A Descriptive Study with Recommendations Regarding Adult Obesity in Benton & Franklin Counties Based on 2003-2010 BRFSS Data

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Introduction

Over 72 million adults in the United States are obese (Centers for Disease Control and Prevention (CDC), 2011). This equates to approximately one in three. Obesity is a growing problem because it contributes to the increase of chronic disease and death. Exploration of potential interventions to stop the increase in obesity are necessary to change these trends(CDC, 2011).

Obesity is the second highest preventable leading cause of chronic disease(Ogden & National Center for Health Statistics (U.S.), 2007). Although the national goal is a 15% obesity rate, no state has met that goal(Johnson & Wardle, 2011). Between 1980 and 2008, obesity rates doubled among adults in the United States, contributing to an increase in the incidence of cardiovascular disease, stroke, liver and gall bladder disease, Type II diabetes, infertility, kidney disease, osteoarthritis, and cancer (CDC, 2011). With this increase in obesity prevalence, U.S. public health agencies have focused their attention on prevention and control of what has officially been called an “obesity epidemic”(Prevention, 2010).

What is causing this epidemic? Evidence suggests that multiple factors contribute to this problem, some within individual control, while other factors may be environmental. Genetics also effects metabolism(Power & Schulkin, 2009) and the natural process of aging has been linked to weight gain(Graff et al., 2011).

Individuals typically control behavioral factors such as consuming healthy foods and beverages and obtaining adequate physical activity(Prevention, 2010). Barriers to these factors may include lack of access to fresh healthy foods, including fruits and vegetables, and proximity to safe “built-environments” that foster and encourage physical activity(Blass, 2008). Community interventions can impact behaviors to slow or prevent the increase of overweight and obesity(Maguire & Haslam, 2010).

Obesity can be described as an **“**unhealthy weight resulting from an imbalance between caloric intake and energy expenditure”(Prevention, 2010; CDC, 2010) and is measured through Body Mass Index (BMI)(Hu, 2008). BMI is calculated by dividing weight in kilograms by height in meters squared (adult obesity is a BMI of30kg/m^2 or more). BMI is one of the least invasive and least expensive ways to determine weight related health within a large population(Greening, Harrell, Low, & Fielder, 2011).

The following descriptive study will examine obesity and the associated factors among different adult sub-populations in Benton and Franklin Counties. Based on a review of the literature recommendations will be made regarding community interventions, and evidence informed best practices to guide local obesity intervention efforts.

Chapter 1: Aims

This descriptive study explored obesity rates among adult sub-population(s) when aggregated with different demographic factors in Benton and Franklin Counties in the Behavior Risk Factor Surveillance Survey (BRFSS) between 2003 and -2010. Demographic factors included were: age, gender, ethnicity, income, and education. Correlations between these demographic factors and BMI were examined. Additionally, potential contributing factors which are known to be associated with BMI, specifically level of physical activity and fruit and vegetable consumption, were examined by analyzing county level data available through the BRFSS. Findings from this analysis will help to identify sub-population group(s) with the highest obesity prevalence.

Figure 1: *Benton and Franklin Counties, Washington*

To better understand obesity prevalence at the local level, an awareness of the geographic and economic makeup of this community is essential. Located in Southeastern Washington, Benton and Franklin Counties contain a vast array of agricultural resources and recreational opportunities. The counties have remained somewhat unaffected by the economic recession of the past few years(John, 2012). People are attracted to the area from around the country and seek employment, school, and rural life-style(Michelle, 2012). Despite the attractive climate and recreational offerings,

these counties currently have a combined obesity prevalence of 31%(Washington State Department of Health (DOH), 2010). What is causing this high prevalence of obesity?

Is it because people aren't eating enough fruits and vegetables or getting adequate physical activity? Before intervention planning can begin, an assessment of how overweight and obesity rates spread over age and gender groups are needed. Bray's analysis of data has revealed that obesity increases as we physiologically age due to a slowing of the metabolism(Bray, 2007), which could explain why older adults have higher obesity prevalence than younger adults.

What's causing this high prevalence of obesity? Are income and education known to be correlated with the obesity rates? According to the literature, people with more education and higher wages tend to have a lower prevalence of obesity than those who are lower earners (Ogden & National Center for Health Statistics (U.S.), 2010a; Webbink, Martin, Visscher, & Netherlands. Centraal Planbureau., 2008) and have less education. Therefore residents who are lower wage earners or less educated may be expected to have a higher prevalence of obesity than those who earn more or are more highly educated.

Is ethnicity alone correlated with obesity rates or are there a series of factors that have to exist? Data from recent studies demonstrate how obesity prevalence is tied to people of minority population groups(Paeratakul, Lovejoy, Ryan, & Bray, 2002), thus minority racial/ethnic sub-populations in Benton and

Franklin Counties may have a higher prevalence of obesity than the White/Caucasian population. According to multiple sources in the literature people who are of Hispanic ethnicity have higher obesity prevalence than the White Non-Hispanic populations in the same geographic areas (Clarke, O'Malley, Johnston, & Schulenberg, 2009; Nicholson & Browning, 2012). An expected finding might be higher rates of obesity among the Hispanic population in this bi-county area when compared to obesity rates among the Non-Hispanic White population.

In summary, based on observations of the available data in BRFSS, is there an association between physical activity and the prevalence of obesity in Benton and Franklin Counties? According to observations from available BRFSS data, is there a clear relationship between fruit and vegetable consumption and the prevalence of obesity?

Chapter 2: Significance and Background

Worsening obesity is contributing to an increase in chronic disease rates and obesity-related medical care costs. In 2008 alone, it is estimated that obesity cost the nation approximately $147 billion(Prevention, 2010). Local obesity associated costs are not easily determined but BRFSS illustrates the prevalence of obesity-related diseases. In Benton County, “1 in 12 adults had diabetes, and 1 in 14 adults reported they had a heart attack, coronary heart disease, angina or stroke” (DOH Report, 2007-2009 BRFSS). In Franklin County, “1 in 9 adults had diabetes (significantly higher than the state diabetes rate of 7%), and 1 in 20 adults reported they had a heart attack, coronary heart disease, angina or stroke” (DOH Report, 2007-2009 BRFSS).

Obesity Prevalence

The Kennewick-Richland-Pasco Metropolitan Statistical Area (MSA) was recently identified as the 9th highest obese metropolitan areas in the United States with an adult obesity rate of 33.2 % ("Gallup Poll", 2012). Washington State 2009-2010 BRFSS data estimate the prevalence of obesity is 31% (95% CI, lower 28%,upper 35%) in Benton and Franklin Counties, 26% (95% CI, lower 25%, upper 27%) in Washington State(Washington State Department of Health, 2010), and 27% nationwide(Beydoun & Wang, 2009). Given this prevalence information, it is clear that Benton and Franklin Counties are experiencing a higher rate of obesity compared to the state and national rates.

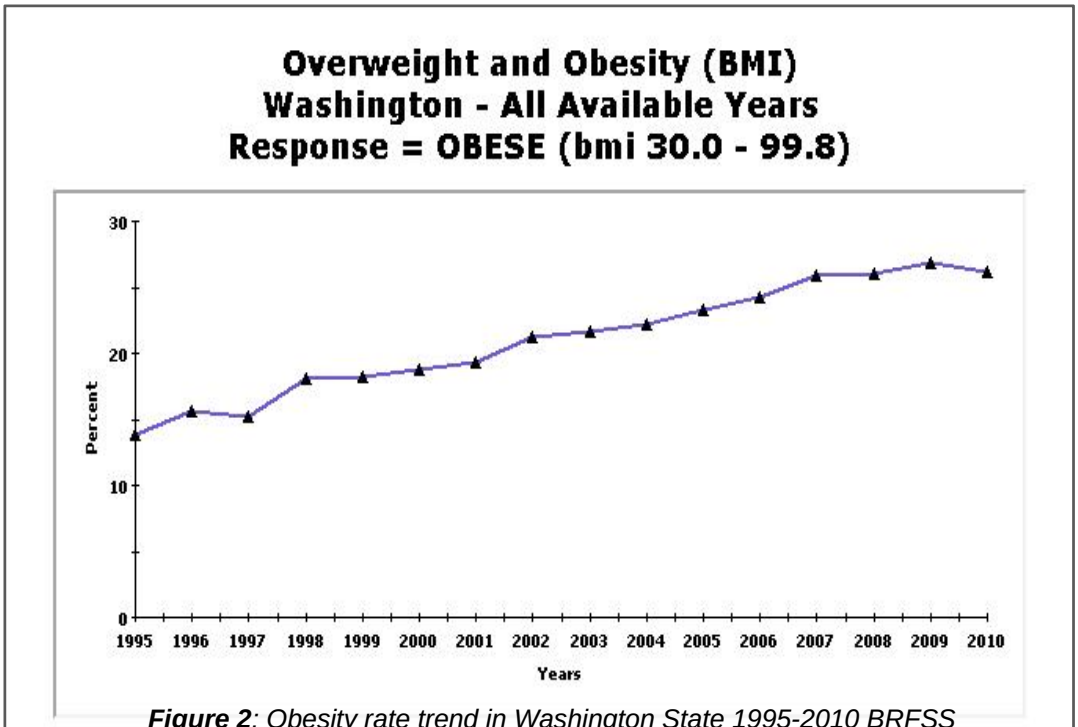

***Figure 2**: Obesity rate trend in Washington State 1995-2010 BRFSS*

As shown in Figure 2 in Washington State, the overall prevalence of obesity has increased over past 15 years from 14% to over 25%(Washington State DOH, 2010; RA, LR, & Services, 2011).

Disparities have been discovered between different sub-populations regarding obesity (Beydoun & Wang, 2009; French, M., & RW, 2001). Data from the National Health and Nutrition Examination Survey (NHANES 2005-2008) found that 51% of non-Hispanic black women, aged 20 years or older, were obese compared with 43% of Mexican Americans and 33% of Caucasians of the same age group (CDC, 2010). While women in general did not see a significant increase in BMI between 2009 and 2010, Hispanic women (p=.046) and non-Hispanic black women (p=0.04)(Ács, Lyles, & Stanton, 2007)had a significant increases in obesity and found a general steady increase in BMI rate among men

(35.5% obesity prevalence 2009-2010). Although in the past 2 to -6 years (2009 to -2010 compared to 2003 to -2008) BMI differences seem to be similar for both sexes in general(Washington State DOH, 2004 to -2007). Washington State data also indicate an obesity disparity between different racial, ethnic and socioeconomic Populations. Washington State data appear to reflect a difference in obesity rates among those who have high school or less education and those who have graduated from college. People who didn't attend college were 52% more likely to be obese compared to college graduates(Washington State Department of Health (DOH), 2009).

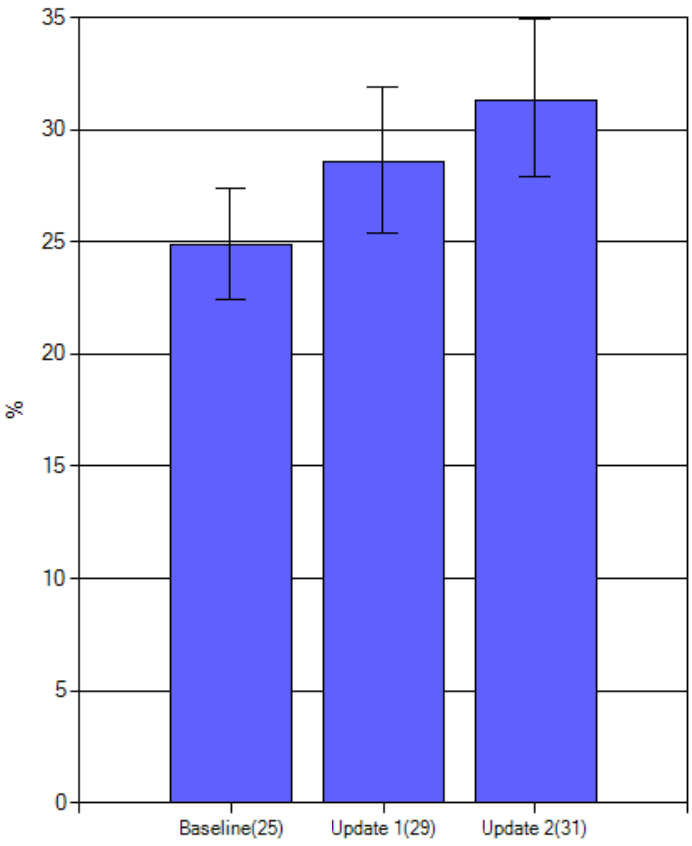

***Figure 3**: DOH Local Public Health Indicators: obesity increase in Benton & Franklin Counties*
Baseline: 2004-2006, update 1:2007-2008, update 2: 2009-2010

In Benton and Franklin Counties specifically, the rate of obese adults has increased dramatically. Between 2004 (25%) and -2010 (31%) (see Figure 3), the obesity rate has increased by approximately 6%(Washington State Deparmtent of Health, 2004-2007).

Obesity Related Behaviors

In 2009, 26% of adults reported consumption of five or more fruits and vegetables daily (BRFSS/DOH), which was a slight increase since 2002 (23%). That means 74% of adults reported consuming less than the recommended amount of fruits and vegetables daily. Washington State BRFSS data indicate that women consume five or more fruits and vegetables per day more frequently when compared to men (2007-2009 BRFSS). State data from 2007-2009 also found that as household income and level of education increased, daily consumption of fruits and vegetables increased.

The percentage of adults in Washington State, aged 25 to -34 years, who meet the nationally recommended levels of physical activity has been steadily declining, from 59.7% in 2001 to 55.8% in 2007(CDC, 2011). The national percentage of adults in this age group who meet physical activity recommendations has increased, from 49.6% in 2001 to 53.2% (CDC, BRFSS, 2007). In 2003, in the Kennewick-Richland-Pasco Metropolitan Statistical Area (MSA), 44.3% of adults reported meeting recommended levels of physical activity, 38.3% reported insufficient physical activity levels, and 10.1% of adults reported no physical activity(Gallup Poll, 2012). Of the people surveyed in Washington State between 2004-2010, physical activity behaviors and consumption of fruits and vegetables has been fairly constant, although low, which may be contributing to this increase in obesity(Washington State Department of Health, 2010).

Exploration of other potential contributing factors is important to understanding how to best intervene. A recent study suggested that among young adults, if a significant other exhibits healthy choices and behaviors (i.e. eats five or more fruits and vegetables daily and meets recommendations for regular moderate and vigorous physical activity) there is a greater likelihood the other partner will have similar favorable attitudes and behaviors(Berge, MacLehose, Einsberg, Laska, & Neumark-Sztainer, 2012). Especially among women, the attitudes and behaviors regarding fruit/vegetable consumption and physical activity participation effect significant others(Berge et al., 2012).

Demographics

To better understand factors that might correlate with increased BMI rates, considerations must be made for the demographic and socioeconomic factors unique to this geographic area. In 2010, approximately 6,724,540 people resided in Washington State, with 253,340 in both Benton and Franklin County combined. Females make up about 49% of the population, while males comprise the remaining 51%. Residents aged 65 years and over, make up approximately 11% of the total population (27,665totals; 20,586 in Benton, 7,097 in Franklin). People aged 18 years and under, make up 27% of the population in Benton County and 34% of the population in Franklin County(United States Census Bureau Population Survey (U.S. Census), 2010).

In terms of ethnic make-up, Caucasians comprise 82.4% of Benton County, and 60.4% of Franklin County. The second largest population group is of

Hispanic ethnicity with 18.6% residing in Benton County and 51.2% in Franklin County(U.S. Census, 2010). Other races represented include Asian/Native Hawaiian/Pacific Islanders (API) (2.8% in Benton County, 1.9% in Franklin County), African Americans (1.2% in Benton County, 1.9% in Franklin County), American Indians/Alaska Natives (AIAN) (0.9% in Benton County, 0.6% in Franklin County), and two or more races combined (3.5% in Benton County, 3.1% in Franklin County)(Washington State Office of Financial Management Population Data (OFM), 2010).

While English continues to be the predominant spoken language, the top eighteen other languages in Benton and Franklin Counties include; Spanish, German, French, Vietnamese, Serbo-Croatian, Chinese, Ukrainian, Russian, Tagalog, Laotian, Korean, Bengali, Portuguese, Japanese, Norwegian, Dutch, Italian and Panjabi. Refugees and immigrants have migrated to this area from all over the world. People have recently come to this bi-county area from Mexico, Canada, United Kingdom, Vietnam, Bosnia, Herzegovina, El Salvador, Laos, the Philippines, the Ukraine and Guatemala (U.S. Census, 2010).

Tools and Interventions to Reduce Obesity

While evidence based interventions are still being developed and evaluated, there are many community efforts occurring throughout the country to reduce obesity. Through effective education, prevention, and early intervention, a decrease in obesity incidence is possible. The following descriptions focus on interventions through environments where people learn, work and play.

Additionally, evidence informed methods for community wide reach and sustainability are discussed.

Schools

According to the literature, one obvious place to begin to decrease adult obesity is through early prevention among children(Katz et al., 2005). Schools, parents, and communities share a responsibility to protect and inform young people within that community(Barbour, 2011). Children spend a majority of their time in school. School is where many children eat 2 to -3 meals per day, and are a captive audience for teachers. Some schools have begun to pilot obesity intervention and found success(Bagby & Adams, 2007; Greening et al., 2011), while other schools struggle to find time during the school day to increase physical activity or find money in the budget to improve cafeteria food and provide healthier food options(Torre, Akre, & Suris, 2010). Coordinated school health has recently been recommended by the CDC as a partial solution to combat childhood obesity (CDC, 2011). Coordinated school health programs involve implementation of effective health curriculums and programs throughout the school day. Such curriculums and lessons are necessary to ensure that children get a healthy start, develop lifelong healthy behaviors early so that health is a part of everyday life(Leeman, Sommers, Leung, & Ammerman). Despite obesity prevention efforts in schools, many disparities exist that are similar to those of obese adult populations. Children who grow up obsese, often

remain obese into adulthood often become obese adults(Nicholson & Browning, 2012; Ogden & National Center for Health Statistics (U.S.), 2010b)

Workplace Wellness

While children spend the majority of time in school, adults spend the majority of time in the workplace(Verweij, Coffeng, Mechelen, & Proper, 2010). Jobs can range from requiring a high level of physical labor to a low level of physical activity (i.e., sedentary)(Hill, Wyatt, Reed, & Peters, 2003). Workplace wellness programs have been adopted by a number of employers, although these programs are expensive and often difficult to implement with tight budgets and economic hardships(Katz et al., 2005). Workplace programs vary by business and industry and are by no means universally adopted(Katz et al., 2005). Studies of worksite diet and physical activity interventions, have found short-term effect on physical weight, but have not illustrated long-term sustainable decrease in BMI among a majority of participants(Verweij et al., 2010). Worksite wellness programs lack consistency and often up-front implementation costs of such programs are perceived by employers as too great(Katz et al., 2005). Recent studies have found potential cost savings through increased productivity, decrease in absenteeism and reduced prevalence of cardiovascular and other diseases, when worksite wellness programs are implemented(Allen, Lewis, & Tagliaferro, 2012). The return on investment resulting from an environment that fosters weight loss and increased

health can actually save companies money in the long term(Shiriki Kumanyika, 2005 October).

While worksite wellness programs support adults in the workplace, there are a number of alternative obesity solutions outside of the workplace. Many commercialized or popular individual approaches to weight loss involve(Burroughs et al., 2006) programs which can be cost prohibitive for many individuals and require time availability outside of the work day(Maguire & Haslam, 2010). Some of these diets and programs are more evidence based than others, and success can vary according to each individual. Others are based on opinion, not evidence(Maguire & Haslam, 2010). Celebrities make money by endorsing such programs, while they use the product to lose weight(Rosemann, Patterson, Patterson, & Meridian Education Corporation., 2004). Despite associated costs (historically unattainable for those with lower incomes), many gyms and fitness centers that recognize the importance of the issue are increasing access through provision of affordable pricing systems(Maguire & Haslam, 2010).

Fitness clubs and gyms are becoming more common and are places where people can pay a monthly or annual fee to have access to fitness classes and equipment. People, who select gym memberships as a weight loss or weight control option, are often those who can afford it. There are many barriers for this to be a feasible solution for the majority. A gym membership, doesn't guarantee that people will attend regularly or develop a lifelong fitness routine(Kellow,

2010). Benefits of gyms include the provision of many fitness choices in a controlled indoor environment, personal trainers can be hired at extra cost to work with individuals, childcare is often available, and nutrition supplements or refreshment opportunities often exist. For those who can afford it, gyms can be a viable solution to reduce obesity, although some message or motivation has to get people there.

Social Marketing

Another approach to increasing health behaviors is through utilization of social marketing. Social marketing is a program that actively promotes a social action or health behavior(Burroughs et al., 2006). This is accomplished through providing widespread health behavior messaging, health promotion campaigns, or targeted media with the goal to influence the general population to eat healthier and exercise more. In particular to get across the message that weight loss is most effective when exercise increases and calorie intake is reduced(N. I. o. Health & National Heart, 2000). For example, a 2003 study was conducted to increase walking and trail use within a rural community(Blass, 2008). In this study, focus groups were used as a tool to test different social marketing messages and techniques with guidance from the Guide to Community Preventive Services(USA.gov, 2012). If a community is saturated with evidence informed health promotion messages, and provision of free or low cost tools & resources for easy use, people are more likely to accept and adopt the behavior(s) as a social norm. Social marketing is a tool that can inform a

message and educate a community to increase weight loss. This is most effective when support and provision of tools exist and foster self-monitoring efforts(Milsom, Middleton, & Perri, 2011).

Policy

Another option for reducing obesity is through the creation, implementation, and enforcement of policies that foster healthy communities. Policies that affect physical health, include requirements for complete streets and sidewalks(Hill et al., 2003), adequate lighting of parks and trails, and zoning laws regarding fast food/fresh food markets. “Complete streets” is a term used to describe the built environment structure with safer sidewalks, crosswalks and curbs that are pedestrian and bike friendly (mainly with some sort of landscaping between the street and the sidewalk)(Blass, 2008). Currently in Washington State, there are 157 Chronic Disease Policies that have gone through the legislative process. Of these policies, 56 have been enacted, 34 have been introduced, 1 vetoed (also a community policy) and 66 dead policies (56 of which were community based policies)("Chronic Disease State Policy Tracking System," 2012). Policy interventions are labor and time intensive, but also have the potential to have lasting positive effect on physical health within the community. Policies are needed to support and foster an environment that is supportive of physical activity(Nestle & Jacobson, 2000). Taxation of soda and snack foods is a policy(Kuchler, Tegene, Harris, & United States. Dept. of Agriculture, 2004) intervention that has been passed in some states, and is now

being tested. However, evidence of success in reducing snack food consumption has been inconsistent(Kuchler et al., 2004). Where implemented, the additional funds from taxation could go towards supporting obesity prevention/intervention programs.

Primary Care

Primary care physicians could play a larger role in helping patients recognize, understand, and address weight issues. Doctors have the knowledge, resources and credibility that others may lack when educating people on these issues(Nsiah-Kumi, Kang, & Parker, 2012). Thus, physicians and other health providers would be an educational resource for families, and adults of all ages(National Institute of Diabetes and Digestive and Kidney Diseases (U.S.) & Weight-control Information Network (U.S.), 2005). A recent study assessed patient perceptions of a physician online referral with information and support for behavior change revealed that 60% of patients reported a positive experience or that it was “fine or okay’”(McTigue et al., 2011). This important tool could be explored further through local focus groups as a potential sustainable resource where people could learn about the various tools and resources including the very simple to the very extreme of obesity solutions.

Medical and Surgical Options

In addition to primary care doctors taking a more active role in educating and encouraging patients to prevent/intervene on obesity, there are surgical

options and medications(Maguire & Haslam, 2010) that are increasing in use and popularity(Katz et al., 2005). Over the counter (OTC) drugs with the intended use of “slimming down” sounds too good to be true, and is due to lack of complete evidence that they are effective in aiding weight loss(Maguire & Haslam, 2010).

Bariatric surgery is one direct weight loss treatment option for adults where surgeons physically reduce the size of the stomach with the intent of decreasing appetite within the individual(Milsom, Middleton, & Perri, 2011). This option has strict qualification criteria and is not recommended for everyone. However, for people who have attempted to change diet and exercise behaviors without success and for those who have a BMI of 50 or over, it can be an effective medical intervention for obesity(Maguire & Haslam, 2010). Despite the dangers associated with these solutions(Quality), people increasingly turn to them when other methods fail(Maguire & Haslam, 2010).

Obesity interventions aimed at making a community wide impact are needed to assess and target the population at highest risk and with the highest prevalence. Obesity affects different populations in different ways. Disparities exist depending on race/ethnicity, age, gender, socioeconomic status and education. Each of these groups will need special targeted messages to help move people away from obesity. This will require community wide, culturally sensitive messaging (social marketing), and provision of tools and resources such as access to healthy foods (farmers markets, etc.) and safe places to exercise.

Because the exact cause of obesity is not always clear, successful solutions may also be uniquely complex. While there is no ‘magic bullet’, there are many options regarding sustainable ways to reduce obesity at the community level, such as building environments conducive of safe places to exercise, community wide social marketing, and increasing access to fresh fruits and vegetables. Celebrities, and those with large disposable incomes, can afford expensive commercial diets and trainers, but these options are not affordable to those groups most affected by obesity. The best, most sustainable interventions to date are policies that communities can create, implement and enforce to foster safe, affordable and fun places to walk, run and ride bicycles. Effective educational components in schools are our top obesity prevention option. Workplace and local media messages can provide broad education outreach regarding healthy eating and increased physical activity. It is likely that every community will require unique approaches to address this issue with interventions tailored to the specific needs of unique populations.

Chapter 3: Methodology

Overall population demographics and socioeconomics were obtained through the Washington State Office of Financial Management (OFM) and the U.S. Census Bureau. These data are publicly available via online databases. Washington State and U.S. obesity statistics were obtained through the CDC, NHANES, and other sources as a means of reference for local rates. Behavioral and BMI data for Benton and Franklin Counties were obtained through BRFSS via a data sharing agreement with the Washington State Department of Health.

Study Design

This descriptive study used BRFSS data from 2003 through -2010. The BRFSS is conducted continuously at the National, State and local level every month through land line telephones and the population sample was determined by a random computer numbers generator. Although not included in the dataset for this study, in recent years, BRFSS has begun collecting cell phone samples as more and more households are beginning to rely only on cell phones for telecommunication. There is a clear disparity between those having landlines and those only having cell phones, thus limiting sample sizes herein. However, valuable observations were made to support obesity prevention and intervention efforts at the local level. Statistical data analysis was accomplished through use of SPSS 16.0 data analysis software program.

Study Population and Data Collection Methods

The sample included a random selection of adults who lived in Benton and Franklin Counties who had landline telephones between 2003 and -2010. All tables illustrated in the next chapter have sample sizes greater than 50. For the purposes of this study, in order to increase the sample size for increased reliability of the data output, the survey data from the eight years mentioned above were combined using the data merge feature in SPSS. Then data was stratified by county and Benton and Franklin Counties had to be extracted from the Washington State sample (using CTYCODE variable), weighted accurately to reflect age structure, gender, ethnicity, education and income (the Washington State weight *finalwtw* was used to create *WTallyears* to weight all cases) and analyzed. The compare means function was used for continuous variables (asked every year), and the crosstabs function was used to compare variables that were both continuous and non-continuous to obtain value percentages (asked every year, every other year or less frequently). [See Appendix III for BRFSS codebook and project crosswalk for detailed list of questions and answer options provided to the survey participants]. To identify statistical significance and variations in the data, p-values were identified from crosstabs Chi-square test contingency tables, whereas the means and standard deviations were obtained through the test to compare means. Exploratory descriptive statistics were used when looking at actual BMI to determined 95% confidence intervals and spread of BMI values.

Measures

BMI was given in the dataset. This was calculated using self-reported height and weight using the formula: weight (pounds) / [height (inches)] ^{2} x 703 =BMI) (CDC). The weight category variable that was formed from the BMI variable categorizes a BMI under 18.5 as underweight, a BMI 18.9-24.5 as normal weight, a BMI of 25 to 29.9 as overweight, a BMI of over 30 as obese, and a BMI of 40 or more as morbidly obese(Prevention, 2010). Age groups included were: *18-24, 25-34, 35-44, 45-64* and *65 and older*.

Analysis of BMI data with demographic variables involved a comparison of the following; *socioeconomic status, race/ethnicity, level of education, gender* and *age* to identify an overall point-in-time eight year analysis of obesity prevalence in Benton and Franklin Counties combined. Variables commonly known to contribute to increased obesity were cross-tabbed for comparison with BMI; demographics were cross-tabbed with self-reported physical activity behaviors and fruit and vegetable consumption.

There is a known relationship between fruit and vegetable consumption and obesity prevalence (CDC). While not a complete measure of diet, fruit and vegetable consumption is defined by the CDC as the respondents age greater than or equal to eighteen years old who report eating fruits and vegetables five or more times a day. BRFSS asks questions about fruit/vegetable consumption and level of physical activity every other year. A dichotomous fruit and vegetable variable (<5 and >=5) was used to examine fruit and vegetable consumption.

This variable was calculated by the CDC from a set of questions asking questions regarding the frequency of consuming fruit, green salad, carrots, potatoes and vegetables.

Due to the strong evidence-based correlation between obesity reduction and physical activity, the CDC also created a calculated variable as a way to measure individual levels of moderate- and vigorous-physical activity. This is defined as the number of adults aged 18 years and over who report *moderate physical activity for greater than or equal to 30 minutes more than five times a week* or who report *vigorous physical activity for at least 20 minutes three times a week or more* divided by the number of adults age 18 and over who report *any or no physical activity within the previous month* (not including those who refused to answer the question, didn't know, or weren't sure). Another calculated variable examined whether people participated in *physical activity in the past 30 days*.

Level of education completed was asked annually and provided the following choices; *adults who never attended school* or *only attended kindergarten*, adults who *completed grades 1-8*, adults *completed grades 9-11*, adults who obtained *education up through grade 12 or GED* (high school graduate), adults who reported they *completed some college or technical school* (1-3 years of college), those who *completed 4 or more years of college*(college graduate) and missing variables (adults who didn't know or refused to answer the question). Level of income data are collected by asking "What is your annual household income from all sources?" and answer options include: *less than*

$10,000, less than $15,000, less than $20,000, less than $25,000, less than $35,000, less than $50,000, less than $75,000, $75,000 or more, and missing variables (don't know/not sure/refused).

Descriptive statistics included crosstabs method for non-continuous variables to identify potential correlations. BMI variables included; individual calculated BMI values, 3 level BMI categories, six level age category, and gender. Variables analyzed also include; race/ethnicity, income and education (while calculated variables were available for these two variables, the data was exactly the same, only grouped slightly differently). Due to the insufficient sample sizes in the fruit/vegetable consumption variable (<50), the three lowest levels of income (*<$10,000, <$10,000 and <$25,000*) and the next two levels of income (*<$35,000* and *<$55,000*) as well as the three lowest levels of education (never attended, grades 1-8, grades 9-11), samples were combined for percentages (see Table 2). Fruit and vegetable data was analyzed through the CDC calculated variable *consumed five or more servings of fruits or vegetables per day*. The recommended physical activity calculated variables and computed overall physical activity. When both the *recommended physical activity* and the *overall physical activity* variables were found to contain inadequate sample sizes for adequate comparison, the variable reflecting *any physical activity in the past 30 days* was incorporated instead to represent physical activity behavior, due to better sample size. All missing category values within the variables were coded as missing in SPSS.

Due to an apparent relationship between education, income and ethnicity, a more detailed examination of the relationship between the level of education (*less than high school graduate, and high school graduate through college*), ethnicity (*Hispanic,* and *White non-Hispanic*) and BMI (*normal weight, overweight,* and *obese*) values were performed. Then, ethnicity was broken down by each of the education variables to examine possible correlations between ethnicity, level of education and actual BMI value (see Table 7).

Chapter 4: Results and Analysis

Table 1 below illustrates the relationship between three categories of BMI compared to the six age and gender categories. Observation of the data, found that people *aged 18-24* years had the highest prevalence of normal weight (63.8%), people *aged 45-54* years had the highest rate of overweight (41.6%) and *aged 55-64* years had the highest prevalence of obesity (34.2%). In general, obesity rates appeared to increase with age until those aged 55-64 years then decreased. The lowest obesity rate occurred among those aged 18-24 years.

Table 1: *Age and Gender by 3 Body Mass Index (BMI) categories for Benton and Franklin Counties, Washington (BRFSS 2003-2010)*

	Normal Weight *BMI <25*	Overweight *BMI 25 to <30*	Obese *BMI >=30*	Consumed >=5 fruits and vegetables per day	Consumed < 5 fruits and vegetables per day	Exercise in the last 30 days
AGE (years)						
18-24	63.8%	19.0%	17.2%	74.1%	20.8%	84.2%
25-34	35.2%	36.0%	28.8%	83.9%	15.0%	75.7%
35-44	30.5%	38.2%	31.4%	77.0%	22.7%	80.6%
45-54	28.0%	41.6%	30.4%	76.5%	23.2%	79.4%
55-64	27.4%	38.4%	34.2%	72.7%	25.5%	78.5%
65 and older	39.1%	39.0%	21.9%	68.1%	30.4%	73.7%
All Ages	*36.9%*	*35.5%*	*27.6%*	*75.8%*	*22.6%*	*78.8%*
Chi-Square Test: Crosstabs between age and BMI *p-value: <.001*						

	Normal Weight *BMI <25*	Overweight *BMI 25 to <30*	Obese *BMI >=30*	Consumed >=5 fruits and vegetables per day	Consumed < 5 fruits and vegetables per day	Reported exercise in the last 30 days
GENDER						
Male	30.4%	42.2%	27.4%	82.3%	17.6%	79.3%
Female	44.4%	29.8%	25.8%	72.2%	27.8%	78.2%
Chi-Square Test: Crosstabs between gender and BMI: p-value: <.001						

Percentages used in the table rounded to the nearest tenth of a percent. All samples are>50.

Although no clear trends were observed as age increases or between genders, young adults, *aged 25-34* years, were observed to have the highest rate of consuming five or more servings of fruits and vegetables per day. The age group with the highest rate of physical activity in the past 30 days was those *aged18-24* years. The group with the lowest rate of exercise in the last 30 days was among those *aged 65 and older* (73.7%) (See Table 1: Age). Two age groups (age *65 years and up*, and those *aged 20-24* years) had the lowest exercise rates but there was not a noticeable overall trend between age and *exercise in the past 30 days*. There was a higher prevalence of men (42.2%) who were overweight compared to women (29.8%), men were slightly more obese than women, and women had a higher prevalence of normal weight than men. Males ate five or more fruit and vegetable servings more frequently when compared to women, but also the prevalence of women who reported exercising in the last 30 days was about the same as the prevalence among the men.

Figure 4 below, illustrates percentages of overweight in each age category are higher than the percentages for obesity across all age groups.

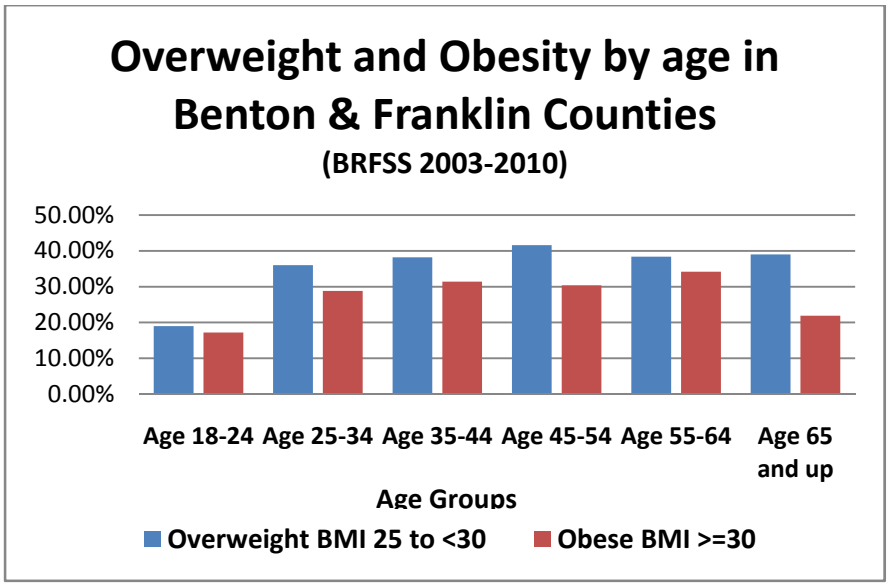

Figure 4: *Overweight and Obesity by age in Benton & Franklin Counties (2003-2010)*

Because level of education, income, fruit and vegetable consumption, and reported exercise in the last 30 days have been associated with BMI, 2-way cross-tabulations were used to compare this potential association with this data. This comparison is important because according to the literature, these variables are related (Washington State Department of Health, 2012). Understanding of these associations will be useful for targeting obesity interventions.

Table 2: *Three categories Body Mass Index (BMI), fruit/vegetable consumption and meeting physical activity recommendations compared to level of education and income in Benton and Franklin Counties (2003-2010 BRFSS).*

EDUCATION	Normal Weight *BMI <25*	Overweight *BMI 25 to <30*	Obese *BMI >=30*	Consumed >=5 fruits and vegetables per day	Consumed < 5 fruits and vegetables per day	Reported exercise in the last 30 days
Never attended school-some high school	35.1%	36.4%	28.4%	79.0%	17.4%	60.9%
Grade 12 or GED (High School Graduate)	39.1%	31.0%	29.9%	79.1%	18.4%	72.6%
College 1-3 years (some college or technical school)	36.3%	35.3%	28.4%	75.3%	24.4%	82.8%
College 4 years or more (College Graduate)	37.8%	40.9%	21.3%	71.5%	28.3%	89.8%
Chi-Square Test: Crosstabs between education and BMI: p-value: <.001						
INCOME	Normal Weight *BMI <25*	Overweight *BMI 25 to <30*	Obese *BMI >=30*	Consumed >=5 fruits and vegetables	Consumed < 5 fruits and vegetables	Reported exercise in the last 30 days
<$25.000	36.2%	32.5%	31.4%	79.6%	20.4%	63.8%
<$35,000 to <$50,000	35.7%	36.4%	27.9%	80.4%	19.6%	77.0%
<$75,000	34.5%	40.0%	25.5%	72.9%	26.8%	87.2%
$75,000 and up	36.4%	39.9%	23.7%	71.3%	28.5%	89.2%
Chi-Square Test: Crosstabs between income and BMI: p-value: .001						

Comparison by row per level of education and income variables. Percentages are rounded to the nearest tenth of a percent.

As observed in Table 2, when education level and income increased the percentage of people who reported exercising in the past 30 days also increased. No clear trend was observed between incomes and being normal weight, however, a strong decreasing trend was found between income and obesity (higher income was correlated with lower obesity prevalence).

Table 3: *Self-Reported consumption of fruits/vegetables and physical activity compared to 3 Body Mass Index (BMI) categories in Benton and Franklin Counties according to the 2003-2010 Behavior Risk Factor Surveillance Survey (BRFSS)*

Consumption of Fruits and Vegetables per day	Normal Weight *BMI <25*	Overweight *BMI 25 to <30*	Obese *BMI >=30*
Consumed <5 servings	36.0%	35.3%	28.7%
Consumed 5 or more servings	39.2%	34.0%	26.9%
Chi-Square Test: Crosstabs between fruit/vegetable consumption and BMI: P-value: .608			
Physical Activity	Normal Weight *BMI <25*	Overweight *BMI 25 to <30*	Obese *BMI >=30*
Meet Physical Activity Recommendations	42.2%	32.9%	24.8%
Insufficient Physical Activity	32.0%	41.2%	26.8%
No Physical Activity	33.3%	35.6%	31.1%
Exercise in the past 30 days	38.5%	36.8%	24.8%
No exercise in the past 30 days	32.9%	33.3%	33.8%
Chi-Square Test: Crosstabs between level of physical activity and BMI: P-value: <.001			

Table 3 (above) illustrates the relationship between BMI, fruit/ vegetable consumption, and multiple physical activity variables. While consuming five or more fruits and vegetables per day appears to be correlated with a slightly higher rate of normal weight and lower rate of obesity, the difference is not statistically significant (see Table 6: p-value 0.608). Individuals, who meet physical activity

recommendations, participating in physical activity in the past 30 days and consumption of five or more fruits and vegetables daily, were more likely to have normal weight (BMI < 25).

Table 4: *Cross-Tabulation of Body Mass Index (BMI)-three levels category between Hispanic and White Non-Hispanic Population in Benton and Franklin Counties according to data from the Behavior Risk Factor Surveillance Survey (BRFSS).*

	Normal Weight BMI <25	Overweight BMI 25 to<30	Obese BMI >=30	Consumed <5 f/v per day	Consumed >=5 f/v per day	Exercise in the last 30 Days
Hispanic	33.5%	37.7%	28.7%	18%	82%	68.0%
White Non-Hispanic	38.0%	35.8%	26.3%	24%	76%	82.1%
Chi-Square Test: Crosstabs between ethnicity and BMI: P-value: 0 .127				*Chi-Square: ethnicity and fruit/vegetable consumption: P-value:0.042*		*Chi-Square: ethnicity and 30 day exercise: P-value: <.001*

While more *Hispanic* adults appeared to consume *five or more fruits and vegetables per day*, this group had a higher obesity rate than *White Non-Hispanic* adults. Likewise, a greater percentage of *White Non-Hispanics* consumed *less than five fruits and vegetables per day* when compared to the rate among the *Hispanic* population, but the *White Non-Hispanics* still had a *higher* rate of normal weight. *Hispanics* had lower prevalence of *physical activity in the last 30 days* when compared to the *White Non-Hispanic* population (see Table 4).

Table 5: *Comparison of variables in association with actual Body Mass Index (BMI) using 2003-2010 Behavior Risk Factor Surveillance Survey data for Benton and Franklin Counties.*

Variables	Total N (valid n)	Mean	Median	Standard Deviation	Confidence Intervals (Upper, Lower)
Age					
18-24	714 (679)	24.85	23.01	534.80	(24.45, 25.25)
25-34	878 (773)	27.98	26.68	657.55	(27.52, 28.45)
35-44	842 (791)	28.10	27.18	545.68	(27.72, 28.49)
45-54	859 (807)	28.52	27.51	597.56	(28.11, 28.93)
55-64	666 (623)	28.61	27.50	601.04	(28.14, 29.08)
65+	609 (585)	26.76	25.90	495.86	(26.36, 27.16)
Education					
Never attended school or only kindergarten Grades 1-8 (Elementary)	332 (236)	28.43	27.38	687.92	(26.47, 30.38)
Grades 9-11 (some High School)	438 (391)	27.63	25.95	622.70	(27.01, 28.25)
Grade 12 or GED (HS Graduate)	1414(1319)	27.56	26.63	604.11	(27.24, 27.89)
College 1-3 years (some college or technical school)	1458 (1400)	27.61	26.66	587.73	(27.30, 27.92)
College 4 years or more (college graduate)	1592 (1478)	26.96	26.27	516.83	(26.69, 27.22)
Income					
<$10,000	130 (108)	28.73	26.42	803.04	(27.20, 30.26)
<$15,000	144 (124)	28.00	27.22	624.20	(26.89, 29,11)
<$20,000	293 (247)	27.56	26.51	611.74	(26.79, 28.33)
<$25,000	570 (516)	28.37	27.18	705.08	(27.76, 28.98)
<$35,000	507 (480)	27.91	27.23	554.25	(27.41, 28.41)
<$50,000	689 (667)	27.35	26.56	579.19	(26.91, 27.79)
<$75,000	876 (846)	27.32	26.68	502.37	(26.98, 27.66)
$75,000 or more	1326 (1301)	27.16	26.50	519.51	(26.88, 27.44)

The relationship between all three of the variables in Table 5 above (*age, level of education, and income*) and BMI are positively skewed due to a few high

BMI scores which are distorting the mean away from the median. Observation of the data suggests that there is a general trend of lower variation in BMI with age and income. The higher standard deviations indicate a larger spread of actual BMI values within each variable sample. The BMI values vary more greatly for those with less education.

Table 6: *Comparison of variables in association with Body Mass Index (BMI) for Benton and Franklin Counties; 2003-2010 according to the Behavior Risk Factor Surveillance System (BRFSS)*

Variables	N (number in the sample)	Mean	Median	Standard Deviation
Gender				
Male	2546 (2443)	27.91	27.18	551.38
Female	2635 (2385)	26.93	25.80	606.22
Ethnicity				
Hispanic	1224 (1022)	27.69	27.00	607.75
Non-Hispanic White	3918 (3774)	27.37	26.50	574.04
Daily Consumption of Fruits and Vegetables				
Consume >=5 servings daily	1515 (1930)	27.61	26.64	570.77
Consume <5 servings daily	451 (424)	27.66	26.49	635.86
Physical Activity in the last 30 days				
Yes	4077 (3841)	27.18	26.50	553.01
No	1098 (982)	28.39	27.18	671.72

Variables that illustrated a statistically significant relationship with obesity were age (p-value < .001), gender (p-value :< .001), education (p-value <.001), income (p-value.001), and physical activity in the past 30 days (p-value <.001) (see Table 6). Mean BMI was higher for those who reported no physical activity in the last 30 days, and males appear to have a larger mean BMI than females.

Table 7: *The Relationship of three-level Body Mass Index (BMI) between ethnicity and low/high education in Benton and Franklin Counties (BRFSS 2003-2010)*

	Normal Weight BMI <25	Overweight BMI 25 to<30	Obese BMI >=30
White, Non-Hispanic, Education less than High School Graduate (<=11 years of school)	37.6%	36.0%	26.4%
White, Non-Hispanic Education High School Graduate through College Graduate	44.8%	30.5%	24.7%
Hispanic, Education less than High School Graduate (<=11 years of school)	38.3%	35.1%	26.6%
Hispanic, Education High School Graduate through College Graduate	29.0%	40.2%	30.8%

The highest prevalence of normal weight was among the *White Non-Hispanic* population (44.8%), and the lowest was among the *Hispanic* population (29.0%). While more education seemed to be correlated with lower rates of overweight and obesity among *White Non-Hispanics*, the opposite trend was observed among the *Hispanic* population (increased education appeared to be correlated with both higher overweight and obesity and lower normal weight) (see Table 8).

Table 8: *The Relationship of actual Body Mass Index (BMI) between ethnicity and low/high education in Benton and Franklin Counties (BRFSS 2003-2010)*

	Mean	Median	Standard Deviation	95% Confidence Intervals (lower, upper)
White, Non-Hispanic, Education less than High School Graduate (<=11 years of school)	27.36	26.50	567.17	(27.17, 27.55)
White, Non-Hispanic Education High School Graduate through College Graduate	27.47	25.80	671.92	(26.61, 28.32)
Hispanic, Education less than High School Graduate (<=11 years of school)	27.44	26.69	586.33	(26.98, 27.90)
Hispanic, Education High School Graduate through College Graduate	28.11	27.43	640.61	(27.47, 28.75)

Median BMI appeared to decrease with more education among the *white non-Hispanic* population through cross-tabs analysis. However, the opposite was true for the *Hispanic* population where median BMI increased with higher education. Among both groups, the spread of BMI values increased with more education, when compared to lower education. *White non-Hispanics* with a *high school diploma or more* had approximately the same mean BMI as the Hispanic groups with less than high school graduation (see Table 7).

Chapter 5: Limitations

The BRFSS is a scientifically constructed telephone survey system. However, there are limitations within the survey methodology and outcomes. The initial study plan included surveys from 1980 through 2011. After conversations with the Washington State Department of Health, it was clear that it would be extremely difficult to combine data from the 1980's with newer data. Another change in data weighting methodology has occurred between the 2010 and -2011survey to the extent that comparability of data between these two years prove to be impossible, hence the exclusion of 2011data in this study. Analysis of the data can identify correlations, but that doesn't necessarily mean that variables included in the analysis are causal factors for one another. Some variables were only asked every other year (fruit and vegetable, physical activity), while others were asked annually (demographics, BMI). This created some difficulty when analyzing data across multiple years and can emphasize the importance of proper weighting and stratification of variables before analysis began.

Recall bias is a limitation that occurs when a survey participant has trouble remembering accurately what information to report or only reports what they think the surveyor wants to hear. Due to the structure of the BRFSS survey, this is controlled for. Survey data is collected over the landline, asking a number of questions pertaining to health and related issues, and relying on self-reported behaviors. Many questions ask the survey respondent to remember the last time

they when to see their primary care doctor, for example, thus the individual would need to remember how recently this occurred. Surveyors ask about how many fruits and vegetables a person consumes, making self-reported accuracy critical for obtaining a valid measure. This has been controlled for by the CDC through rigorous question/answer formulation process, highly trained and consistent BRFSS surveyors and survey data analyst professionals (both at the CDC and again at DOH). Sample size data were collected and weighted for generalize-ability to the larger population. Limitations of data resources; As with all self-reported sample surveys, BRFSS data might be subject to systematic error resulting from non-coverage (e.g., lower telephone coverage among populations of low socioeconomic status), non-response (e.g., refusal to participate in the survey or to answer specific questions), or measurement (e.g., social desirability or recall bias). Unfortunately, the sample for this study does not include data from cell phone interviews, thus limiting samples obtained and included from young adults and transient populations (cell phone sampling began in 2008 to account for demographics no longer relying on land lines).

According to the CDC, the BRFSS indicator is unable to collect information regarding an average consumption of servings of fruits and vegetables daily (per studies showing that eating more fruits and vegetables has an effect of dose-response, and not a threshold of five servings per day)(CDC BRFSS, 2010). Limitations of the BRFSS calculated variables for physical activity include exclusion of activities in occupational settings, however moderate and

vigorous activities that occur during leisure-time are assessed. Scientists have demonstrated through research that the food we eat and our level of physical activity, link directly to our weight/body fat composition (Prevention, 2010).The Healthy People 2010 objective regarding this variable is to “increase the proportion of adults who engage regularly, preferably daily, in moderate physical activity for 30 minutes a day or more”(Healthy People 2010, 2020).

A number of potential variables thought to contribute to obesity were not included in this study. Variables needing further consideration and study include potential ties to mental health issues (Onyike, Crum, Hochang, Lykestos, & W.W., 2003), disability, social pressures/norms to look heavy (some cultural norms foster higher BMI) (Millstein, Carlson, & Fulton, 2008), cultural perceptions, acceptance and reward systems (Brewis, 2003), lack of sleep, stress, disparities around access/availability of high calorie foods (Stroebe & American Psychological Association., 2008) and lack of safe places to obtain adequate physical activity (Demers, 2006).

Although screen time has been identified as a contributing factor for obesity(Weight-control Information Network (U.S.) & National Institute of Diabetes and Digestive and Kidney Diseases (U.S.), 2002), the BRFSS survey does not ask questions about or define excess screen time (time sitting in front of television, computer, and other electronic screens), consumption of a diet high in saturated fat and refined sugar or family genetics/human physiology of aging. Yet, these variables can have an impact on physical health.

Despite the data illustrating an increase in consumption of fruits and vegetables in Washington State, and constant self-reported consumption of fruits and vegetables locally over a six year period, the problem of obesity has continued to grow. Limiting nutritional questions to number of carrots, salads or potatoes are consumed may not be specific enough to adequately surround the issue of overall food consumption as a contributing factor to obesity. Additional considerations are necessary to examine calorie content of what people are eating as well as the frequency in which they consume foods that are high in calorie and fat content. In 2012, data found that 47% of all restaurants in Washington State are fast food restaurants (County Health Rankings, University of Wisconsin). Meanwhile, Benton County has 52% and Franklin has 59% of restaurants are considered in the fast food category (the National Benchmark is 25%). While the presence of fast food has not been linked to rates of obesity, further studies are needed to explore whether the location or density of fast food/fresh food sources, frequency and content among individuals consuming fast food impact obesity.

Sample was a major limitation for getting an accurate description of the health problems of counties with lower populations. Although rolling eight years of data together did increase the sample size for this study, there were still some issues where sample sizes were too small for inclusion in the analysis. For example, the CDC used reported height and weight data and provided three pre-calculated variables for BMI, only one of which was appropriate to show both

enough variability and adequate sample size through three answer options (normal weight, overweight or obese). The first calculated variable provided BMI by number, which was used for analysis of mean, median, standard deviation and p-value. The third calculated variable provided a simple yes or no grouping together overweight and obesity, as opposed to neither. Similarly, demographic calculated variables provided multiple options to choose from. Calculated variables for age were provided by individual ages, fourteen level age groups, six level age groups, and two level age groups. Although output appeared to have variability when cross-tabbed with BMI, the fourteen level age group variables had some age groups where the sample was less than fifty. On the other end of the spectrum, the two-level-age-group had a sufficient sample, but not enough variability. Therefore, the 6-level-age-group calculated variable was utilized for the analysis.

Race was initially in the data analysis plan, however, after discovery of sample sizes too small to report, even when weighted, we opted to simply include ethnicity (White Non-Hispanic and Hispanic). Due to samples that were more than sufficient for analysis, the ethnicity variable identified for use in analysis was *RACEG2X* which was a calculated variable identifying Hispanic and Non-Hispanic White populations. Similar variable switches were made for physical activity and fruit/vegetable consumption variables (see Chapter 3: Methodology for more information on variables used and sampling limitations).

Chapter 6: Discussion

Low levels of physical activity can be associated with obesity. As expected, *meeting physical activity recommendations* appears to be correlated with a high rate of *normal weight* and lower prevalence of *obesity* when compared to people getting *insufficient physical activity* (see Table 3). *Insufficient physical activity* had a higher correlation to being *overweight* compared to a lower correlation with *obesity*. *Meeting physical activity recommendations* and *exercise in the past 30 days* appeared to be correlated with *obesity* at exactly the same prevalence (24.8%).

Similarly, researchers have found that eating fruits and vegetables has been connected to a healthy diet, and a healthy diet has been related to low obesity prevalence (CDC, 2010). *Consumption of five or more fruits and vegetables daily* was correlated with lower BMI. While *consuming five or more servings of fruits and vegetables per day* had a higher prevalence of *normal weight* and was lower for both *overweight* and *obesity*, compared to people who *consumed less than five servings per day*.

Some differences were discovered in comparison to what was found in the literature. In regards to level of income, for example, those earning *less than $25,000* per year had the highest rate of obesity when compared to all others who earned more. *Obesity* was observed to decrease as income increased. However, the highest rate of *overweigh*t was discovered to be those making *more than $50,000, but less than $75,000* per year. Although no associations

between income and being overweight were observed, income was strongly correlated to being *obese*. While there did not appear to be any trends between income and fruit/vegetable consumption, there was a strong correlation between income and *reported exercise in the last 30 days* (30 day physical activity increased as income increased).

According to the literature, education is another factor that has been associated with BMI(DOH, 2010). While there were no observed trends between level of education, obesity and normal weight, the rate of overweight appeared to be lowest among *high school graduates*, and increased as education increased. Rates of overweight among those with *less than 12th grade education* (36.4%) were similar among those who *attended some college* (35.3%). The rate of obesity was highest among *high school graduates* (29.9%) and lowest among *college graduates* (21.3%) (see Table 2). The level of education was also found to be correlated with fruit and vegetable consumption. Contrary to our expectations, as education increased, those who consumed less than five fruits and vegetables per day increased. Similar to income, as education increased, physical activity in the last 30 days also increased.

Contrary to the literature, observations from crosstabs between *BMI* and *Hispanic/White Non-Hispanic*s ethnicity groups were different from results in the literature. While *Hispanic* adults appeared to have a lower rate of normal weight than *White Non-Hispanic* adults (see Table 4), no differences between overweight or obesity and ethnicity were observed (approximately the same

mean BMI, see Table 6). However, Hispanics had a much lower rate of physical activity in the last 30 days (68.0%) compared to *White Non-Hispanics* (82.1%). Also, when cross-tabulated by level of education (high, low) and actual BMI, *Hispanic* adults who were *high school graduates through college graduates* had higher rates of *overweight* and *obesity* when compared to all other groups included in this comparison (see Table 7).

In regards to age, gender and BMI, the lowest obesity occurred among adults *aged 18-24* years (17.2%), while the highest obesity rate was found among adults *aged 55-64 years* (34.2%). Adults *aged 25-34* years who consumed *5 or more fruits and vegetables daily* at a higher rate than all other age groups and adults *aged 18-24* years had the highest rate of *exercise in the past 30 days*. Fruit and vegetable consumption and age did not have any observed correlation or trend. While there was no overall trend between age and BMI, physical activity in the last 30 days was observed to be highly correlated with being aged 18-24 years old.

Observations between gender and BMI revealed that while *females* had a higher rate of *normal weight* compared to *males*, males had a higher rate of *overweight* compared to *females,* and there was no observed difference between genders and *obesity*. *Males* consumed *five or more fruits and vegetables* more frequently than *females* and both genders had about the same rate of *reported exercise in the last 30 days* (see Table 1).

Due to the skewness of actual BMI values, obesity was measured as a category with three distinct levels (normal weight, overweight, and obese). When obesity was measured as a category, sometimes trends for obesity differed from trends for overweight.

As measured, physical activity was more closely related to BMI than fruit and vegetable consumption. Since diet most often consists of more than fruits and vegetables (fat and calorie content, for example), this should be measured more thoroughly before effective diet interventions are implemented. Efforts to prevent and reduce *obesity* should initially focus on the adults earning *less than $25,000* per year and people who have an *elementary school education or less.* According to observations in the data, Hispanic adults with a high school diploma or some college could benefit more from intervention than Hispanic adults with less than a 12th grade education. Implications regarding the correlation between age and BMI did not have specific trends. This suggests a general intervention approach across all ages. Further analysis between BMI and age would be an appropriate area for further study.

General Recommendations

Interventions to reduce overweight and obesity can be accomplished through utilization of a variety of evidence informed methods (for example, social marketing campaigns tailored to the specific target audiences as described in Chapter 2). Education regarding the importance of physical activity would be a start, but is not sufficient to address the issue alone. Efforts must also be made

to ensure that public “buy-in” exists so that a social/cultural norm fosters acceptance of implementing policies to reduce obesity. Additionally, providing motivational support tools and resources to help individuals maintain a healthy weight and lifestyle throughout the remainder of their life is critical for sustainability. The following interventions are recommended for schools, workplaces, healthcare facilities and communities.

According to the literature, the best way to prevent obesity is through targeting preventive efforts among children and adolescents(Centers for Disease Control and Prevention (U.S.) et al., 2011). For such interventions to be successful, parents, schools and community organizations can work together to find affordable and sustainable opportunities for healthier food offerings in school cafeterias, and increase physical activity (more structured physical activity options during recess, better training for recess staff, etc.) throughout the school day(Siahpush, Huberty, and Beighle, 2012), and supporting students who are already overweight or obese through school nurses and family engagement(Bagby & Adams, 2007). To reduce common barriers in schools(Torre et al., 2010), community organizations such as Local Public Health, Hospital Education Programs, and Boys & Girls clubs, can do their part to help educate school boards, administrators and teachers about how integrating these healthy options can increase academic performance, reduce absenteeism, and additionally create a healthy work environment for teachers and staff(Katz et al., 2005). Through community and school efforts

combined(Greening et al., 2011) we can positively impact obesity reduction among children, parents, and community members(King, Gill, Allender, & Swinburn, 2011).

Tailoring messages and interventions to reach diverse ethnic populations will require the provision of information in various languages (both written and spoken) for the community (see Chapter 2 for a detailed list of languages spoken in both counties). Providing materials in English and Spanish would be a necessity. Print materials should be written at the 6th grade reading level or less in attempt to reach people with less education.

Well planned and coordinated approaches to worksite wellness programs, can be effective. In addition to creating in-house worksite wellness programs, the local health departments could support workplace efforts through providing workplaces with ideas and suggestions that could foster a healthy environment to increase a cultural norm of healthier choices. Ideas might include promoting walking breaks or having fruit at meetings and workplace celebrations.

So who is responsible for implementing these changes? Public (both governmental and nongovernmental), private, and community health organizations must collaborate to educate and empower people through sharing resources and tools to make healthy choices easy. It is also the responsibility of workplaces, schools, and businesses to support such efforts in an attempt to create a better quality of life across the lifespan. With these tools and resources in place people can take responsibility to plan, prepare, act and maintain a

healthy weight can be attributable to personal responsibility(Barbour, 2011; Burnette, 2010). In addition, communication between public health and primary care providers to increase obesity prevention awareness, resource sharing and linking of resources for patients can increase access to preventive care.

Evidence based or informed methods are multi-faceted and can take time to develop, but are cost effective and sustainable(King et al., 2011). Finding effective programs for each unique population in every community may require the use of focus groups. Such efforts would be a quality of life investment.

The U.S. National Physical Activity Plan through the CDC recommends community and individual interventions to reduce the growth of nationwide obesity rates. As a potential solution centered on aspects of both physical activity and nutrition, the CDC has announced increasing three target areas: consumption of fruits and vegetables, physical activity, breastfeeding (initiation, duration, and exclusivity). The CDC also recommends reducing consumption of sugary drinks and high-calorie, energy-dense foods. While breastfeeding has been shown to decrease the risk of obesity later in life, a majority of these goals pertain directly to reducing adult obesity. For example, if more workplaces had breastfeeding policies that might help prevent obesity in the next generation. The CDC is currently funding 25 state-based Nutrition and Physical Activity Program to Prevent Obesity and Other Chronic Diseases or NPAO. This effort emphasizes surveillance, research and working with key community partners (CDC).

The US Department of Health and Human Services (DHHS) recommends that for substantial health benefits, adults should participate in at least 150 minutes every week of moderate-intensity physical activity. Additionally, DHHS recommends adults obtain at least 75 minutes of vigorous-intensity, aerobic physical activity every week, or an equivalent combination of moderate- and vigorous-intensity aerobic activity (DHHS, 2008). Aerobic activity should be performed in episodes of at least 10 minutes spread throughout each week(Ogden & National Center for Health Statistics (U.S.), 2010a).

Other national campaigns and programs at the CDC such as Michelle Obama's campaign "Let's Move," "The Weight of the Nation" (DHHS) and "Communities Putting Prevention to Work" are working to address obesity in the U.S. Tools and resources for implementation have been developed at the local level to increase awareness of the problem (See Appendix II for additional recommendations from various agencies and organizations). Whether due to lack of funding to implement such programs or a lack of champion(s) to initiate action steps, it is clear that some communities are at a disadvantage(Stamatakis, Leatherdale, Marx, Yan, Colditz, and Brownson, 2012). Communities need to work together to ensure access to safe and affordable places to exercise. Providing sustainable, evidence-based resource recommendations to share with policy makers on the importance of the issue and possible ways to address it will increase the quality of life. With all of these pieces in place, the easy choice will become the healthy choice.

Other factors needing further study to explore potential correlations to overweight and obesity include access to adequate preventive healthcare, consumption of high calorie foods, over-reliance on personal vehicles, sleep patterns, presence of chronic stress, and self-perceived life-satisfaction. Recent studies also suggest that obesity and overweight can have a negative effect on emotional well-being(Unyoke et al., 2003) or do mental or emotional issues negatively affect BMI? It is essential that these and other factors be studied further and for each community to be able to assess and address obesity.

Although solutions to this issue have been researched to some extent, these areas need better data to be able to study other contributing factors and more evidence-based, cost effective solutions. A recommendation for improving preventive health services begins with an emphasis on improving screenings to better identify those overweight and at risk for becoming obese. It also begins with increasing the amount of data, for example, obtaining a larger BRFSS sample size at the county level every year. This could become costly, but would be well worth the stronger sample for a smaller number of years. Adding more specific questions to improve screening for food consumption among different sub-populations in each community could provide a more focused approach to planning effective obesity interventions. Focus groups could potentially supplement BRFSS data through exploration of how different cultural norms are associated with body shape and size and how those might differ between multiple race and ethnic groups within each unique community.

Due to the multitude of health disparities that exist between different socioeconomic groups and genders(Beydoun & Wang, 2009), interventions to increase physical activity are imperative. Obesity prevalence reduction methods must consider and integrate ways to reduce these disparities in order to create equal, effective and sustainable community wide change (Sassi & Organisation for Economic Co-operation and Development., 2010). Ideally, a decrease in overweight and obesity incidence will decrease the prevalence of associated chronic diseases and the costs associated with them(Obesity, 2000).

Recommendations for Local Health District Intervention

Because the Benton-Franklin Health District (BFHD) reaches a broad client base, and limited funding, the District would benefit by integrating obesity prevention education and intervention work through existing programs and services (such as Safe Babies Safe Moms (SBSM), Women Infants and Children (WIC), the Nurse Family Partnership Program, Food Safety and others). Despite the fact that BFHD has only recently been included in the statewide Healthy Communities Community Transformation Project, District staff persons have participated in meetings and workshops to prepare for addressing the demonstrated need at the local level. Initial recommendations include: adding at least three objectives to the agency Community Health Improvement Plan (CHIP) regarding obesity incidence reduction, begin preparing a toolkit with resources that could be integrated with existing agency programs, conduct focus groups with target audiences at greatest risk to find out what resources and modes of

communication would be most effective, and provide consistent staffing support to collaborate with appropriate existing community efforts. Although it may be too soon to determine the staffing hours (FTE's) necessary for such a project, 1 to -2 community health educators would be the ideal professional to carry out this work through hands on approach and meeting clients where they are to best meet the needs of targeted populations, such as increasing education and resources to increase physical activity among those with lower incomes, lower education (see Table 2), and the Hispanic population (see Table 4).

In addition to an increase of annual BRFSS sample size for a better county wide BMI measurement, creation of the CHIP should include evidence informed components to reduce obesity. Staff collaborating to create the CHIP objectives relating to obesity prevention could include WIC and SBSM supervisors and staff, administrative staff, a food safety supervisor and staff. Considerations made for recommendations as discussed above: Healthy People 2020 obesity reduction goals, community wide promotion of HHS physical activity recommendations, and the five priority area suggestions from the CDC.

By integrating tools and resources to target high risk populations (those with low income and low education) the Health District can empower people to make healthier choices. One cost-effective way to do this is through existing agency programs (SBSM, WIC, food safety), creation of an obesity prevention web page, and an obesity prevention education kit through the Benton-Franklin Safe Kids Coalition (this group already has education kits on multiple health and

safety topics such as bicycle safety, drowning prevention, and others). Opportunities for both environmental health and preventive health to integrate obesity prevention messaging exist. The WIC program could take nutrition education one step further by discussing overweight and obesity prevention, through engaging other adults and children living in the same household with physical activity education and resources. Likewise, the communicable disease and immunization programs at BFHD already communicate regularly with local medical providers and primary care doctors could begin the conversation with, and provide appropriate recommendation and referral resources for clients who are overweight or obese.

The environmental health food safety and inspection program could also collaborate with WIC nutritionists to increase awareness and inform local restaurants about ways to cook meals that would be healthier for customers to consume. This could be accomplished through creation of brochures made available in multiple languages to reach the diverse language needs of restaurant owners and managers, provide special cooking classes or supplemental food safety and health classes for restaurant cooks to learn healthy cooking techniques, and through one-on-one consultation services where BFHD could provide additional fee-for-service site-visits to educate restaurant owners, managers, and service staff about how to prepare, and promote healthy foods while maintaining good taste and food safety. Although there may be some resistance on this at first, it has potential to create sustainable change and

provide yet another opportunity for the paying customer to make a healthy choice, especially with feedback from focus groups.

To increase efficiency and reduce potential duplication of effort, the BFHD could work to identify other community entities working to reduce obesity incidence, assess whether those efforts are evidence-informed or evidence-based, and collaborate where effort goals are aligned with BFHD CHIP objectives. This is especially important when planning to work with schools and workplaces where wellness efforts often already exist. The Health District could provide additional tools, information, and technical assistance to school/workplace food programs, creative ways to include physical activity throughout the school/work day, and help to construct or improve sustainable policies that foster healthy environments.

Once obesity prevention methods and messages have saturated BFHD programs mentioned above, focus groups and other ways to get community feedback could be extremely beneficial to find out what other efforts would work in reaching out to a larger adult sub-population. As identified in this study, people with low income and low education appeared to have the highest rate and risk of obesity. Often, these are the populations being reached by BFHD programs and services. Focus groups with these target populations would help to inform better messages with the goal of improved health outcomes.

Obviously, these strategies are among many in the ever growing field of obesity prevention and intervention. It makes sense to be strategic, continue the dialogue with community members, key partners (other Local Health Jurisdictions in Washington and other states) that have already begun implementing similar programs. It is important to utilize and build upon existing resources as opposed to attempts at “reinventing the wheel”. The key is to create cost-effective, sustainable, and efforts that will achieve buy-in from target populations.

Something needs to be done to address this epidemic. Through reducing obesity incidence, quality of life can increase people can be more productive, happier and healthier. Once obesity incidence and prevalence are reduced, there should be a decrease in the incidence of chronic diseases, an increase in life expectancy, and a reduction in medical care costs.

Through attainable goals and sustainable resources, lasting change can occur for the individual, the family, and the community. Education is our best motivating factor, community leadership in combination with grassroots efforts must be the force driving the education. Sustainability can occur through sound policy creation, implementation, and enforcement. When our community and school environments foster healthy choices across demographics, we can reduce obesity associated disparities to make the healthy choice the easy choice for everyone though generations to come. Through identification of sub-populations with the highest obesity rates, and exploring potential correlations between BMI and physical activity, evidence-based interventions are recommended. Through

targeted education, awareness and availability of low cost resources, public health and its key community partners can work in collaboration to begin implementing actionable steps to address this epidemic at the local level.

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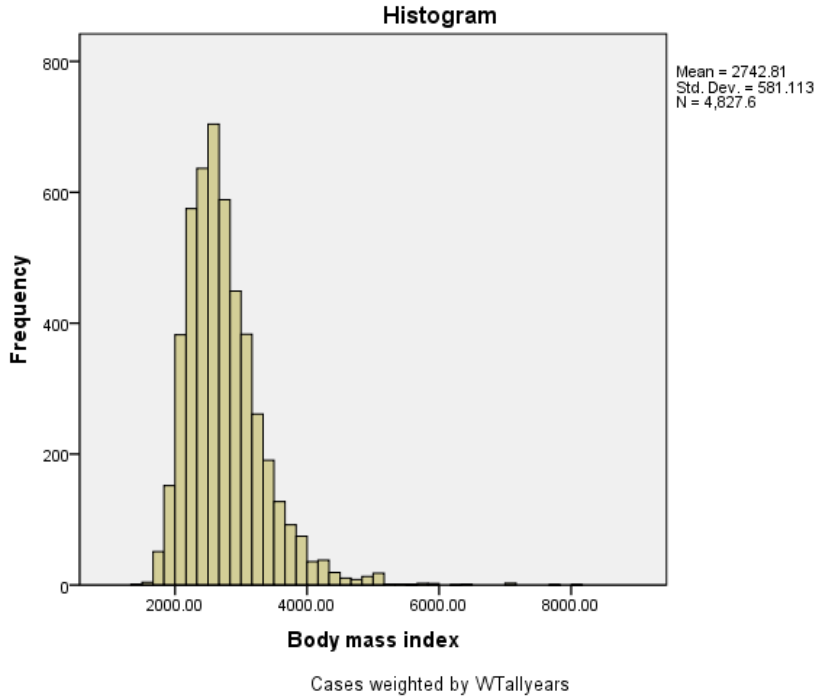
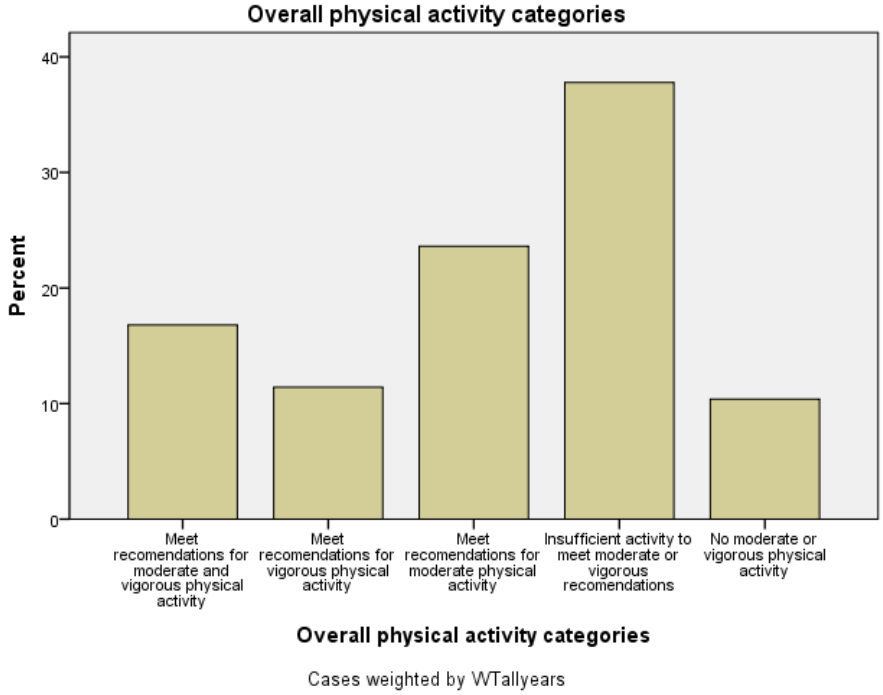
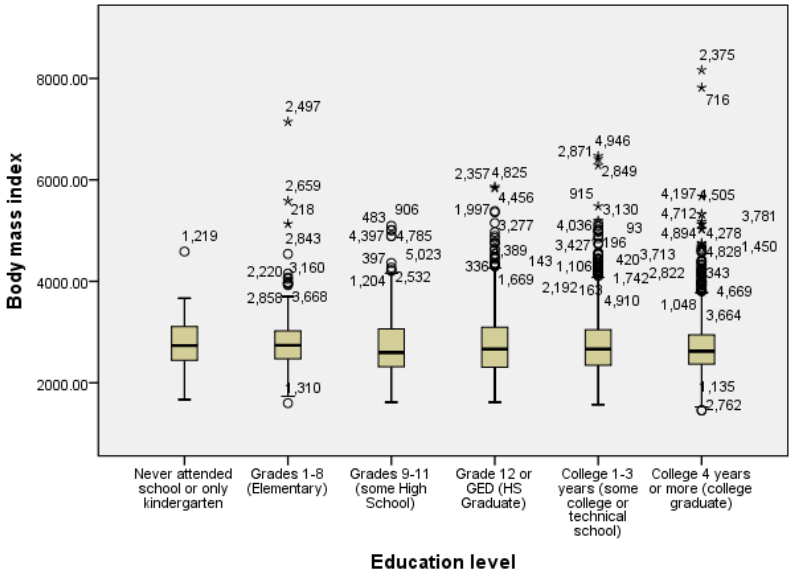
Appendix I: Additional Figures

A. Histogram reflecting BMI among survey participants (2003-2010 BRFSS)

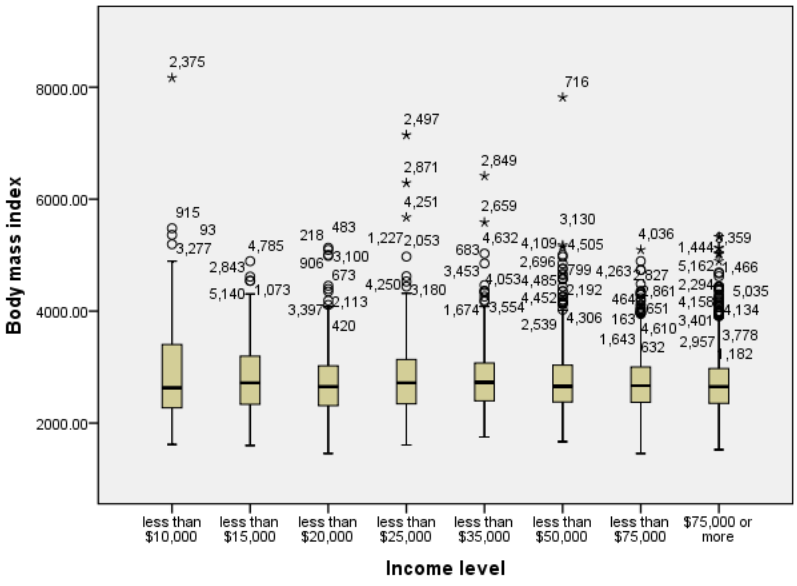


B. Overall physical activity in BF Counties between 2003-2010 (data from BRFSS, graph from SPSS

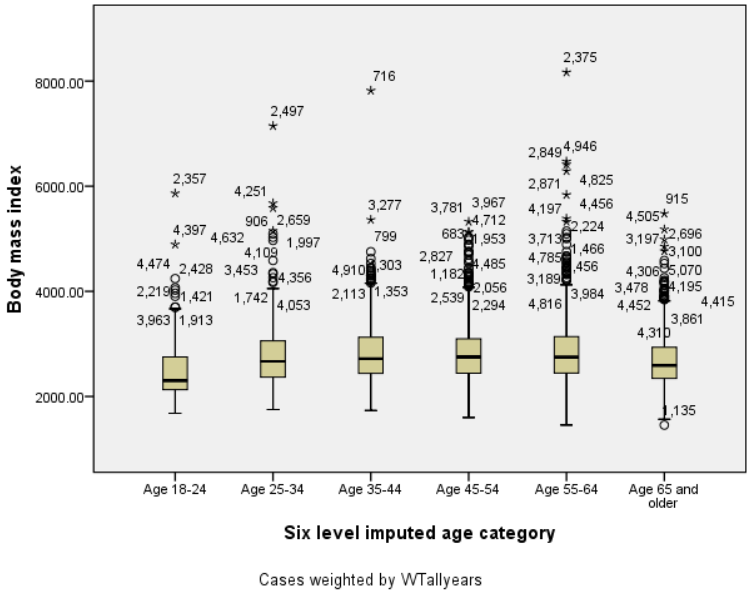




Cases weighted by WTallyears



Cases weighted by WTallyears


Body mass index
8000.00
6000.00
4000.00
2000.00
Age 18-24
Age 25-34
Age 35-44
Age 45-54
Age 55-64
Age 65 and older
Six level imputed age category
Cases weighted by WTallyears

Appendix II: Community Tools and Resources for Reducing Obesity

Due to the timeliness of this project, a great deal of attention has been placed on the obesity epidemic in recent months. Most, if not all of the following resources have been recently created or revised to address this issue more aggressively at the national level. This list is not all inclusive, but is intended to provide tools for use in community planning and implementation of obesity interventions.

Screening for and Management of Obesity in Adults:
http://www.uspreventiveservicestaskforce.org/uspstf/uspsobes.htm

CDC Recommendations and Resources to address adult obesity:
http://www.cdc.gov/obesity/resources/recommendations.html

The Community Guide to Preventive Services:
http://www.thecommunityguide.org/obesity/index.html

CDC's Lean Works: Worksite Obesity Prevention Program:
http://www.cdc.gov/leanworks/resources/communityguide.html

USDA Federal Guidelines on the identification, evaluation and treatment of obesity:
http://fnic.nal.usda.gov/weight-and-obesity/treatment-and-prevention-guidelines

Physical activity recommendation and action guide for children and youth:
http://www.cdc.gov/physicalactivity/downloads/PA_State_Indicator_Report_2010_Action_Guide.pdf

Institute of Medicine-Early Childhood Obesity Prevention:
http://www.iom.edu/Reports/2011/Early-Childhood-Obesity-Prevention-Policies/Recommendations.aspx

Appendix III: Behavior Risk Factor Surveillance Survey (BRFSS) Code Book Crosswalk 2003-2010: Includes selected CDC Core Demographic Questions& Washington State Added Questions included in this study.

All survey codebooks were obtained through the Washington State Department of Health, Division of Disease Control and Health Statistics and can be made available upon request at the following location;

Data Quality and Statistical Services, Center for Health Statistics
Division of Disease Control and Health Statistics
Washington Department of Health
111 Israel Rd SE; Tumwater, WA 98501
Mailing: Box 47814; Olympia, WA 98504

Main Variables Used in Data Analysis

Body Mass Index (BMI)	BMI4X, BMI4CATX
Ethnicity	RACEG2X
Ethnicity/Education (created new)	newWHx
Age	AGE_GX
Gender	SEXG_X
Income	INCOM2
Education	EDUCA
fruit/vegetable consumption	FV5SRVX
Exercise	EXERANY2, PACAT__, RFPARECX

Years Asked	Section	CODE	Questions	Answer Options
DEMOGRAPHIC VARIABLES-BRFSS				
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	Section 13: Demographics SPSS 35	AGE	13.1b. What is your age?	__Code age in years 07=Don't know/not sure 99=refused
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	SPSS 47	SEX	13.19 Indicate sex of respondent (only asked if necessary)	1=Male, 2=Female
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	SPSS 41	EDUCA	13.7 What is the highest grade or year of school you completed?	1 = Never attended school or only kindergarten 2 = Grades 1 through 8 (Elementary) 3 = Grades 9 through 11 (Some high school) 4 = Grade 12 or GED (High school graduate) 5 = College 1 year to 3 years (Some college or technical school)

				6 = College 4 years or more (College graduate) 9 = Refused
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	SPSS 43	INCOME 2	13.11 What is your annual household income from all sources:	0 1 = Less than $10,000 0 2 = Less than $15,000 0 3 = Less than $20,000 0 4 = Less than $25,000 0 5 = Less than $35,000 0 6 = Less than $50,000 0 7 = Less than $75,000 0 8 = $75,000 or more 7 7 = Don't know / Not sure 9 9 = Refused
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	SPSS 111	BMI4X	Calculated body mass index	_ _ _ _= 1 or greater BMI 9999 = Don't Know/Not Sure/Refused/Missing
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	SPSS 112	BMI4CATX (calculated variable)	Calculated body mass index categories	1=neither overweight nor obese 2=overweight 3=obese 9=don't know/not sure/refused/missing
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	SPSS 113	RFBMI4X	Adults who are overweight or obese (BMI > 25) calculated variable	1=yes 2=no 3=don't know/not sure/refused/missing
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	*SPSS 106*	*WEIGHT 2*	*13.12 About how much do you weigh without shoes?*	*_ _ _ _ = weight (pounds)* *9 _ _ _ = weight (kilograms)* *7 7 7 7 = Don't know/Not sure* *9 9 9 9 = Refused*
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	*SPSS 107*	*HEIGHT 3*	*13.13 About how tall are you without shoes?*	*_ _ _ _ = Height (feet/inches)* *9 _ _ _ = Height (meters/centimeters)* *7 7 7 7 = Don't know/Not sure* *9 9 9 9 = Refused*
2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	*SPSS 44*	*CITYCODE (number)*	*13.14 What county do you live in (FIPS County Code Number*	*005 Benton* *021 Franklin* *(other counties available, only listed B&F)*
BEHAVIOR VARIABLES (BRFSS)				
2003, 2004 (section 4), 2005 (4), 2006 (4), 2007 (4), 2008 (5), 2009 (5), 2010 (5)	Section 3: Exercise	EXERANY2	3.1 During the past 30 days, other than your regular job, did you participate in any physical activities or exercise such as running, calisthenics, golf, gardening, or walking for exercise?	1 = Yes 2 = No 7 = Don't know/Not Sure 9 = Refused

2003 (section 18), 2005 (18), 2007 (17), 2009 (19)		MODPACT	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. 15.2 Now, think about the moderate physical activities you do when you are not working/employed/self-employed (Q 13.8). In a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes small increases in breathing or heart rate?	1= yes 2= no 7= don't know/not sure 9=refused
2003 (section 18), 2005 (18), 2007 (17), 2009 (19)		MODPADAY	15.3 How many days per week do you do these moderate activities for at least 10 minutes at a time?	__days per week, 88=Do not do any moderate physical activity for at least 10 minutes at a time 77= don't know/not sure, 99= refused
2003 (section 25), 2005 (18), 2007 (17), 2009 (19)		MODPATIM	15.4 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 and minutes per day, 77=don't know/not sure, 99=refused
2003 (section 18), 2005 (18), 2007 (17), 2009 (19)		VIGPACT	15.5 Now think about the vigorous physical activities do you do when you are not working/employed/self-employed (Q13.8). In a usual week, do you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?	1=Yes, 2= no, 7=don't know/not sure, 9=refused
2003 (section 18), 2005 (18), 2007 (17), 2009 (19)		VIGPADAY	15.6 How many days per week do you do these vigorous activities for at least 10 minutes at a time?	__days per week, 88=Do not do any vigorous physical activity for at least 10 minutes at a time 77=don't know/not sure, 99=refused
2001, 2003 (section 18), 2005 (18), 2007 (17),		VIGPATIM	15.7 On days when you do vigorous activities for at least 10 minutes at a time, how much total time per day do you spend	__hours and minutes per day, 777=don't know/not sure, 999=refused

2009 (19)			doing these activities?	
2003 (section 7), 2005 (section 17), 2007 (16), 2009 (18)	Section 4: Fruits and Vegetables	FRUITJUI	4.1 How often do you drink fruit juices such as orange, grapefruit, or tomato?	1 _ _ = Per day 2 _ _ = Per week 3 _ _ = Per month 4 _ _ = Per year 5 5 5 = Never 7 7 7 = Don't know / Not sure 9 9 9 = Refused
2003 (section 7), 2005 (section 17), 2007 (16), 2009 (18)	FRUIT		4.2 Not counting juice, how often do you eat fruit?	
2003 (section 7), 2005 (section 17), 2007 (16), 2009 (18)	GREENSAL		4.3 How often do you eat green salad?	
2003 (section 7), 2005 (section 17), 2007 (16), 2009 (18)	POTATOES		4.4 How often do you eat potatoes not including French fries, fried potatoes or potato chips?	
2003 (section 7), 2005 (section 17), 2007 (16), 2009 (18)	CARROTS		4.5 How often do you eat carrots?	
2003 (section 7), 2005 (section 17), 2007 (16), 2009 (18)	VEGETABL		4.6 Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?	
		FV5SRVX	Consumed five or more servings of fruits or vegetables per day calculated variable	1 = Consume < 5 times per day (FRTSERVX < 5) 2 = Consume 5 or more times per day (5 <= FRTSERVX < 999.99) 9 = Don't know/Not sure/Missing (FRTSERVX = 999.99)

SPSS #	CDC Calculated Variables		
80	RACEG2X	Calculated non-Hispanic whites/all others	1 = Non-Hispanic White 2 = Non-White or Hispanic 9 = Don't Know/Not Sure/Refused/Missing
	AGE_GX	Six-level age category (10 year increments)	1 = Age 18 to 24 2 = Age 25 to 34 3 = Age 35 to 44 4 = Age 45 to 54 5 = Age 55 to 64 6 = Age 65 or older
PACAT_		Computed overall physical activity categories	1 = Meet recommendations for moderate and vigorous physical activity 2 = Meet recommendations for vigorous physical activity 3 = Meet recommendations for moderate physical activity 4 = Insufficient activity to meet moderate or vigorous recommendations 5 = No moderate or vigorous physical activity 9 = Don't know/Not sure/Refused/Missing
TOTMNWKX		Computed minutes of total physical activity per week	0 - 99999 = Minutes of physical activity BLANK = Don't know/Not sure/Refused/Missing
Washington State-Added Weighting Variables			
NOTE: The following weighting variables and resulting FINAL WEIGHTS were calculated using Washington Office of Financial Management population estimates (as opposed to the national population estimates obtained by CLARITAS that the CDC uses to calculate weights). The method of weighting is the same, but the population estimates used to get the final weights are different, therefore these weights differ from the CDC calculated weights. Please see the technical notes for more information.			
FINALWTW		Final WA State Weight using OFM Population estimates and county adjustment factor, Form A and B combined	Final weights for WA State with county adjustment using OFM population estimates. Final OFM state-level weight (FINALOFM) multiplied by the county adjustment factor (CTYWT).