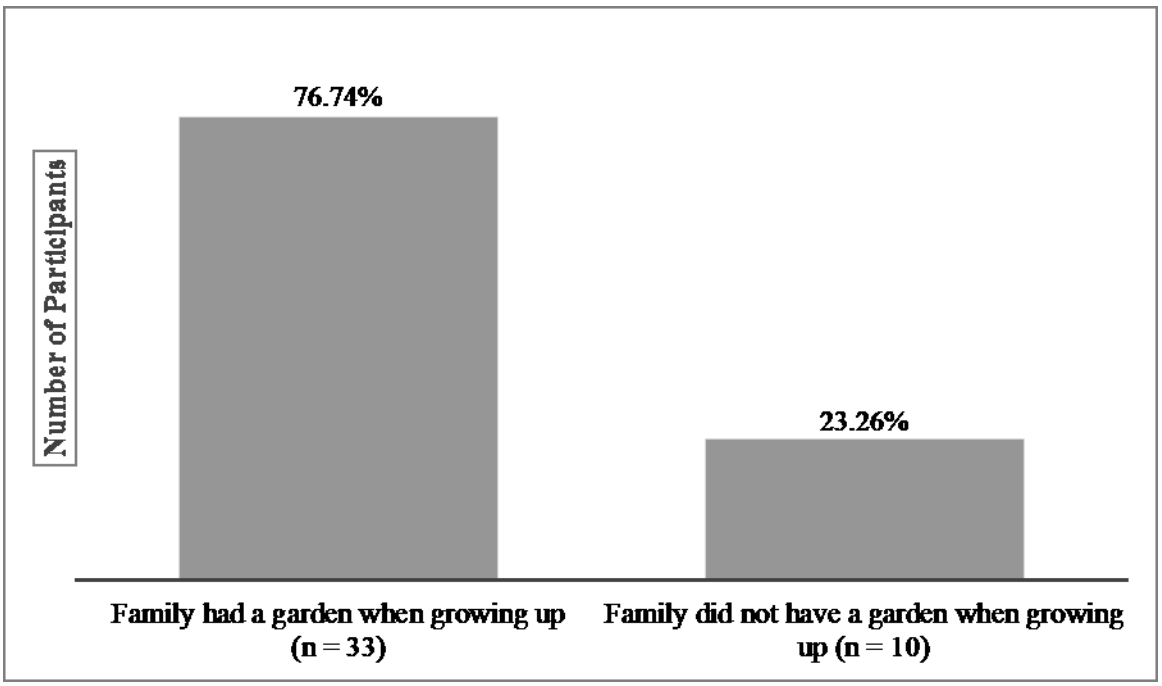


Figure 6-1 Number of Spring 2014 survey participants grouped according to whether or not their family had a garden while they were growing up.

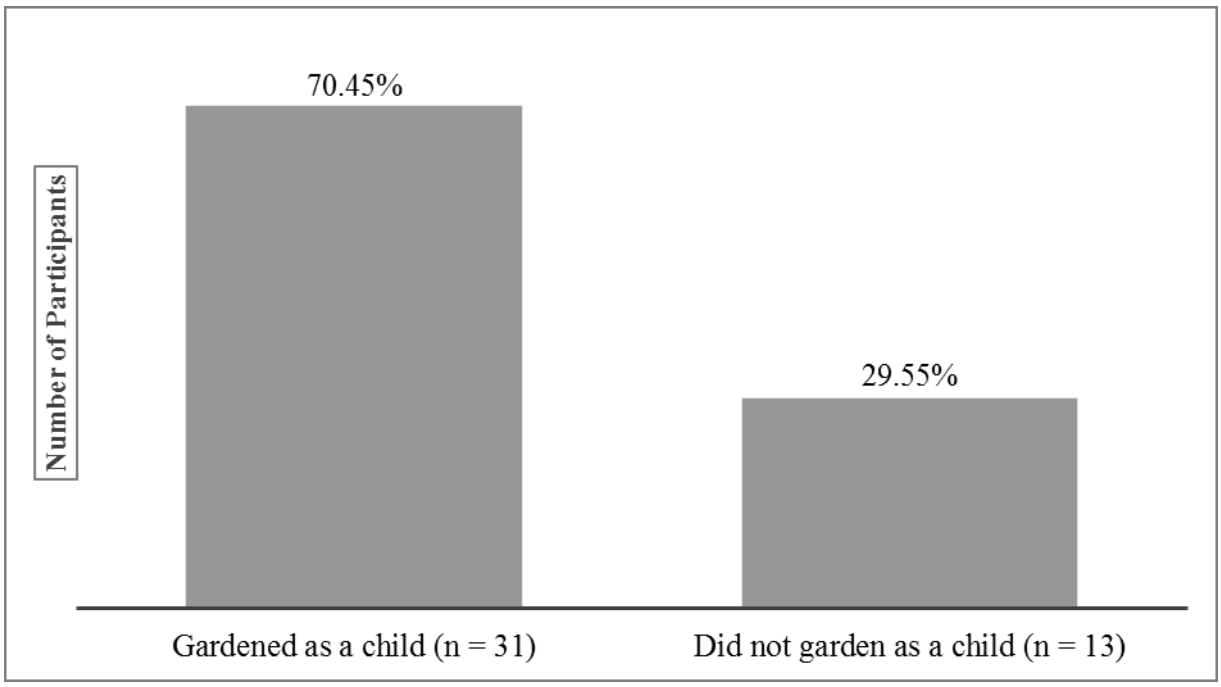


Figure 6-2 Number of Spring 2014 survey participants grouped according to whether or not they gardened as a child.

The majority of fruit most often eaten was fresh fruit. Even though canned fruit was the second highest type of fruit eaten, it dwindles in comparison to fresh fruit (Figure F-3). Like fruit, fresh vegetables were the type of vegetable most often eaten, accounting for nearly half of the vegetables eaten. However, unlike fruit, canned vegetables was a close second in the type of vegetables most often eaten (Figure F-4).

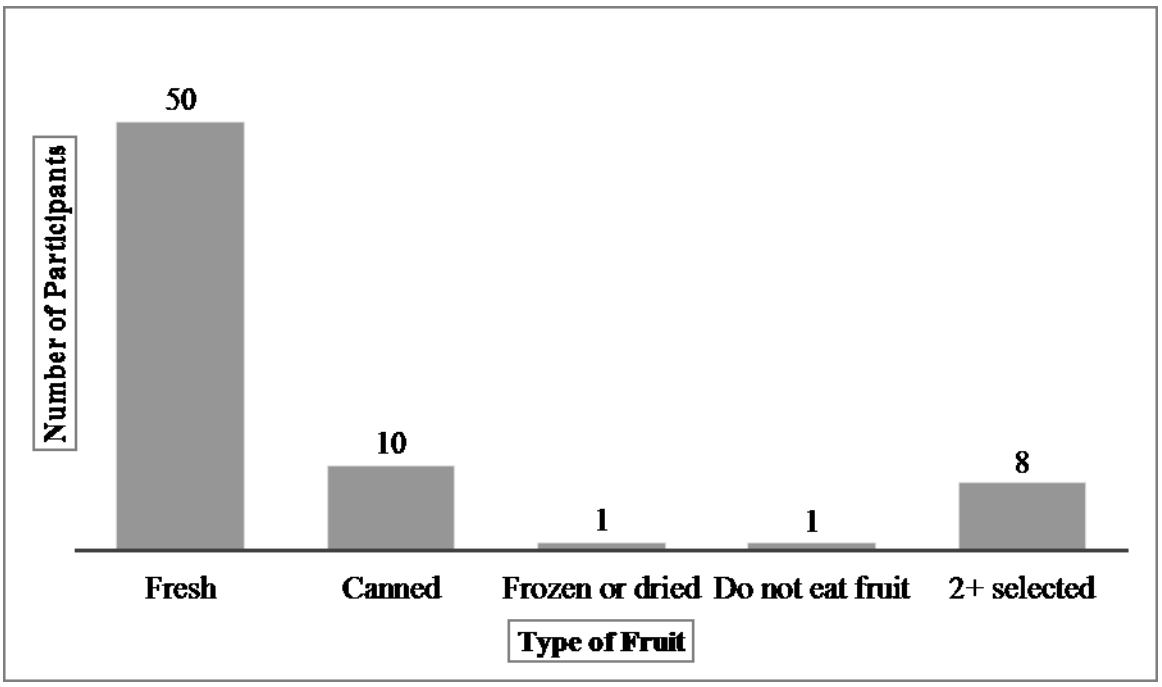


Figure 6-3 Type of fruits and the number of participants who most often eat that type of fruit.

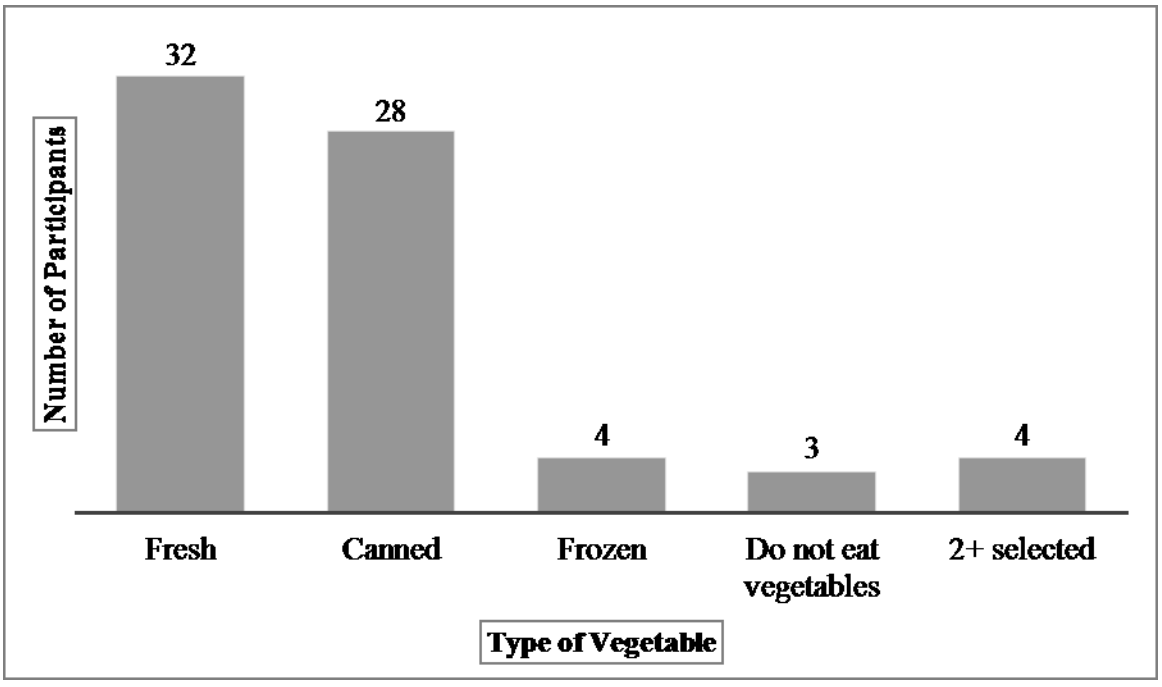


Figure 6-4 Type of vegetables and the number of participants who most often eat that type of vegetable.

There was no significant differences for self-efficacy to perform various gardening tasks and self-efficacy to be able to garden for 30 minutes in regards to gardening, gender or age groups. Additionally, no differences were found in the self-efficacy to eat the daily recommended amount of FV, when factoring for gardening, gender, or age groups. Gardening, gender and age group did not influence participants' self-efficacy in their ability to be physically active for 30 minutes.

Table F-1 Self-efficacy scores[z] in abilities to do various activities.

Ability to perform various gardening tasks	3.569
Ability to garden for 30 minutes	2.876
Ability to eat the daily recommended amount of FV[y]	3.248
Ability to be physically active for 30 minutes	3.789

[z]Self-efficacy scores are out of a possible 5.000 score

[y]FV = Fruit and Vegetable

Appendix G - SAS software 9.4 Generated Graphs

Graphs were generated using SAS software software 9.4 for a visual distribution of participants categorized as gardeners or non-gardeners, and males or females, and young adults (YA), mature adults (MA), and older adults (OA). The higher number of participants categorized according to the gardening, gender, and age group factors, who responded a given way are represented by the size of the box. A larger box means that more participants fitting that category gave that response. The color of the box indicates the probability for that category of participants' response, with a pinkish color indicating high probability, and a bluish color indicating low probability.

Education Levels

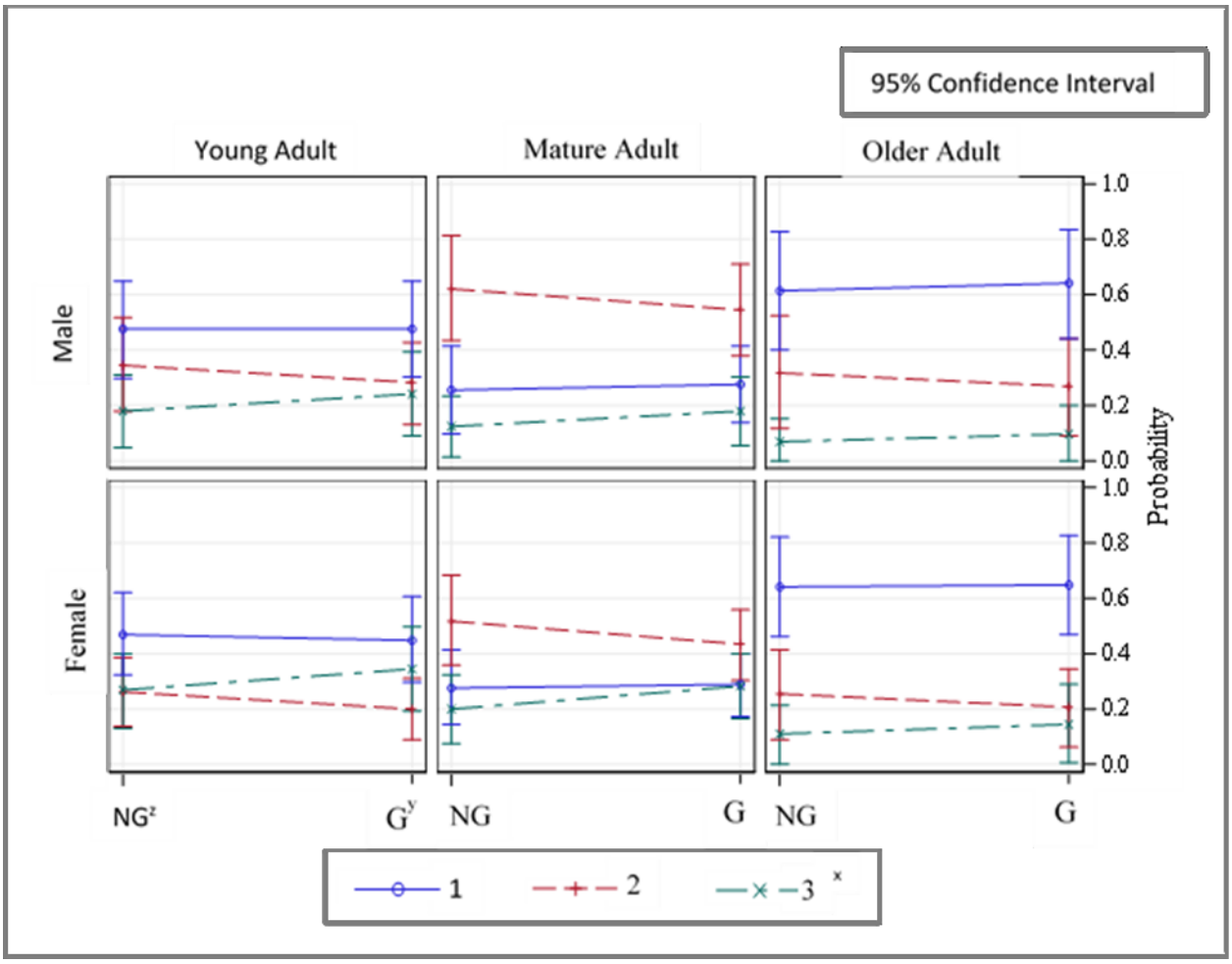


Figure 6-5 Probability of highest grade of school or year of college completed by participants, categorized as gardeners or non-gardeners, and males or females, and young adults (18-39 years old), mature adults (40-64 years old) or older adults (64+ years old).

[y]G = gardener

[x]1= no schooling through high school; 2 = some college or technical school (1-3 years); 3 = bachelor's degree, college graduate, 4+ years of college

Poverty Level

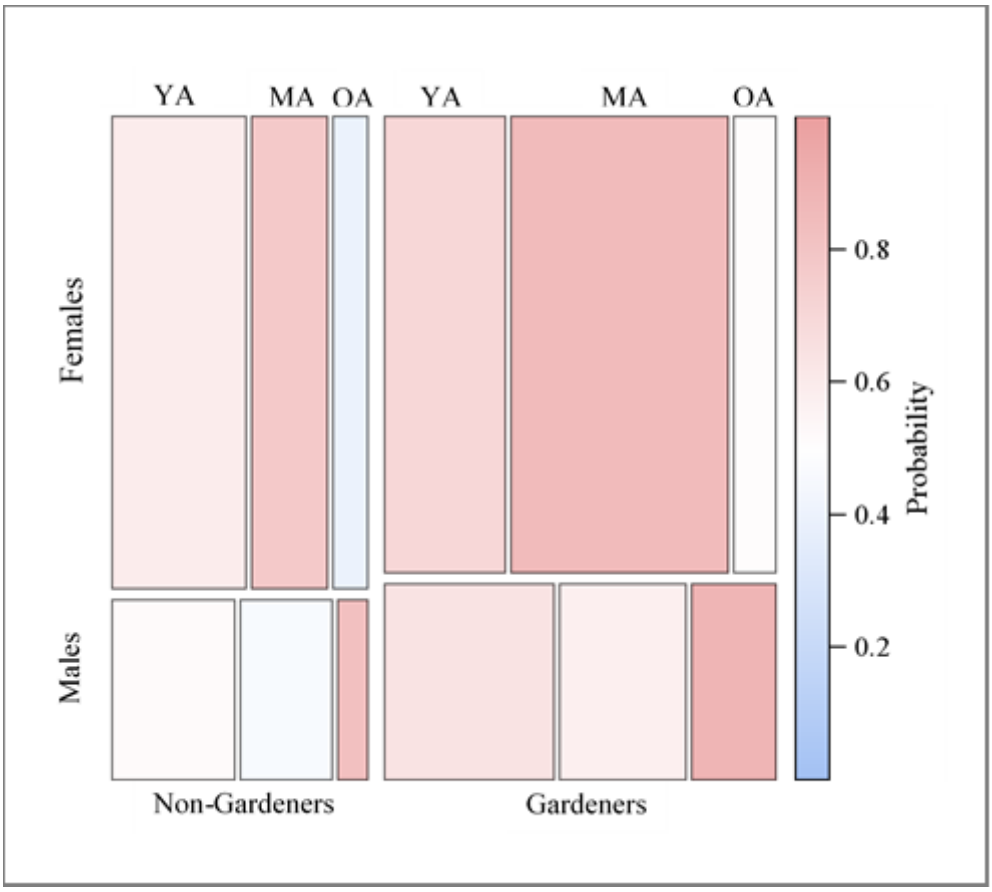


Figure 6-6 Probability that participants live above the poverty line, categorized as gardeners and non-gardeners, males and females, and YA, MA and OA[z]

[z]YA = young adults (18-39 years old); MA = mature adults (40-64 years old); OA = older adults (65+ years old)

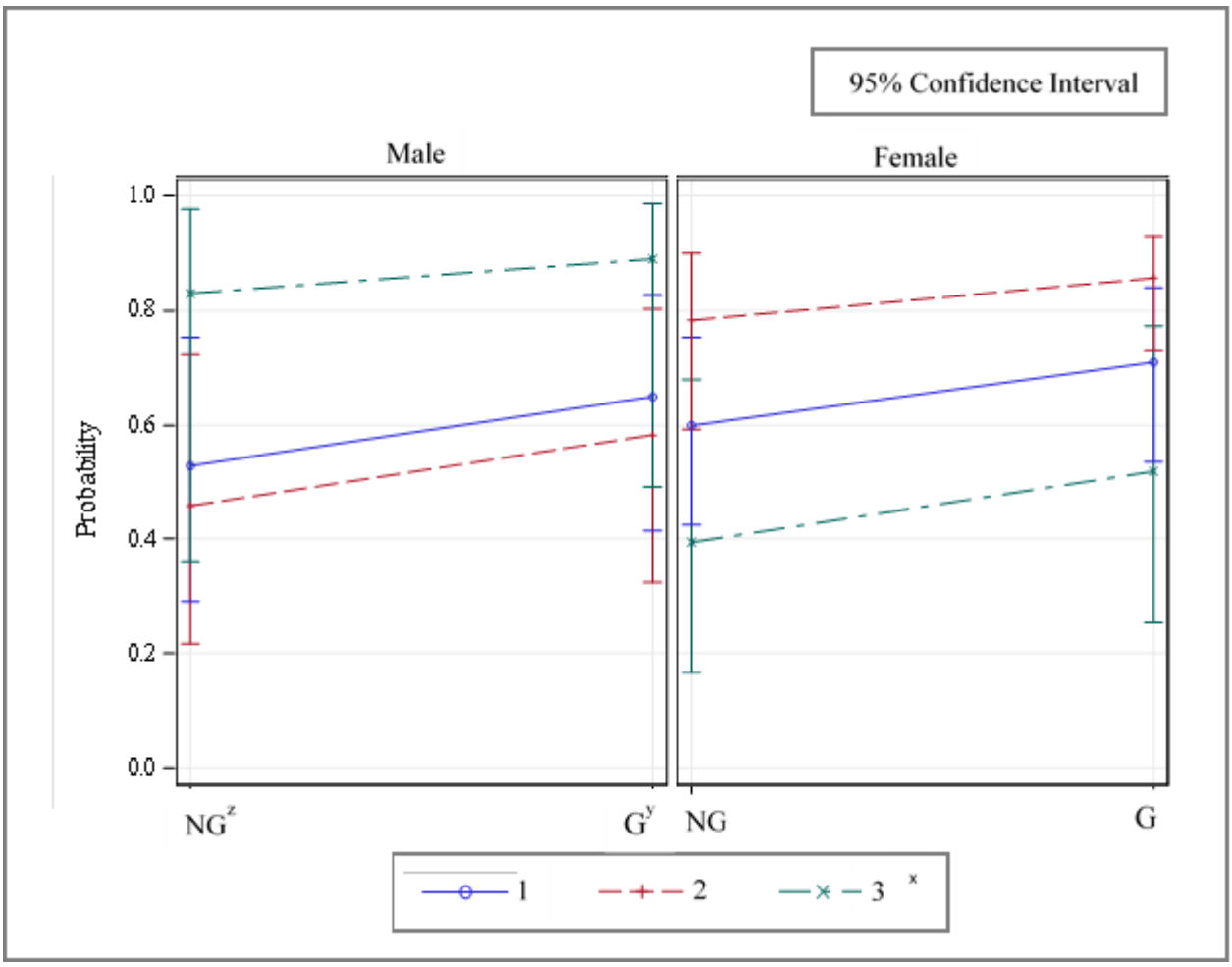


Figure 6-7 Probability that participants live above the poverty line, categorized as gardeners and non-gardeners, males and females, and young adults (18-39 years old), mature adults (40-64 years old) and older adults (65+ years old).

[z]NG = non-gardener

[y]G = gardener

[x]1 = young adults; 2 = mature adults; 3 = older adults

Perceived Health

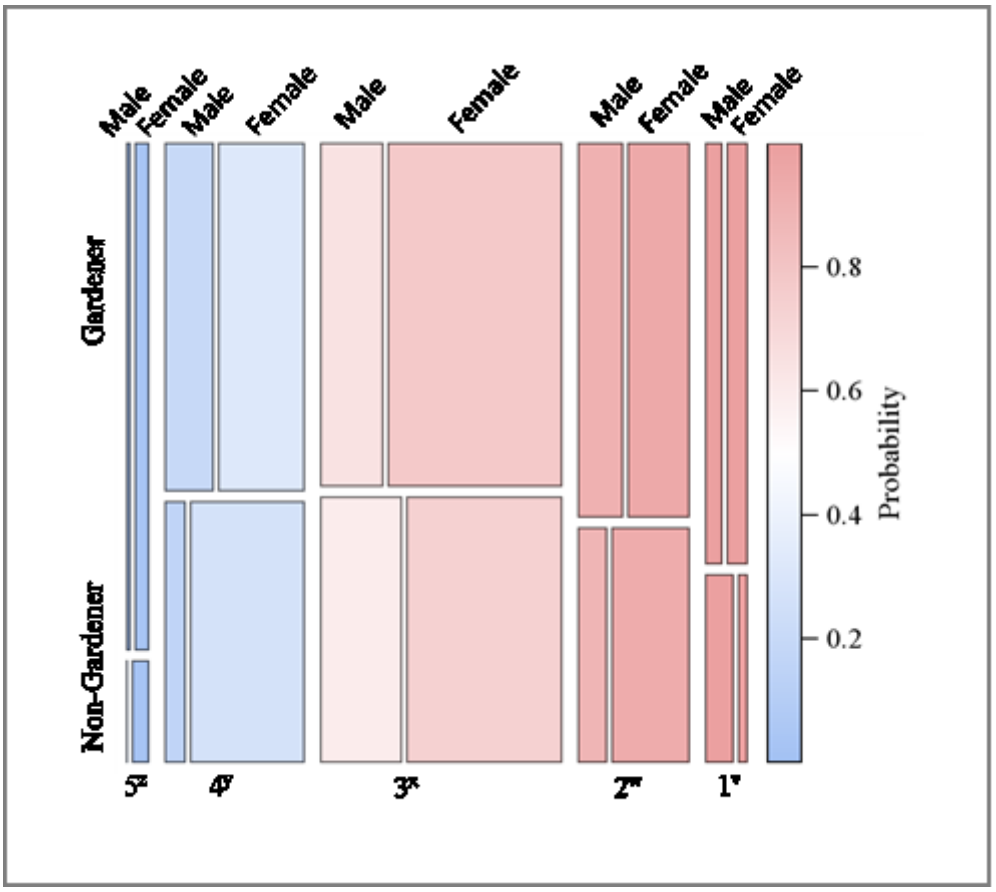


Figure 6-8 Probability that young adults (18-39 years old) participants perceive their health as excellent, very good, good, fair, or poor, categorized as gardeners or non-gardeners, and males or females.

[z]5 = excellent health

[y]4 = very good health

[x]3 = good health

[w]2 = fair health

[v]1 = poor health

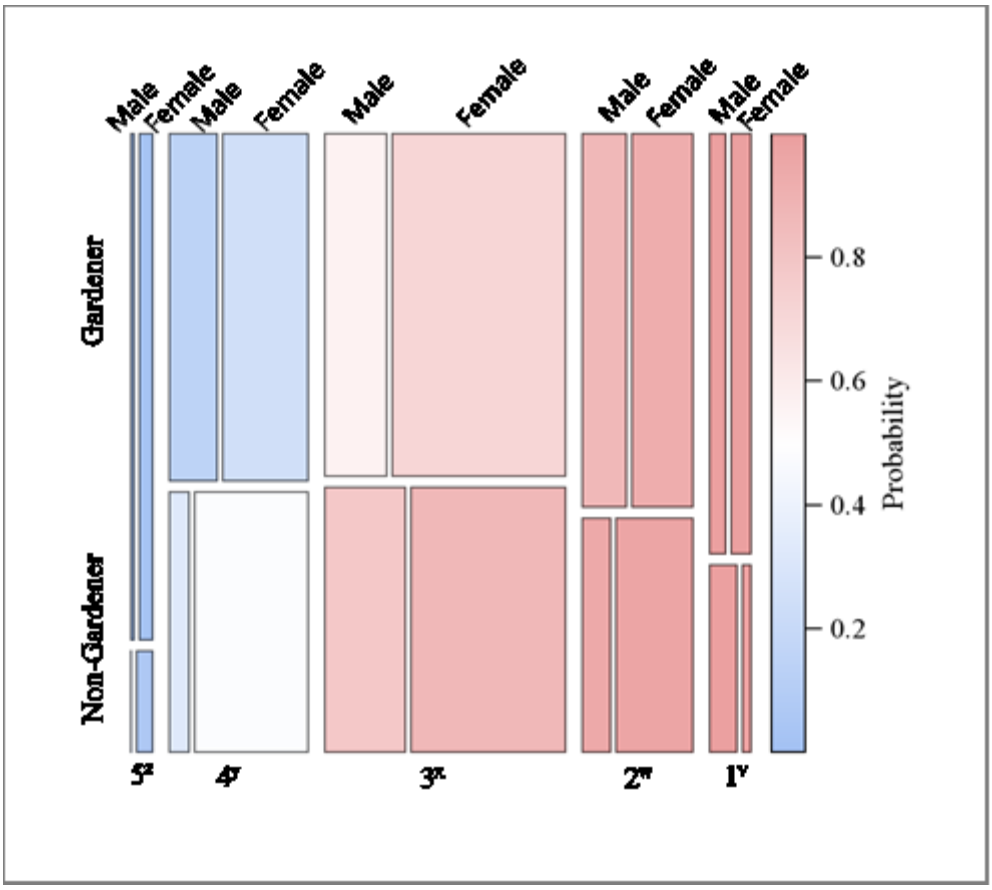


Figure 6-9 Probability that mature adults (40-64 years old) participants perceive their health as excellent, very good, good, fair, or poor, categorized as gardeners or non-gardeners, and males or females.

[z]5 = excellent health

[y]4 = very good health

[x]3 = good health

[w]2 = fair health

[v]1 = poor health

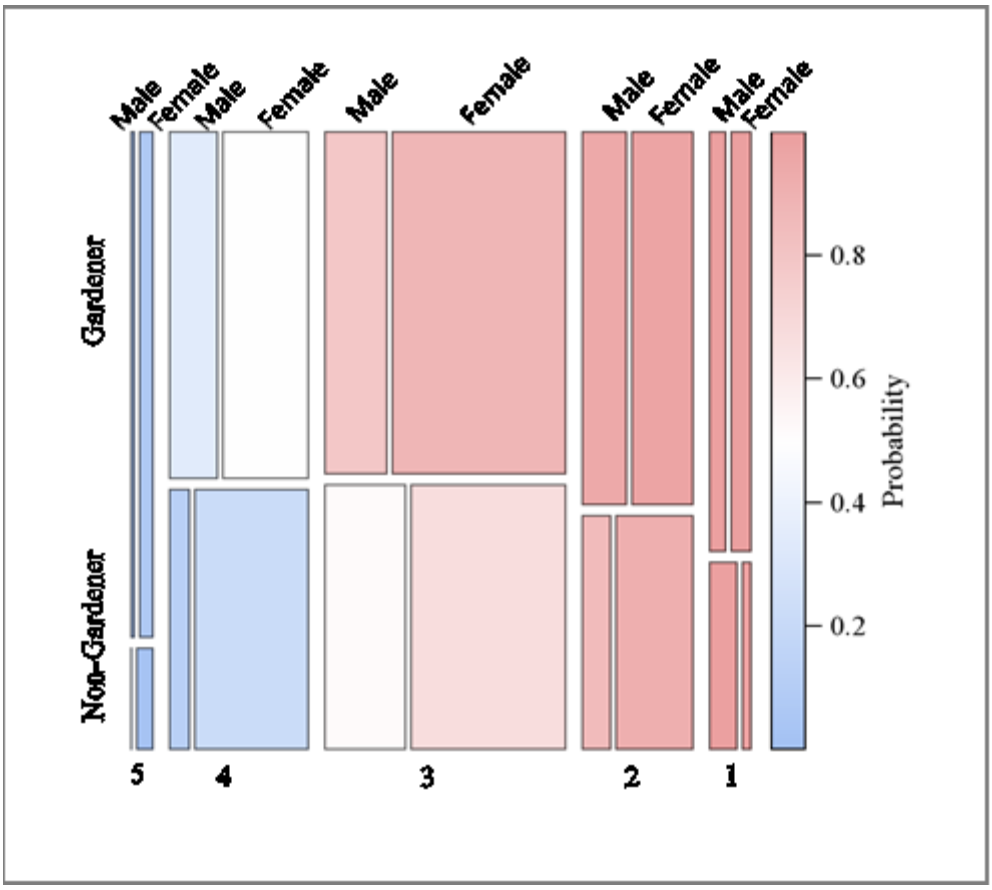


Figure 6-10 Probability that older adults (65+ years old) participants perceive their health as excellent, very good, good, fair, or poor, categorized as gardeners or non-gardeners, and males or females.

[z]5 = excellent health

[y]4 = very good health

[x]3 = good health

[w]2 = fair health

[v]1 = poor health

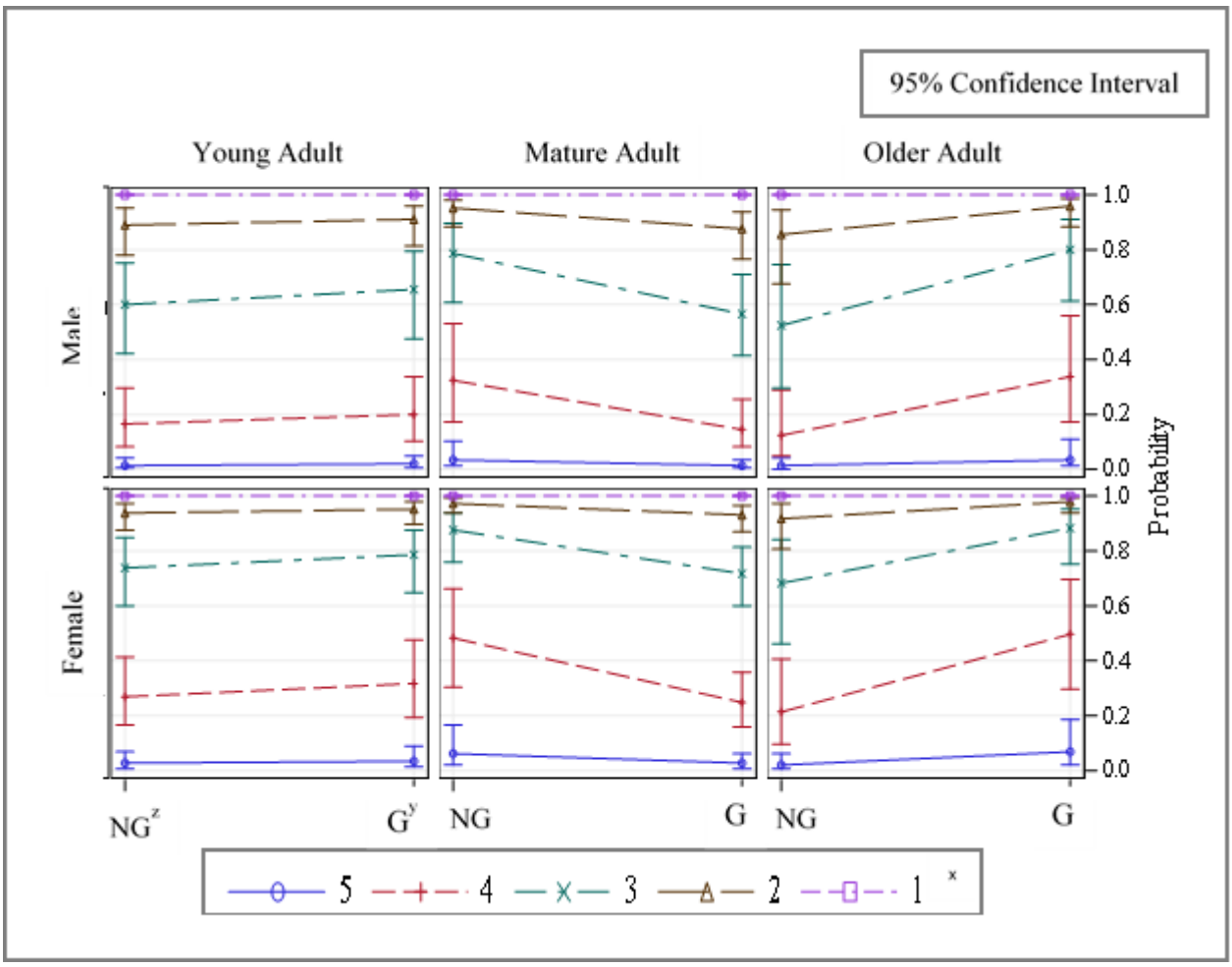


Figure 6-11 Probability of how participants perceive their health, categorized as gardeners or non-gardeners, and males or females, and young adults (18-39 years old), mature adults (40-64 years old) or older adults (64+ years old).

[z]NG = non-gardener

[y]G = gardener

[x]5 = excellent health; 4 = very good health; 3 = good health; 2 = fair health; 1 = poor health

Perceived Health Compared to the Community

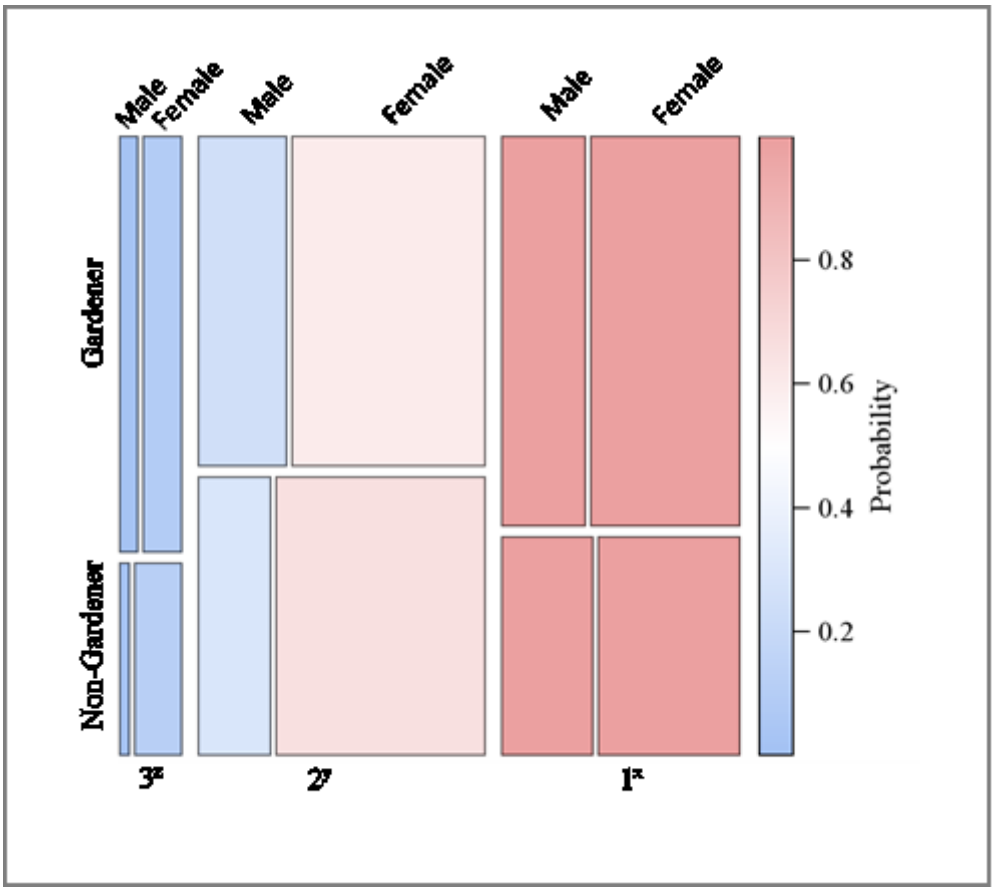


Figure 6-12 Probability that young adults (18-39 years old) participants perceive their health as better than, about the same as, or better than the rest of the community, categorized as gardeners or non-gardeners, and males or females.

[z]3 = health is better than the rest of the community

[y]2 = health is about the same as the rest of the community

[x]1 = health is worse than the rest of the community

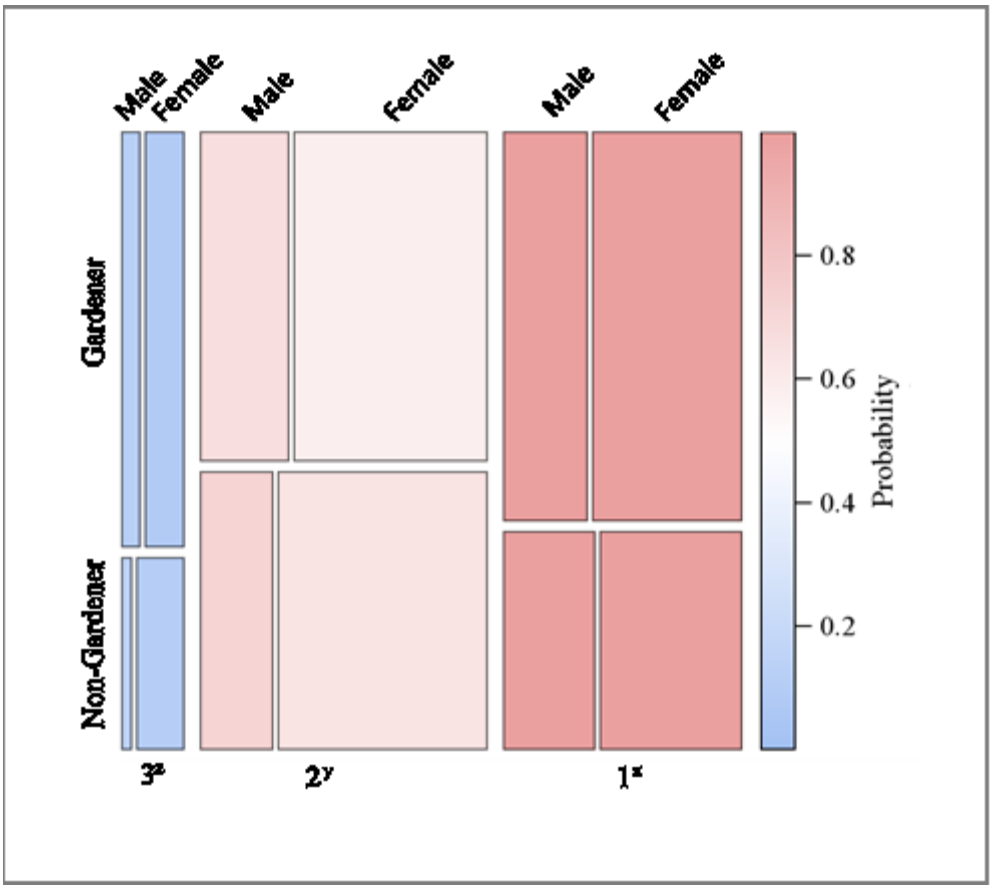


Figure 6-13 Probability that mature adults (40-64 years old) participants perceive their health as better than, about the same as, or better than the rest of the community, categorized as gardeners or non-gardeners, and males or females.

[z]3 = health is better than the rest of the community

[y]2 = health is about the same as the rest of the community

[x]1 = health is worse than the rest of the community

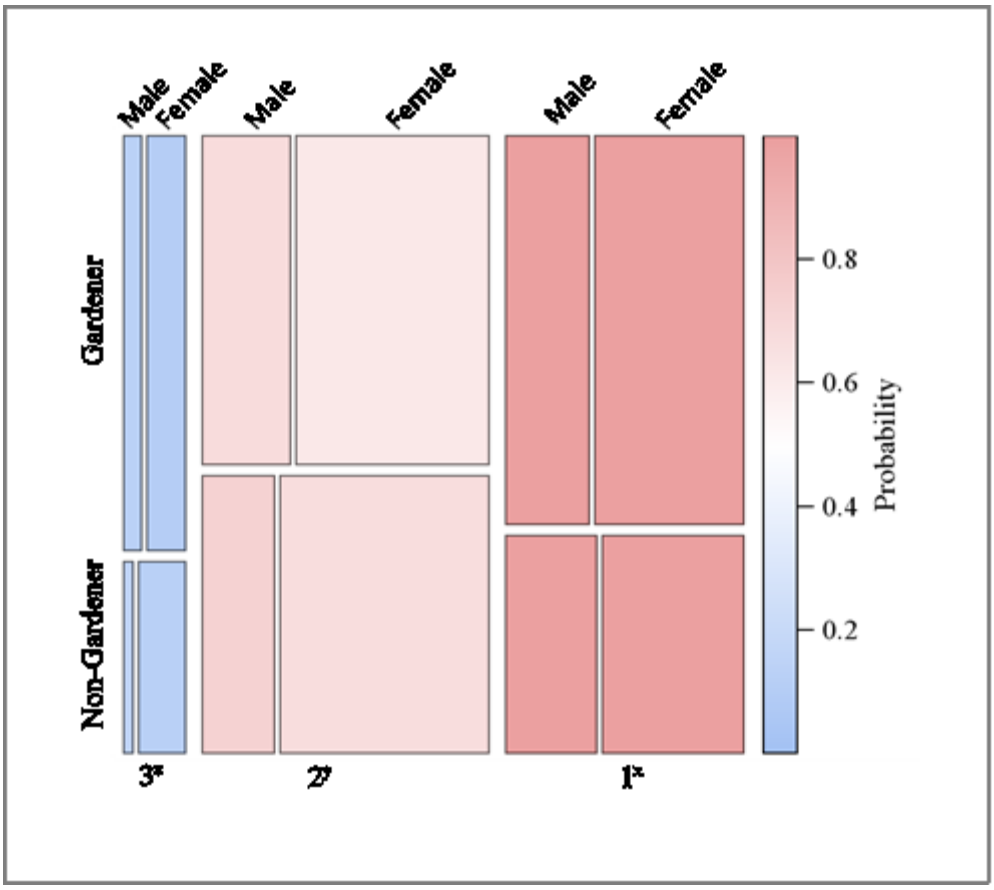


Figure 6-14 Probability that older adults (65+ years old) participants perceive their health as better than, about the same as, or better than the rest of the community, categorized as gardeners or non-gardeners, and males or females.

[z]3 = health is better than the rest of the community

[y]2 = health is about the same as the rest of the community

[x]1 = health is worse than the rest of the community

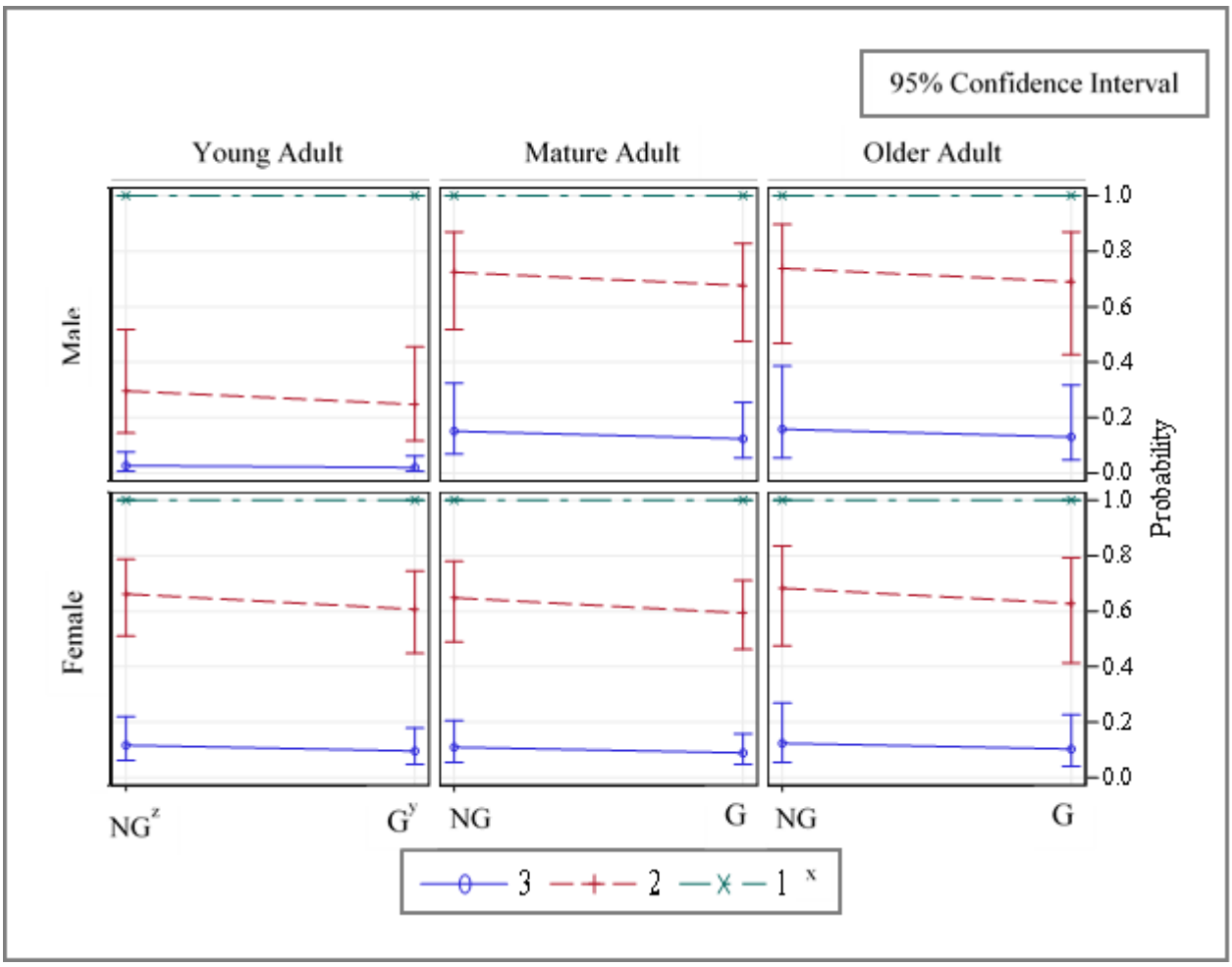


Figure 6-15 Probability that participants perceive their health as better than the rest of the community, about the same as the rest of the community, or worse than the rest of the community, categorized as gardeners or non-gardeners, and males or females, and young adults (18-39 years old), mature adults (40-64 years old) or older adults (64+ years old).

[z]NG = non-gardener

[y]G = gardener

[x]3= health is worse than the rest of the community; 2 = health is about the same as the rest of the community; 1 = health is better than the rest of the community

Fruit Intake

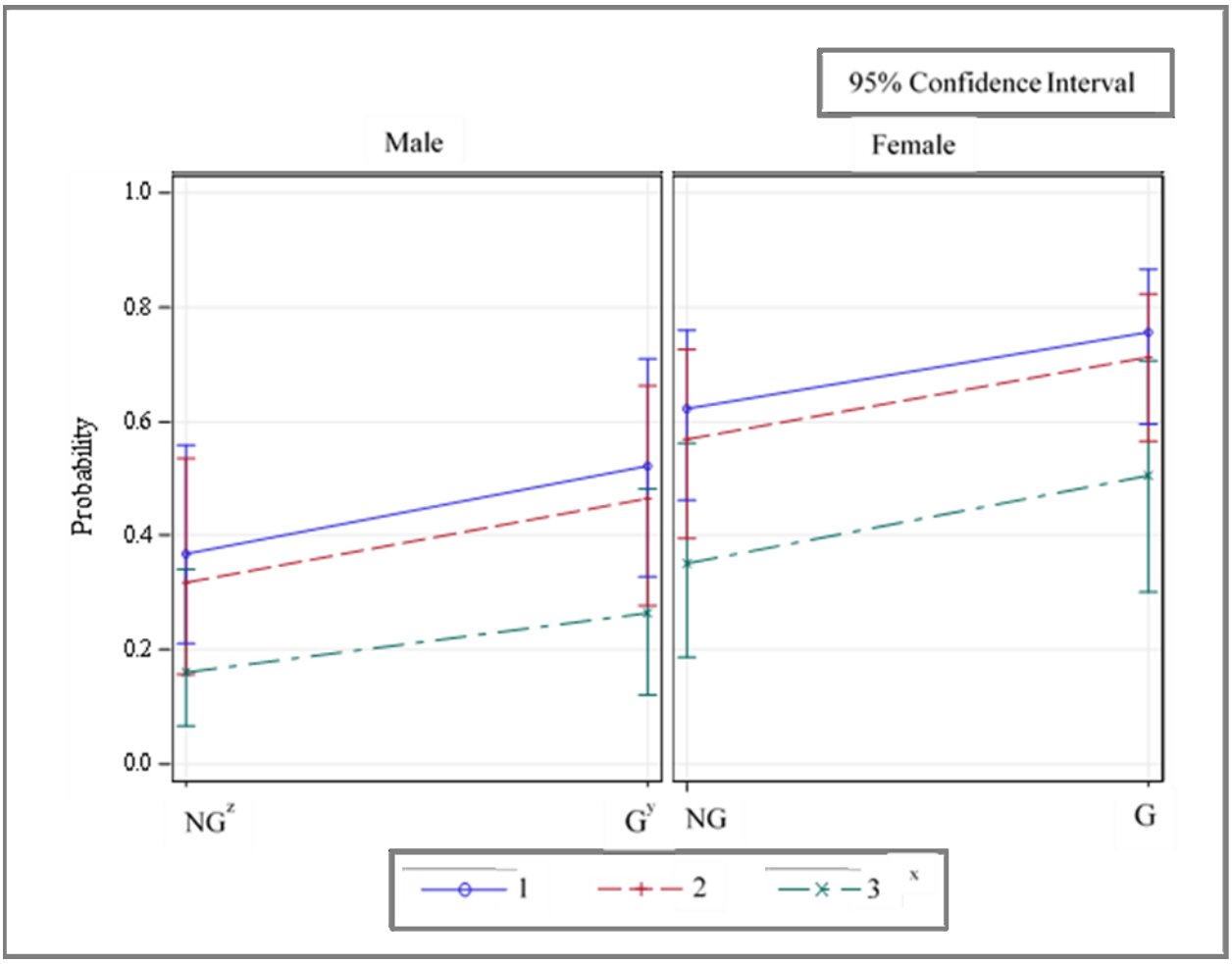


Figure 6-16 Probability that participants eat the daily recommended amount of fruit (2+ servings), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)

Vegetable Intake

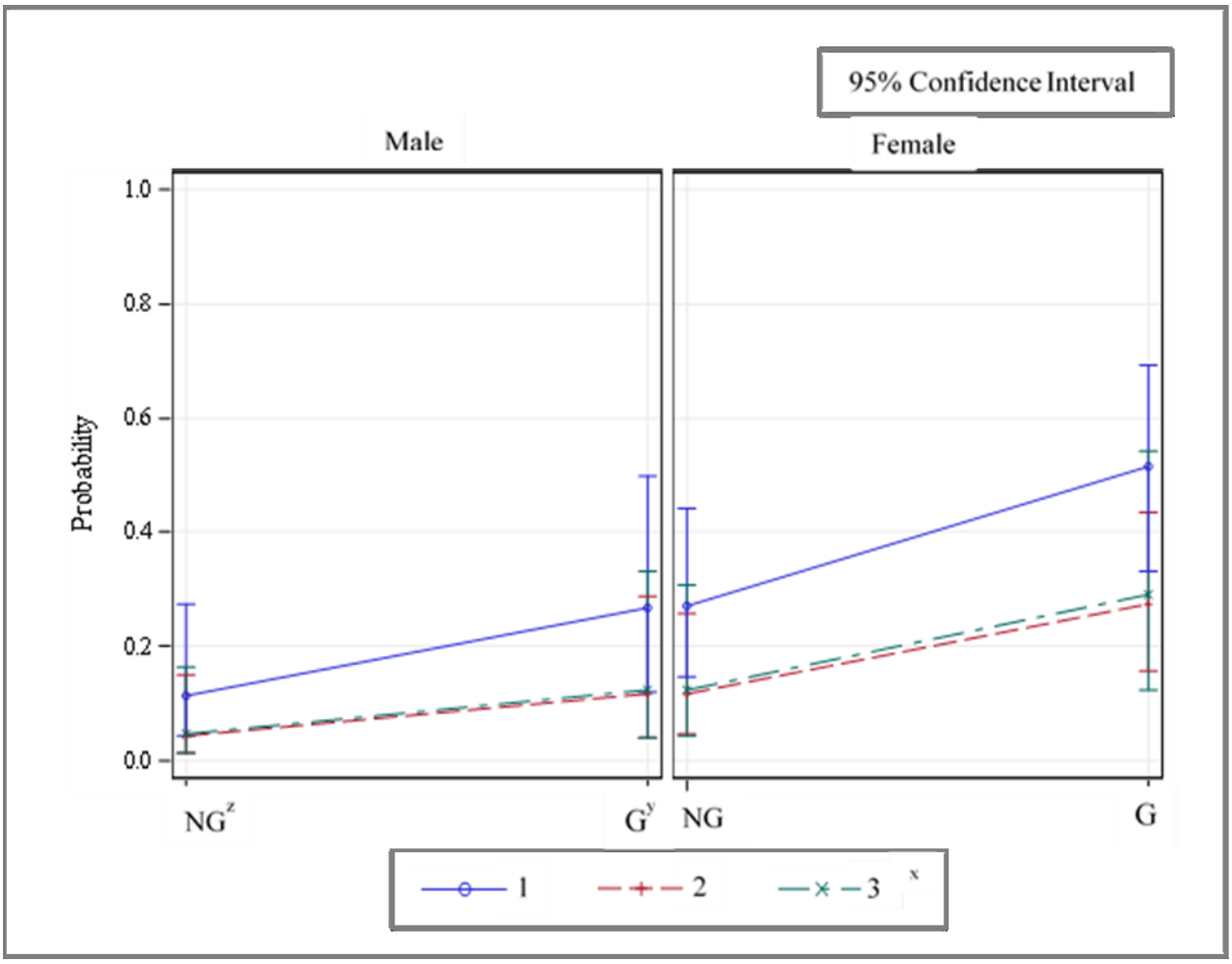


Figure 6-17 Probability that participants eat the daily recommended amount of vegetables (3+ servings), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)

Fruit and Vegetable Intake

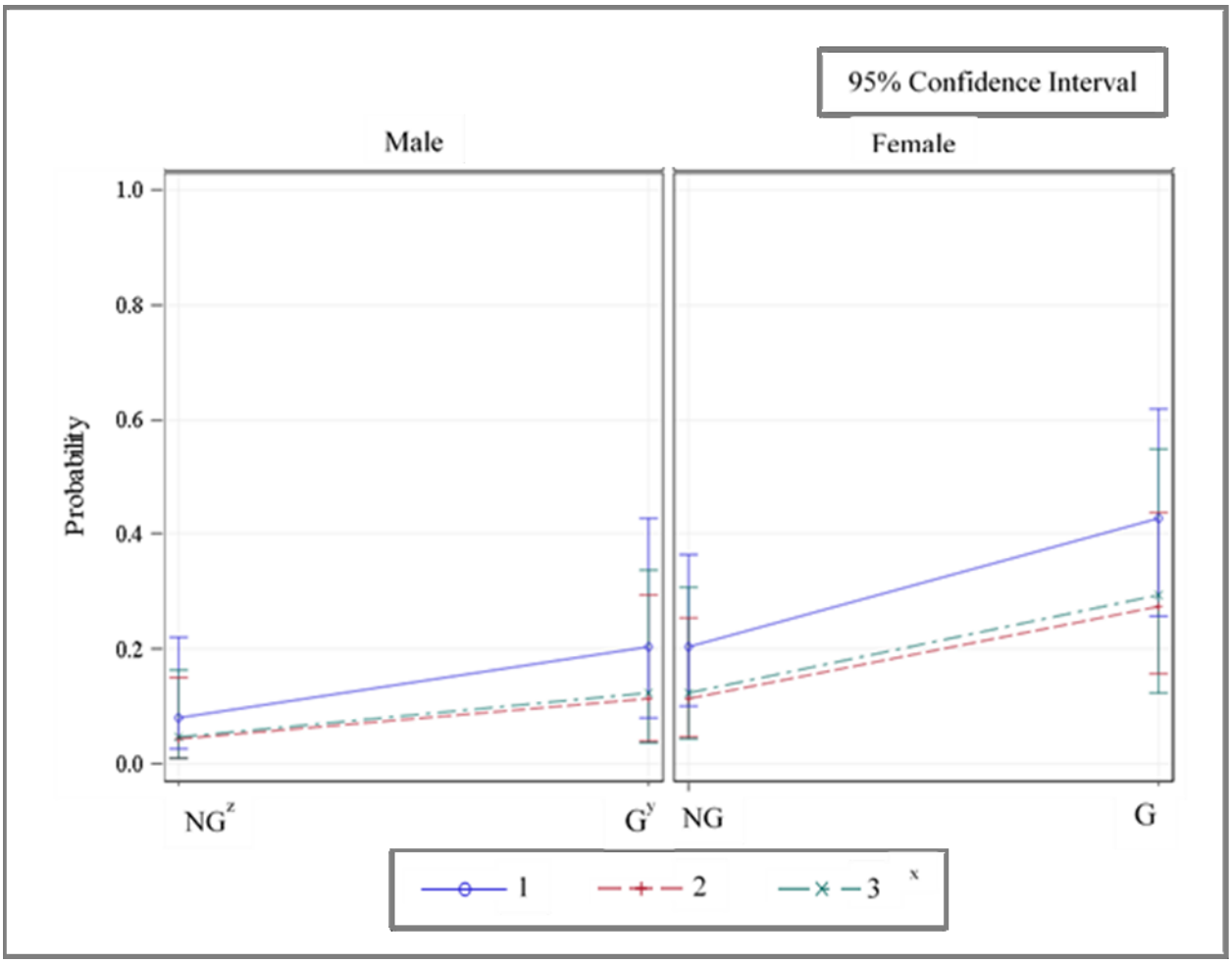


Figure 6-18 Probability that participants eat the daily recommended amount of fruit (2+ servings) and vegetables (3+ servings), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)

Moderate Physical Activity

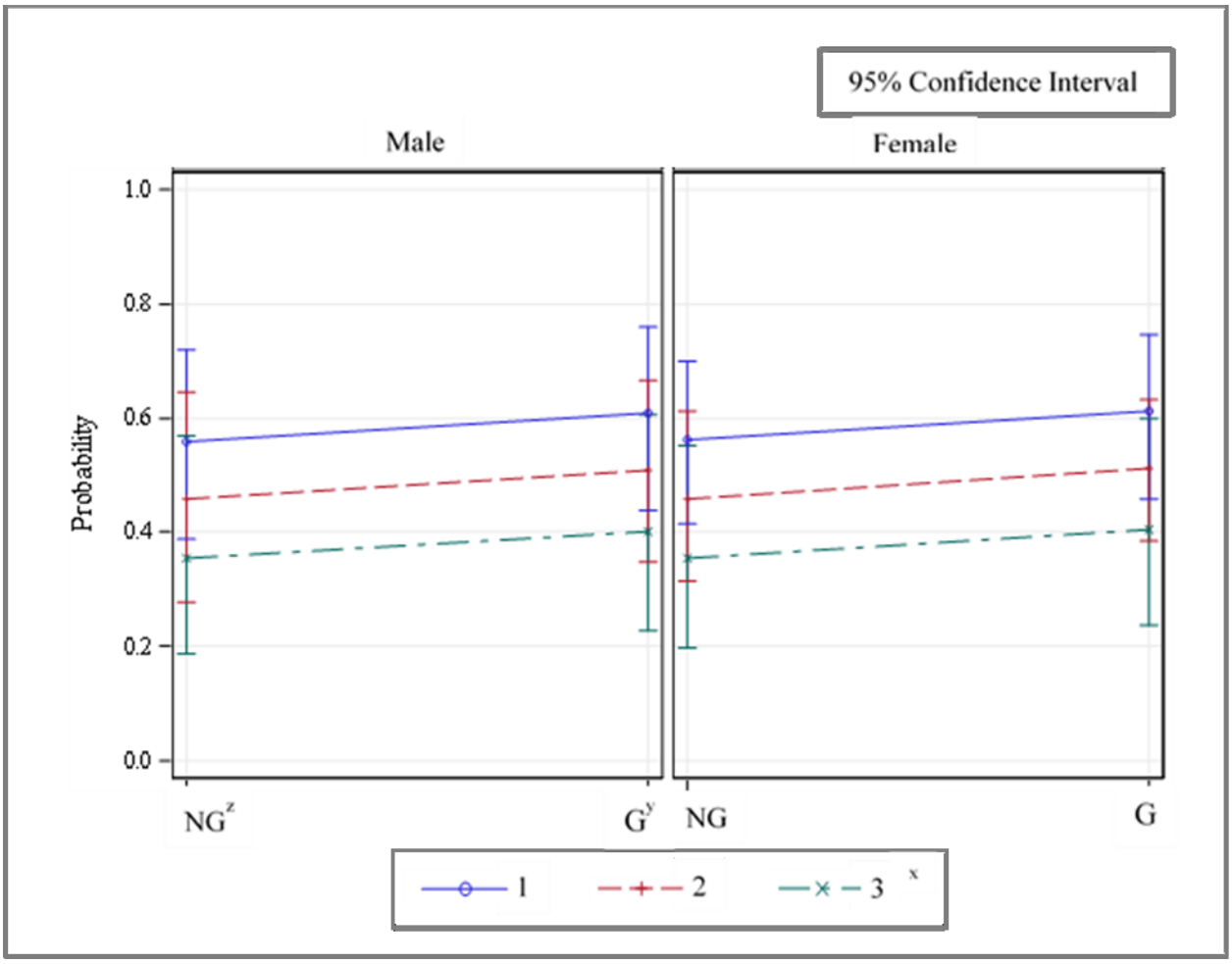


Figure 6-19 Probability that participants meet the recommended amount of weekly physical activity through moderate physical activity (150+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)

Vigorous Physical Activity

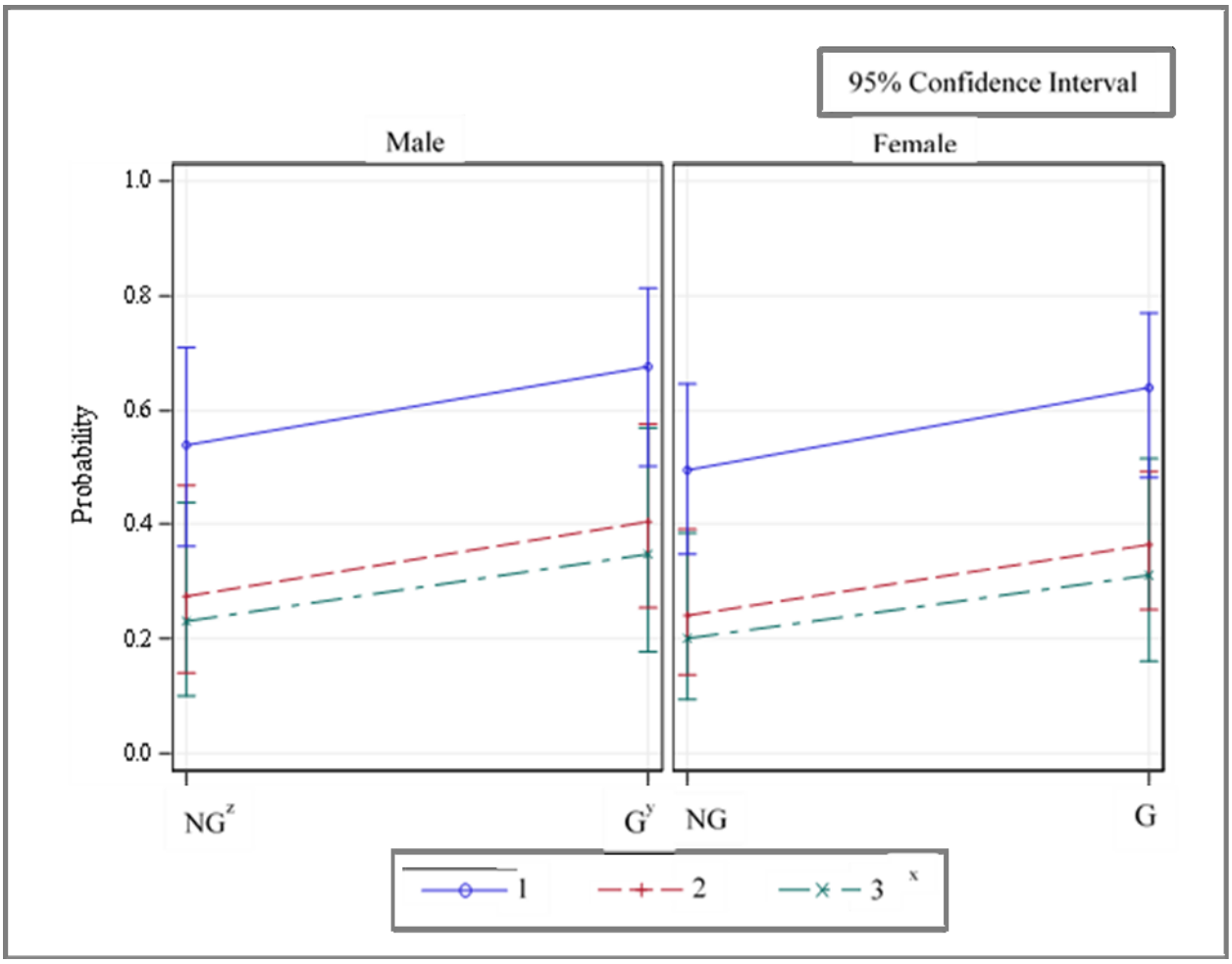


Figure 6-20 Probability that participants meet the recommended amount of weekly physical activity through vigorous physical activity (75+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)

Moderate and Vigorous Physical Activity

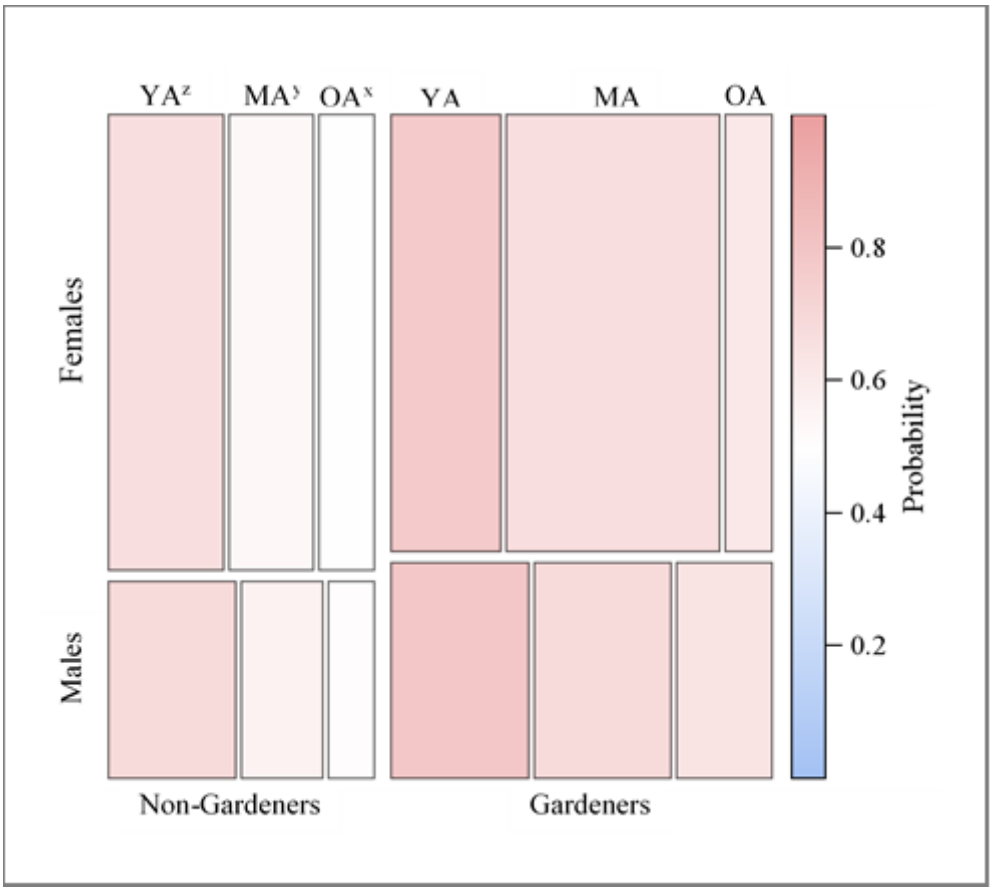


Figure 6-21 Probability that participants meet the recommended amount of weekly physical activity through a combination of moderate physical activity (150+ minutes) and vigorous physical activity (75+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

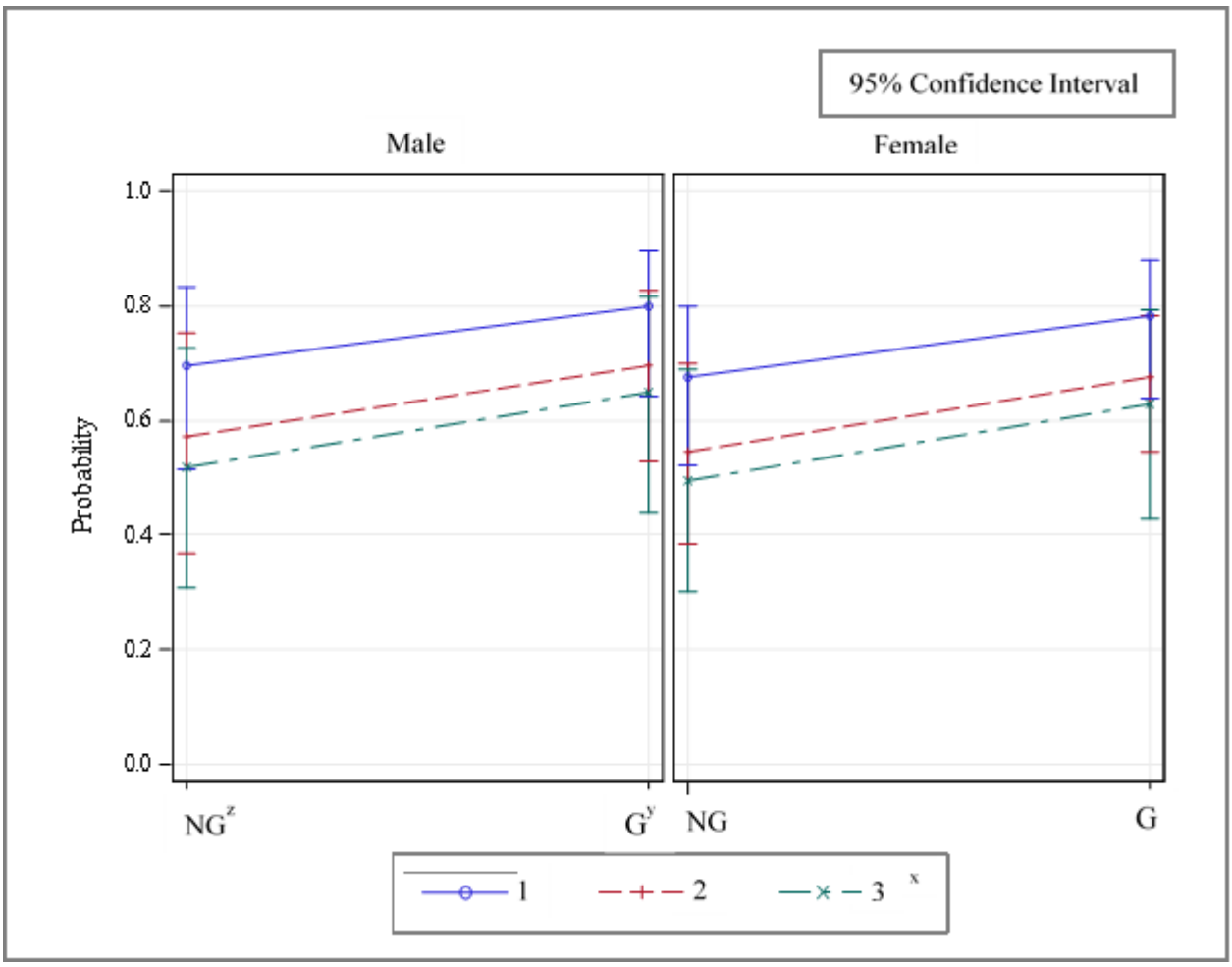


Figure 6-22 Probability that participants meet the recommended amount of weekly physical activity through a combination of moderate physical activity (150+ minutes) and vigorous physical activity (75+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)

Fruit and Vegetable Intake, and Moderate and Vigorous Physical Activity

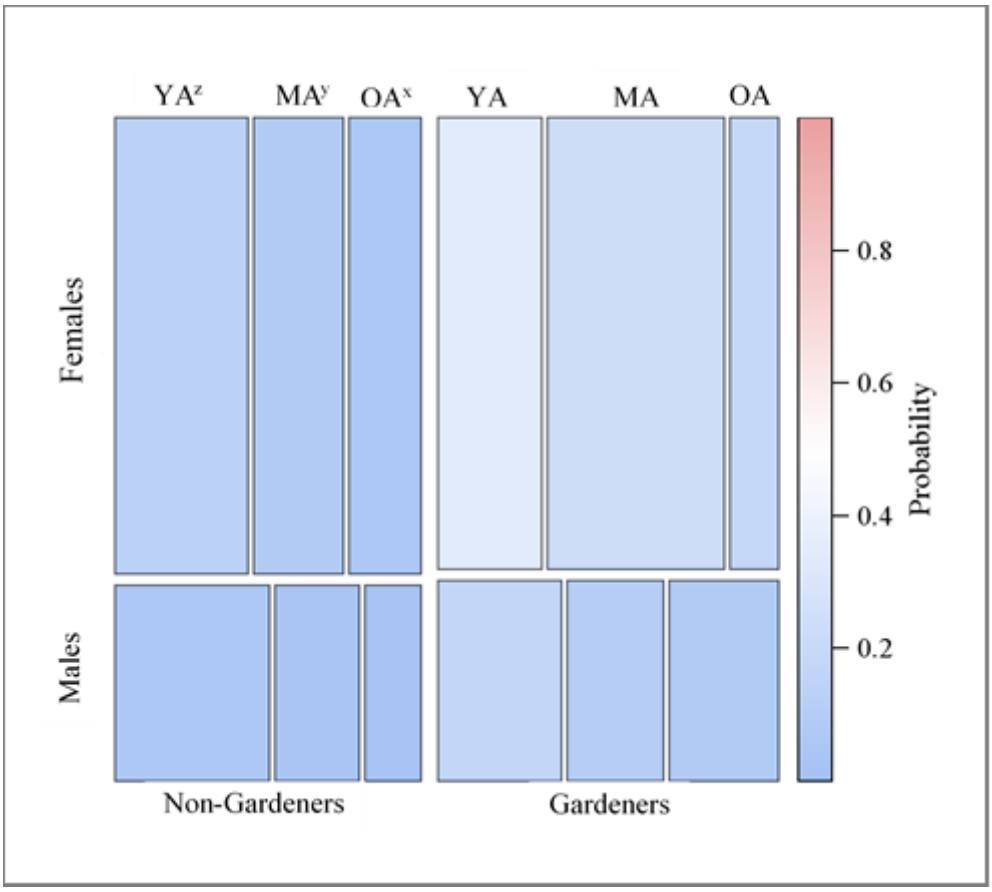


Figure 6-23 Probability that participants meet daily recommended fruit (2+ servings) and vegetable (3+ servings) intake and meet the recommended amount of weekly physical activity through a combination of moderate physical activity (150+ minutes) and vigorous physical activity (75+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]YA = young adult (18-39 years old)

[y]MA = mature adult (40-64 years old)

[x]OA= older adult (64+ years old)

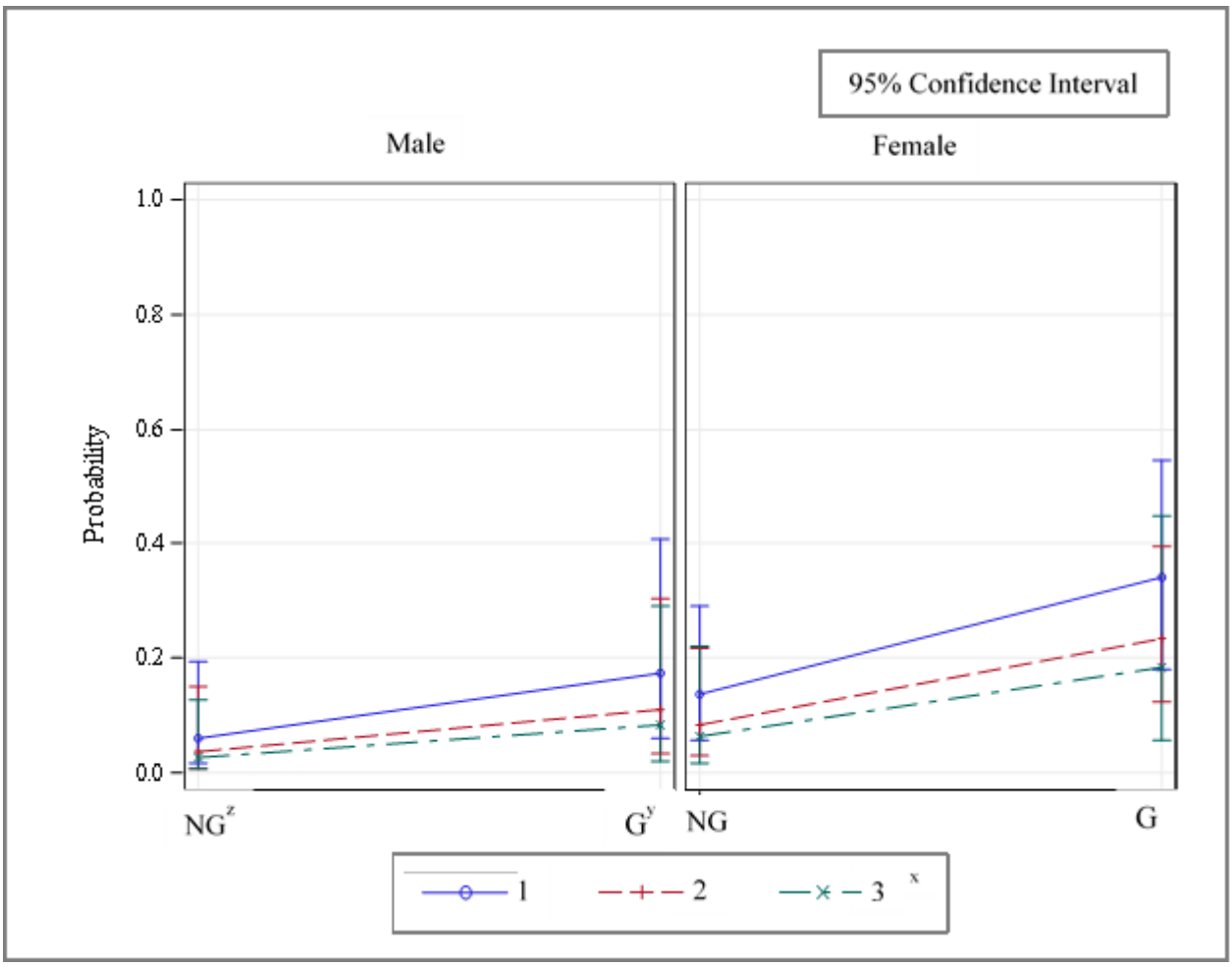


Figure 6-24 Probability that participants meet daily recommended fruit (2+ servings) and vegetable (3+ servings) intake and meet the recommended amount of weekly physical activity through a combination of moderate physical activity (150+ minutes) and vigorous physical activity (75+ minutes), categorized as gardeners or non-gardeners, and males or females, and young adults, mature adults or older adults.

[z]NG = non-gardener

[y]G = gardener

[x]1= young adult (18-39 years old); 2 = mature adult (40-64 years old); 3 = older adult (65+ years old)