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Obesity: The Anthropometric and Demographic Characteristics
of Insured and Uninsured Individuals

Culminating Experience

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December 14, 2011

Acknowledgements

I would like to express my sincere gratitude to my family and the staff and faculty of the Wright State University Boonshoft School of Medicine, Master of Public Health Program for their encouragement and dedication. I am grateful to Michele Battle-Fisher and Sylvia Ellison for providing oversight as the chair and reader of my research committee despite their many other commitments. I am deeply indebted to Dr. William Spears who provided his expertise and encouragement throughout this project. To Dr. James Ebert, words cannot express my heartfelt gratitude, appreciation and thanks for all the support, guidance and time you have provided to me in the program. Heart-filled thanks to the Levin Family Foundation and CEO Karen Levin for allowing me to be a part of “Celebrating Life and Health”. This event has been a blessing to many citizens in the Dayton/Montgomery County area. The generosity from the Levin Family Foundation is truly remarkable! If the world had more people like you, it would be a better place. Karen, you have made a major impact on my life, and I am so blessed to have you as a mentor to help me through the process. Your leadership and ability to get things done are an inspiration to all and really help make the health fair the success that it is.

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Abstract

Objectives. This study evaluates the association between Body Mass Index (BMI) and health insurance status in attendees at a local health fair. BMI was also compared among ages, gender, and races.

Methods. Descriptive analysis conducted using data collected at the “Celebrating Life and Health” health fairs between the years 2008 and 2011. Data for this study were collected at the BMI booth staffed by Wright State Boonshoft School of Medicine students.

Results. The results of this particular study do not demonstrate a statistical difference between obesity and health insurance status. Consistent with other research articles this study does show that race, age, and gender were linked to BMI.

Conclusions. This study linked multiple characteristics with the risk of being obese. Obesity has increased at an alarming rate over the past three decades. The associations of obesity with health insurance, gender, age, and ethnicity status are complex and dynamic. Understanding the specific cause or causes of obesity is essential in order to best direct efforts to eliminate or to curtail disease and death.

Introduction

Obesity has become a serious health problem worldwide. It has become the second leading cause of preventable deaths and a public health concern in the United States. Increased public awareness, through public health initiatives, is on the rise; however, the problem continues to increase. Obesity rates have increased dramatically in the past twenty years (Menifield, Doty, & Fletcher, 2008). In 1990, ten states had an obesity rate of less than 10 percent and no state had an obesity rate higher than 15 percent. By 2010, obesity trends showed that nearly 34 percent of U.S. adults were obese (Centers for Disease Control and Prevention [CDC], 2010). The number of overweight individuals is leading to a generation of Americans who are at increased risk for cardiovascular disease, diabetes and other serious health issues. Given the detrimental health consequences of obesity and the rapidly rising rates, successful prevention efforts are urgently needed.

The discussion of obesity as a health problem is now becoming a business issue. Due to the increased rate of obesity, health care insurance costs are increasing. The direct medical cost of treating obesity includes prevention, diagnostic, and treatment services. Most of these obesity-related services are covered by health insurance plans. As a result cost of health insurance has increased as the rate of obesity has increased (Bungum, Satterwhite, Jackson, & Morrow, 2003). Obesity-related health care costs are staggering. In 2009 an estimated \$117 billion was spent to cover the costs of obesity-related incidence (Wee et al., 2005). Due to the cost and consequences, obesity has become a societal issue. Society bears the cost of obesity in terms of health care insurance cost and productivity (Bhattacharya, Bundorf, Pace, & Sood, 2009).

With the prevalence of obesity in society, health fairs are an effective way to provide valuable health information and screening services to individuals in a convenient one-stop format. A health fair is an educational, interactive, and free event that provides basic medical screenings, such as cholesterol testing, high blood pressure, and Body Mass Index (BMI) screening, with direct access to family practice doctors and multiple specialists. Health fairs are public health interventions geared toward improving health awareness and encouraging individuals to assume responsibility for their own health. Individuals who attend health fairs vary in age, socioeconomic status, educational level, ethnicity, and insurance status. Health fairs are a bridge of access between those who are in need with those who can help. It is also a long-term resource for the future of the community.

Statement of Purpose

The purpose of this study is to examine the relationship between insurance status and obesity in a population of individuals who attended the “Celebrating Life and Health” health fair in Dayton, Ohio between the years of 2008 and 2011. It is important to examine the relationship between health insurance and obesity. An objective of the study is to provide information to aid in future health fairs and programs essential to obesity prevention.

Literature Review

Obesity is a complex chronic disease that develops as a result of behaviors that are associated with diet and physical activity and may be influenced by the social and physical environment. These factors are mediated by the impact they have on human metabolism and genetics (Johnson, 2011).

These interactions, which are characterized by long-term energy imbalance due to a sedentary lifestyle, excessive caloric consumption, or both, lead to obesity. The etiology of

obesity is simple: calories eaten exceed calories expended. The results are an energy imbalance. Energy imbalance can be the major cause of obesity. The first law of thermodynamics states that energy is neither created nor destroyed but transformed from one state to another (Morgan & Shapiro, 2008). In the human body energy is transformed into adenosine triphosphate (ATP). ATP, a form of energy the body uses to provide power to cells, supplies the power needed for energy-consuming activities of the body. When the body does not use ATP for metabolic work, this energy transforms into fat (Johnson, 2011). When the intake of energy into the body does not equal energy used by the body, it can lead to a long-term positive energy imbalance (Hodge & Zimmet, 1994).

Although energy imbalance is one of the underlying reasons for being obese, other reasons, such as medical conditions, genetic diseases, and medications, may cause the imbalance (Das, Gabriely, & Barzilai, 2004). Some medical causes of obesity are hypothyroidism, Cushing's syndrome, and depression. Hypothyroidism results from the thyroid gland producing insufficient thyroid hormones. Cushing's syndrome is caused by adrenal glands producing an excess of cortisol, a steroid hormone that is known to create a buildup of fat in the face, back, and abdomen. Depression, a state of mental disturbance, may cause people to overeat, which may lead to obesity.

Obesity is a consequence of having a poor diet and consuming more calories than the human body needs. We live in a society where diets composed of refined grains, added sugars, and added fat are more affordable, easily accessible, and more convenient than diets based on lean meats, fresh vegetables, and fruit (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2010). Good taste and convenience have led to overeating, having unhealthy eating habits, and gaining weight. Home-prepared meals have become increasingly

uncommon in many American families. Many parents work unreasonable hours, which can result in increased intake of fast food and other prepared processed foods. The demand of long work hours has resulted in less leisure time and has reduced the motivation to exercise. All of these circumstances may lead to a possible sedentary lifestyle.

A sedentary lifestyle is a medical term that denotes a lifestyle with no or irregular physical activity (Porth & Matfin, 2009). Much of the responsibility for the growing obesity problem can be attributed to sedentary lifestyles. The World Health Organization (WHO) listed sedentary lifestyle as one of the top ten causes for disability and death. The American National Health Interview Survey conducted in 2008 by the Centers for Disease Control and Prevention (CDC) concluded that 36 percent of adults in the United States were considered inactive and more than 59 percent of adult respondents had never participated in any vigorous physical activity. Sedentary lifestyle and obesity are directly related. Some of the activities that may contribute to a sedentary lifestyle and obesity include excessive television watching, stationary Internet usage and video gaming, and online shopping. Environmental influences also may play a role in shaping our dietary and exercise habits.

The links between environment and obesity are well established. Gorin and Crane (2009) stated the environment in the United States has been classified as obesogenic. The term “obesogenic” refers to conditions that lead people to become excessively fat. Obesogenic environments are external factors, such as distance to a grocery store, access to parks, urban sprawl and neighborhood safety concerns, which can contribute to the ability to maintain a healthy weight (Swinburn, Egger, & Raza, 1999). In other words, the obesogenic environment refers to conditions that help in the prevention of or the contribution to obesity. The built environment can facilitate or hinder an individual’s opportunities for food intake and physical

activity. For example, an environment with a high density of fast-food restaurants and convenience stores promotes unhealthy food choices and hinders good nutrition (Booth, Pinkston, & Poston, 2005). During the past two decades, communities' environmental designs and modes of transportation have changed. These changes influence the amount of physical activity in communities as the rates of obesity have increased (Papas et al., 2007).

Obesity Trends in the United States

Currently, one in every three Americans suffers from obesity. Between 1980 and 2008, the prevalence of obesity doubled in adults 20 and older (Flegal, Carroll, Ogden, & Curtin, 2010). By 2010, one-third of the U.S. adult population (65 percent) was obese. According to the CDC, no state has an obesity rate less than 20 percent (CDC, 2011). Thirty-six states have an obesity rate of 25 percent or more with twelve of those states having a prevalence of 30 percent or higher (CDC, 2011).

Ohio has an obesity rate of 29.2 percent (CDC, 2011) and is ranked thirteenth in the nation for the most obese state in the U.S. (Robert Wood Johnson Foundation, 2010). Sixty-five percent of Ohioans were classified as overweight and 26.9 percent were classified as obese, almost two-thirds of the adult population (Robert Wood Johnson Foundation, 2010). Obesity prevalence is highest in southwest Ohio (23 percent) and lowest in central Ohio (17.2 percent) (Ohio Department of Health, 2003). Locally, a staggering 38 percent of the adult population has been classified as being overweight and 30 percent of the general population has been classified as obese (Public Health – Dayton & Montgomery County, 2010). The obesity epidemic affects all segments of the population from health, economy, age, gender, to ethnicity.

Impact of Obesity on Health

The influence of obesity on health has received increased attention in recent years. Obesity has been linked to several chronic diseases, specifically cardiovascular disease, hypertension, diabetes, dyslipidemia, metabolic syndrome, gallstones, osteoarthritis, sleep apnea and certain forms of cancer (Wyatt, Winters, & Dubbert, 2006). It is estimated that more than 80 percent of the people with type 2 diabetes are obese (CDC, 2008). Thirty percent of individuals diagnosed with high blood pressure are obese, which contributes to heart disease (American Heart Association, 2010). Statistics show that being obese can increase the risk of developing cancer; however, this link is not universal as only certain types of cancer are associated with obesity (American Cancer Society, 2010). These illnesses have been ranked among the 15 priority medical conditions identified by the Institute of Medicine for needed improvement in the efficiency of prevention and treatment (Thorpe, Florence, Howard, & Joski, 2004).

Obesity can reduce quality of life and even cause premature death. On average, obesity-related diseases cause in excess of 300,000 deaths per year and a reduction of life expectancy in the United States by six to ten years (Flegal, Graubard, Williamson, & Gail, 2005). As an underlying cause of death obesity claims an average of 334 lives per year at an age adjusted rate of 1.4 per 100,000. As a contributing cause of death, obesity was involved in an average of 1,680 deaths per 100,000 (Olshansky et al., 2005). It has been theorized that the relationship between obesity and mortality/morbidity would be difficult to isolate and to evaluate even if the necessary basic records were available. The relationship is obscured because of the various factors of incidence. Economic consequences have become more evident as a result of obesity (Finkelstein, Trogon, Cohen, & Dietz, 2009).

Not surprisingly, health care expenditures are higher for obese individuals. Medical care for obese individuals is 60 percent higher than for normal weight individuals (Sturm, 2002). Medical conditions associated with obesity are among the most expensive health problems because they often also require treatment for comorbid conditions (Wyatt et al., 2006). Narayan, Boyle, Thompson, Sorensen, and Williamson (2003) examined medical expenses of ten chronic obesity-related conditions. The results show that these conditions accounted for \$92.6 billion to \$117 billion or approximately 5.7 to 9.1 percent of U.S. health care expenditures. The mean per capital total health care expense was \$2,970 for normal weight individuals compared to \$4,333 for obese individuals (Wee et al., 2005).

Medical cost associated with obesity involves both direct and indirect cost. The direct medical cost includes preventive, diagnostic, and treatment service. Indirect costs are related to morbidity (value of income lost through the decrease of productivity, absenteeism, restricted activity) and mortality (premature death) (Wyatt et al., 2006; Friedman & Fanning, 2004). Making precise or comprehensive estimates of the costs is difficult, but the costs certainly amount to many billions of dollars per year. It is clear that the financial cost of obesity is rising rapidly as the prevalence of obesity increases.

Studies show a relationship between obesity and age, gender, and race. The prevalence of obesity is higher among women than men. Among men, the age-adjusted obesity prevalence was 32 percent and for women the age adjusted obesity prevalence was 35 percent (Flegal et al., 2010). Women generally have a higher percentage of body fat than men.

The two types of fat found in the body are *essential* fat and *nonessential* fat. Essential fat is needed for normal physiological and biological functioning. Nonessential fat is typically layered below the skin and is referred to as *subcutaneous* fat. The level of essential fat is

approximately 3 percent of total body weight for men and 12 percent of total body weight for women. Women have a higher essential body fat level because of gender-specific fat deposits in breast tissue and the area surrounding the uterus (Heyward & Wagner, 2004). A healthy range of body fat for women 34 to 55 years old is 25 percent to 32 percent. A healthy range for men the same age is 10 percent to 18 percent (Heyward & Wagner, 2004). For this age group, a body fat percentage of over 38 percent for women and 25 percent for men are considered an indication of obesity.

The prevalence of obesity is strongly related to age. The 16-24 year age group, both males and females, is less at risk of becoming obese than older age groups. The incidence of obesity for males in this age range has declined very slightly in recent years. Those aged between 25 and 34 have the second lowest rates of obesity. Middle-aged people and those of retirement age are the most at-risk groups (National Center for Health Statistics, 2008).

Obesity is increasing in all ethnic and racial groups though prevalence is higher in non-white populations. In 2009, African Americans were 1.5 times as likely to be obese than non-Hispanic whites; just as Hispanic Americans are 1.2 times as likely to be obese compared to non-Hispanic whites (U.S. Department of Health and Human Services, 2011). Among blacks, the highest rates of obesity are in the South and Midwest. Among Hispanics, obesity rates were highest in the South, the Midwest and the West (CDC, 2009). Non-Hispanic black women had the greatest prevalence (39.2%), followed by non-Hispanic black men (31.6%), Hispanic women (29.4%) and Hispanic men (27.8%). Non-Hispanic white men (25.4%) and non-Hispanic white women (21.8%) had the lowest rates of obesity (CDC, 2009). The reasons for the differences in prevalence obesity among groups are complex. Factors involved include environment, socioeconomic status (SES), culture, physiology, genetics, interactions among these variables, as

well as others not fully recognized. Understanding the influence of these variables, people may change the patterns of eating and physical activity that would lead to interventions to prevent obesity.

Measurement of Obesity

Weight is the obvious measure of obesity. Changes in body dimensions reflect the overall health and welfare of individuals and populations. Anthropometry is used to assess and predict performance, health and survival of individuals (U.S. Department of Health and Human Services, 2010). It is a widely-used, inexpensive and non-invasive measure of general nutritional status of an individual or population. Anthropometry encompasses a variety of human body measurements such as height, weight, skin-fold thickness, waist circumferences, length and width (World Health Organization, 1995). This study will focus on the anthropometric measurements of height and weight, which are a statistical measurement used to determine a person's Body Mass Index (BMI).

Body Mass Index (BMI) is an anthropometric index of weight and height (stature) that is defined as body weight in kilograms divided by height in meters squared (Cogill, 2001). BMI is the commonly accepted index for classifying adiposity in adults and is recommended for use with children and adolescents. Many epidemiological studies use BMI as the primary screening tool for obesity. BMI is simple and inexpensive and allows you to successfully calculate and interpret your results. BMI is viewed as a favored screening for obesity because it can be applied at anytime. Optimal BMI levels are generally believed to lie between 20 and 25. BMI below 20 is considered underweight between 25 and 30 overweight, and above 30 obese (World Health Organization, 2000; Sturm, 2002). BMI is a surrogate measure of obesity; it measures excess weight. It does not measure fat nor does it take into account skeletal size, amount of body water,

or muscle mass. BMI is not gender or age specific. Nevertheless, on a population level, BMI is considered to be the most inexpensive obesity measure (U.S. Department of Health and Human Services, 2010).

BMI is the most commonly used method for classifying an individual as overweight or obese. However, BMI has limitations that can lead to the misclassification of certain individuals, such as those with increased muscle mass or the elderly. Waist circumference may be a better indicator of health risk than BMI alone, especially when used in combination with BMI (Janssen, Katzmarzyk, & Ross, 2004). Waist circumference is one of the practical tools to assess abdominal fat for chronic disease risk and during weight loss treatment (Freiberg et al., 2008). A high waist circumference or a greater level of abdominal fat is associated with an increased risk for type 2 diabetes, high cholesterol, high blood pressure, and heart disease. Waist circumference is particularly useful for individuals with a BMI of 25-34. For individuals with a BMI less than 35, waist circumference adds little predictive power on the disease risk classification of BMI.

Health Insurance Status

Quality health care coverage is important to living a healthy and productive life. Health care coverage or health insurance is a general term used to describe many kinds of insurance coverage. For most people, the broadest kind of health insurance covers most of the cost of keeping individuals healthy and getting healthy if becoming ill. Health insurance coverage includes doctor visits, hospital care, tests, certain therapies, and sometimes prescription drugs. Health insurance is the principal mechanism used to finance health, and it is critical to ensuring financial security of families as well as their access to needed health care (Rashad & Markowitz, 2007). Health insurance companies provide an important service by helping to pay for their

policyholders' health care. Health insurance is provided through two distinct mechanisms—private and public health insurance plans.

Private health insurance consists of individual-paid or employer-paid health insurance plans. Most people with private health insurance get coverage through their employer, the employer of their spouse, or a parent. Job-based health insurance is most popular because it usually offers the most comprehensive coverage and is subsidized with employers and tax breaks paying some or most of the premium on their behalf (National Endowment for Financial Education, 2006).

Public health insurance plans, such as Medicaid and Medicare, are provided by the government. Medicare and Medicaid are the two key government programs that can help meet the health care and long-term services needs of some people with disabilities and other serious health conditions (U.S. Department of Health and Human Services, n.d.). Medicare and Medicaid offer an important safety net for people with disabilities and others who don't have private insurance to cover their health care needs. Usually people can only get public coverage if they qualify based on age, income, family status, or health status.

Relationship between Body Weight and Health Insurance Status

Our nation faces a growing population of obese Americans who are both insured and uninsured. The question of whether health insurance matters in health often arises. The incidence of illness and the cost of treatment are uncertain. Uninsured Americans represent diverse populations, which have many complex reasons for their lack of health care insurance. The uninsured experience reduced access to health care. They tend to live in sickness and consequently die younger than people with health insurance. A lack of health care insurance makes a difference in people's access to needed medical care.

For the past 25 years there has been a growing uninsured rate as a result of the economic recession and a weak job market (The Henry J. Kaiser Family Foundation, 2010). Uninsured working-age adults are less likely to have a usual source of care or a recent health care visit. They are more likely to forego or delay needed medical care or preventive care because of cost. Consumers who cannot afford health insurance tend to concentrate on symptomatic care while neglecting disease prevention and risk factor control. Prior studies have documented that lacking health insurance is associated with important clinical consequences, such as obesity (Beydoun & Wang, 2008) as it is linked to many comorbidities (Formiguera & Canton, 2004). Some of the effects of being uninsured include extremely poor health outcomes related to delayed diagnosis, such as congestive heart failure, cancer, diabetes, hypertension, which results in dying sooner than persons with insurance (Robert Wood Johnson Foundation, 2010). The absence of health insurance creates a range of consequences, including lower quality of life, increased morbidity and mortality, and higher financial burdens (Institute of Medicine, 2009).

Being severely overweight can have a dramatic impact on health, sense of well-being, as well as finance. As the state of health care becomes increasingly stressed, people are realizing that health insurance can be costly to acquire (Hammond & Levine, 2010). Even worse, if insured, the policy may not offer sufficient coverage. For those who struggle with obesity, the problem is worsening. Although obesity can lead to health conditions that are typically covered by most policies, companies do not recognize obesity itself as an illness (Hammond & Levine, 2010). This may prevent a person from receiving treatment. Health insurance companies realize that severely overweight people typically have shorter lifespans than others. As a result, health insurance companies are less inclined to insure them, or if they do, they often charge much more than they otherwise would. The health care costs associated with treating conditions related to

obesity tend to be high (Bhattacharya et al., 2009). To compensate for the risk of insuring those who will likely one day need medical attention, health insurers can attach premiums to policies that make them cost-prohibitive (Friedman & Fanning, 2004). These companies are ultimately in business to make a profit, and they can view those who are obese as a poor business risk.

Impact of Health Insurance

Insurance coverage is related to better health outcomes for both children and adults when it makes health care affordable and helps consumers use care appropriately. Insurance improves health outcomes by helping people obtain preventive and screening services, prescription drug benefits, mental health and other services and by improving continuity of care (Institute of Medicine, 2009). Insurance coverage can also improve social and economic well-being by averting developmental problems in children, increasing workforce productivity, decreasing use of hospital services, and reducing costs of public programs (Tu & Cunningham, 2005). Quality health insurance provides patients with appropriate services in a technically competent manner, good communication, shared decision-making, and cultural sensitivity in order to obtain, process, and understand basic health information and services needed to make appropriate health decisions.

The economic consequences of making decisions about health care are costly. As the prevalence of obesity increases in the United States, so have related health care costs (Finkelstein et al., 2009). Individuals who are obese spend 60 percent more on medical care than those of normal weight (Wyatt et al., 2006). It is estimated that approximately 16 percent of the Gross Domestic Product (GDP) is related to health care spending (Thorpe et al., 2004). Health economists warn that obesity is the driving force behind the rise in healthcare spending (Finkelstein et al., 2009). For example, diabetes costs the nation \$190 billion a year to treat, and

excess weight is the single biggest risk factor for developing diabetes (American Diabetes Association, 2008). Health economists question if health decisions related to obesity will become a financial time bomb for the country. Overall there are a variety of factors that play a role in health decisions.

Health Fair and Attendees

Health fairs provide services and information that empower individuals in making health decisions. Health fairs are community health events designed to meet community members' needs for health promotion, education, and prevention services (Dillon & Sternas, 1997). A variety of types of entities conduct health fairs from public health departments, companies, community-based organizations, communities, and churches. The agenda of a health fair includes a set of basic medical screenings for chronic diseases (e.g. diabetes, hypertension, cholesterol, and BMI screenings) and counseling services. In addition, some health fairs offer health education workshops and activities, like walking clubs, to enhance an individual's ability to follow the path of prevention.

Health fairs provide services to a broad diversity of people. The target populations for health fairs are often of low socioeconomic (SES) status without regular access to routine doctor visits (Mayer, Connell, & Villaire, 2004). These individuals may be uninsured or underinsured, may be from low economic status, may have insurance or Medicare/Medicaid, or may not have had medical check-ups for years. Health fairs may also be geared toward a specific group of people. Examples include health fairs focused on women or senior citizens. Studies show that women are more likely than men to participate in health fairs (Heath, Lucic, Hollifield, & Kues, 1991). The average age of individuals attending health fairs tends to be over 50. Overall, there are many individual groups who attend health fairs. The immediate goals of health fairs usually

are to increase health knowledge and promote healthy behavioral intentions among the target population. The ultimate goal is to empower individuals to make health a top priority and to increase collaboration between community health and social service agencies (Andrulis & Brach, 2007). In doing so, health fairs address several Healthy People 2020 health priorities.

“Celebrating Life and Health” Health and Wellness Fair

“Celebrating Life and Health” is a health fair sponsored by the Levin Family Foundation, a not-for-profit philanthropic organization in Dayton, Ohio. The event, which is free and open to the public, is held at Sinclair Community College. The health fair is in its tenth year of community service. A variety of health information, services, and assessments are offered at this annual event. Over 100 agencies, such as Premier Health Center, Project Impact, Good Neighbor House, Public Health - Dayton & Montgomery County, and Wright State Boonshoft School of Medicine, participate in the health fair. These agencies are invited to set up booths to be a source of health education and free health screenings. Some of the services provided by these agencies include free mammography, prostate PSA testing, blood pressure checks, vision and glaucoma testing, blood sugar and blood lipid testing, and weight, height, and body mass index (BMI) measurements. Health fair attendees had direct access to not only family practice doctors but also multiple specialists. Private consultations were provided, and attendees with abnormal results were advised for follow-up care at the exit interviews. Additional support was available for appropriate referrals and appointments. Each year approximately 3,000 individuals attend. Many participants return from year to year (Levin Family Foundation, 2011).

Study Questions

This is a descriptive study of individuals who participated in the “Celebrating Life and Health” health fairs over a four-year period. The study explores the relationship between Body Mass Index (BMI) and personal characteristics of participants. The study will address:

1. The relationship between BMI and insurance status
2. The relationship between BMI and age
3. The relationship between BMI and gender
4. The relationship between BMI and race

Methodology

This is a descriptive analysis conducted using data collected at the “Celebrating Life and Health” health fairs between the years 2008 and 2011. Each year around 3,000 individuals attended the health fair. Participants who attended visited only the education and screening booths in which they were interested. Data for this study were collected at the BMI booth staffed by Wright State Boonshoft School of Medicine. The number attending the BMI booth differed from year to year but the average was 200 per year over the four-year period. Information for weight and height was collected from 831 individuals.

Protection of Human Subjects

Findings from this study may assist Public Health – Dayton & Montgomery County with health promotion programs. Participation was completely voluntarily and thus risks, if any, were minimal. There was no financial incentive to participate. However, each participant left with a card listing his/her personal health measurements carried out at the station. Adult participation will help in the advances to drive the culture changes in Montgomery County.

Data Collection

Health fair participants, who visited the BMI booth, were administered an assessment that requested basic demographic information, including age, gender, racial background, and health insurance status. No personal identification was recorded during the assessment. After completion of the assessment, participants were taken behind privacy screens where measurements were taken and recorded. Following BMI measurement, each participant received health educational counseling from an interdisciplinary group of volunteers.

The interdisciplinary group of volunteers consisted of Wright State Boonshoft School of Medicine medical students, Wright State Boonshoft School of Medicine Master of Public Health students, Wright State Boonshoft School of Medicine faculty and staff, and community volunteers. Volunteers were trained the morning of the event on how to measure and record height, weight, and waist circumference, and how to calculate BMI. Each group of volunteers had multiple roles from checking-in participants, measuring height, weight, and waist circumference, calculating BMI, and providing educational health counseling.

The purpose of the BMI booth was to give participants an indication whether they had a healthy or unhealthy weight. At the BMI booth, anthropometric measurements were collected and recorded and BMI was calculated. The anthropometric measurements include height, weight, and waist circumference. Individuals were weighed using the Taylor 7023BL Biggest Loser Electronic bathroom scale. Weight was recorded in pounds. Height was measured using a portable wall-mounted stadiometer. Height was measured in feet and inches then converted to inches. Waist circumference was determined by measuring the circumference of the abdomen beginning at the navel and measured even around the waist. Waist circumference was recorded

in inches. After the volunteers collected and recorded the participant's weight and height, the volunteers calculated BMI. To calculate BMI below is an example:

1. Divide the weight (in pounds) by the height (in inches), example $140 \div 63 = 2.2$
2. Divide the answer from step 1 by the height, example $2.2 \div 63 = 0.03$
3. Multiply the answer from step 2 by 705, example $0.03 \times 750 = 22.5$

Participants were given their BMI and directed to the health educational counseling section of the BMI booth.

Health educational counseling was conducted by medical students, public health students, and faculty/staff of Wright State Boonshoft School of Medicine. The types of health educational counseling included BMI, nutritional health management, obesity management, and the food pyramid. The purpose of health educational counseling was to promote active participation in management of each participant's own health care.

Analysis

BMI values were compared between insured and uninsured adults over age 18. BMI was divided into four categories: underweight ($\text{BMI} < 18.5 \text{ kg/m}^2$), normal weight (BMI 18.5 to 24.9), overweight (BMI 25 to 29.9), and obese (BMI 30 plus). Due to the limited sample size, participants with $\text{BMI} < 18.5$ (underweight) were excluded from the data analysis. Additional comparisons were made between BMI and gender (male and female), BMI and race (all ethnic groupings together, blacks and whites alone), and BMI and age. Age was divided into five categories: 18 to 29, 30 to 39, 40 to 49, 50 to 59, and 60 and over.

A statistical analysis was conducted using SPSS Version 18.0 for Windows. The tables were analyzed using Pearson's Chi-squared test. The dependent variable of interest was BMI and the independent variables were health insurance status, race, age, and gender. Data was

analyzed in several different ways by comparing BMI and insurance status, gender and race.

Statistical results were considered significant at $p \leq 0.05$. Summary data are expressed as mean with standard deviation.

Results

Table 1: Demographic Characteristics Statistics from “Celebrating Life and Health” Health Fair

Demographic Characteristic	Total	Percent	Montgomery County	Percent
Number of Attendees				
Female Attendees	560	67.4	290,691	51.9
Male Attendees	271	32.6	268,371	48.1
Total	831	100	559,062	100
Race				
Black	457	55.3	111,870	20.9
White	314	38.0	395,272	73.9
Other	56	6.8	28,011	5.0
Total	827	100.0	535,153	99.8
Missing	4			
Age				
18 to 34	172	20.8	121,442	26.9
35 to 44	121	14.6	85,833	20.6
45 to 54	253	30.6	6,145	18.5
55 Plus	280	33.9	127,385	31.0
Total	826	100.0	410,805	97.0
Missing	5			
Health Insurance Status				
Insured	540	66.4		
Uninsured	273	33.6	67,000	17.9
Total	831	100.0		
Missing	18			
BMI				
Normal	166	20.2		32.0
Overweight	206	25.1		37.8
Obese	450	54.7		30.2
Total	822	100.0		
Missing	9			

**2008 BRFSS, OFHS; 2010 US Census
 Mean age 50 (±14.9)
 Mean BMI 31.6 kg/m² (7.5)**

Table 1 shows demographic characteristics of attendees for the “Celebrating Life and Health” health fair BMI station. A total of 831 participants participated in the BMI station over a four-year period. Twice as many females attended the “Celebrating Life and Health” health fair BMI station than males, 67 percent compared to 33 percent. The Montgomery County population was 52 percent female vs. 48 percent male. Participants attending the health fair were 55 percent black, 38 percent whites and 7 percent other racial groups. The county’s population was 21 percent black, 74 percent white and 5 percent other races. Participants’ ages ranged from 18 to 88 with an average age of 50 years. Sixty-four percent of participants at the “Celebrating Life and Health” health fair BMI station were age 45 or older. Thirty-four percent of participants reported they were uninsured, which is higher than the 17.9 percent reported for Montgomery County. The average BMI of participants was 31.6 Kg/m². Eighty percent of the participants were overweight or obese as compared to 68 percent of adult Montgomery County residents. Participants at the BMI booth were older, more likely to be female and twice as likely to be African American. Participants were also twice as likely to be uninsured and more likely to be obese.

Health Insurance Status

Table 2 shows participant self-reported health insurance status coverage. Thirty-four percent of the participants reported not having any health insurance coverage. Private health insurance (25 percent) was the most common type of health insurance coverage reported, 19 percent of the participants reported they were covered by Medicaid, 14 percent reported were covered by Medicare, and 8 percent were covered by both Medicaid and Medicare.

Table 2: Health Insurance Status

Type of Coverage	N	Percent
No Insurance	273	33.6
Medicaid	153	18.8
Medicare	115	14.1
Both MCMC	66	8.1
Private	206	25.3
Total Participants Reported	813	99.9
Missing	18	
Total Participants	831	

Health Insurance and Gender

Table 3 shows relationship between health insurance status and gender. There is no difference in the proportion of males and females who have insurance coverage.

Table 3: Health insurance by Gender

Gender	Not Insured		Insured		Total
	N	Percent	N	Percent	
Female	167	30.6	379	69.4	546
Male	106	39.7	161	60.3	267
Total	273	33.6	540	66.4	813
Pearson Chi-Square		6.679	p=0.100		

Health Insurance and Race

Table 4 presents the distribution of health insurance by race. There is no statistically significant difference in insurance coverage by race. The data suggests that participants of other races may be less likely to have health insurance coverage.

Table 4: Health Insurance by Race

Race	Not Insured		Insured		Total
	N	Percent	N	Percent	
Black	149	33.3	298	66.7	447
White	98	31.6	212	68.4	310
Other	26	48.1	28	51.9	54
Total	273	33.7	538	66.3	811
Pearson Chi-Square		5.679	p=0.058		

Health Insurance and Age

Table 5 shows the relationship between health insurance and age. There is a statistically significant difference between health insurance and age, as age increases the proportion insured increases.

Table 5: Health Insurance by Age

Age	Not Insured		Insured		Total
	N	Percent	N	Percent	
18 to 34	74	43.3	97	56.7	171
35 to 44	47	39.5	72	60.5	119
45 to 54	94	38.1	153	61.9	247
55 plus	57	21.0	215	79.0	272
Total	272	33.6	537	66.4	809
Pearson Chi-Square		30.708	p=0.000		

Participants aged 18 to 34 were among the lowest percentage (43 percent) of participants without health insurance coverage. Seventy-nine percent of participants aged 55 and older have health insurance coverage.

BMI and Gender

Table 6 shows that there is a significant difference in weight status for women and men. More men (25 percent) are normal weight than women (18 percent). Fifty-nine percent of women were categorized as obese compared to 46 percent of men.

Table 6: BMI by Gender

Gender	Normal Weight		Over Weight		Obese		Total
	N	Percent	N	Percent	N	Percent	
Female	99	17.8	129	23.2	327	58.9	555
Male	67	25.1	77	28.8	123	46.1	267
Total	166	20.2	206	25.1	450	54.7	822

Pearson Chi-Square 12.391 P=0.002

BMI and Race

Table 7 shows the percentage of participants in each weight category by race. Only 20 percent of attendees were normal weight. Overall, the data shows that 55 percent of the participants regardless of race were obese.

Table 7: BMI by Race

Race	Normal Weight		Over Weight		Obese		Total
	N	Percent	N	Percent	N	Percent	
Black	78	17.1	113	24.8	264	58.0	455
White	75	24.4	75	24.4	158	51.3	308
Other	12	21.8	18	32.7	25	45.5	55
Total	165	20.2	206	25.2	447	54.6	818

Pearson Chi-Square 8.590 p=0.072

BMI and Age

Table 8: The Relationship between Age and BMI

Age	Normal Weight		Over Weight		Obese		Total
	N	Percent	N	Percent	N	Percent	
18 to 34	59	34.7	41	24.1	70	41.2	170
35 to 44	18	15.0	17	14.2	85	70.8	120
45 to 54	42	16.7	61	24.2	149	59.1	252
55 plus	46	16.7	86	31.3	143	52.0	275
Total	165	20.2	205	25.1	447	54.7	817

Pearson Chi-Square 30.708 p=0.0001

Table 8 shows the relationship between age and BMI. There is a significant difference between the age groups and BMI category. Young adult participants 18-34 years of age are less likely than any other age group to be obese.

Thirty-five percent of the 18 to 34 age group are normal weight. The 35 to 44 age group has the highest obesity rate at 71 percent. Obesity decreases among participants as age increases with 52 percent of those ages 55 and older are obese. However, it is important to note that 80 percent or more of participants over 35 years old are either overweight or obese.

BMI and Health Insurance

Table 9 summarizes weight status by health insurance coverage. There is no statistically significant difference in weight status by type of insurance coverage. These are unadjusted results. If controlled for age and income may produce a clearer understanding of the relationship between BMI and health insurance coverage.

Table 9: Health Insurance by BMI

Insurance Status	Normal Weight		Over Weight		Obese		Total
	N	Percent	N	Percent	N	Percent	
No Insurance	60	22.4	67	25.0	141	52.6	268
Medicaid	29	19.2	33	21.9	89	58.9	151
Medicare	15	13.0	42	36.5	58	50.4	115
Both MCMC	13	19.7	11	16.7	42	63.6	66
Private	45	22.1	47	23	112	54.9	204
Total	162	20.1	200	24.9	442	55.0	804
Pearson Chi-Square	14.918		p=0.061				

BMI, Health Insurance and Race

Table 10 presents the relationship between BMI by race and health insurance coverage. There is no statistically significant difference in BMI and insurance coverage for any race group.

Table 10: BMI, Health Insurance by Race

Insurance Status	Normal Weight		Over Weight		Obese		Total
	N	Percent	N	Percent	N	Percent	
Black							
Not Insured	32	21.6	35	23.6	81	54.7	148
Insured	45	15.2	75	25.3	177	59.6	297
Total	77	17.3	110	24.7	258	58.0	445
White							
Not Insured	22	23.4	23	24.5	49	52.1	94
Insured	51	24.3	51	24.3	108	51.4	210
Total	73	24.0	74	24.3	157	51.6	304
Other							
Not Insured	6	23.1	9	34.6	11	42.3	26
Insured	6	22.2	7	25.9	14	51.9	27
Total	12	22.6	16	30.2	25	47.2	53
Total							
Not Insured	60	22.4	67	25.0	141	52.6	268
Insured	102	19.1	133	24.9	299	56.0	534
Total	162	20.2	200	24.9	440	54.9	802

Chi-Square Tests

Race	Values	p=Value
Black	2.896	.235
White	0.028	.986
Other	0.591	.744

BMI, Health Insurance and Age

Table 11 shows the results for the relationship among BMI by health insurance coverage and age. There is no statistical significant difference in BMI by health insurance coverage in any age group.

Table 11: BMI, Health Insurance by Age

	Normal Weight		Over Weight		Obese		Total
	N	Percent	N	Percent	N	Percent	
18 to 34							
Not Insured	25	34.2	20	27.4	28	38.4	73
Insured	33	34.4	21	21.9	42	43.8	96
Total	58	34.3	41	24.3	70	41.4	169
35 to 44							
Not Insured	7	15.2	8	17.4	31	67.4	46
Insured	11	15.3	9	12.5	52	72.2	72
Total	18	15.3	17	14.4	83	70.3	118
45 to 54							
Not Insured	14	14.9	27	28.7	53	56.4	94
Insured	27	17.8	32	21.1	93	61.2	152
Total	41	16.7	59	24.0	146	59.3	246
55 plus							
Not Insured	13	24.1	12	22.2	29	53.7	54
Insured	31	14.6	71	33.3	111	52.1	213
Total	44	16.5	83	31.1	140	52.4	267
Total							
Not Insured	59	22.1	67	25.1	141	52.8	267
Insured	102	19.1	133	25.0	298	55.9	533
Total	161	20.1	200	25.0	439	54.9	800

Age Group	P= Value	Chi Square
18 to 34	.666	0.813
35 to 44	.756	0.559
45 to 54	.380	1.937
55 plus	.129	4.101

Discussion

Few would argue that it is not desirable to have health insurance. Access to health care has been viewed as basic human rights (Scandlen, 2004). Having health insurance is important because having coverage helps people get timely medical care. Uninsured people receive less medical care and less timely care and have the worst health outcomes. A lack of insurance also increases the fiscal burden on households. There are other associated problems and issues that

are associated with health insurance that increases cost (Bundorf & Pauly, 2006). This paper examines one particular manifestation of the problem, the relationship between body weight and health insurance coverage.

Obesity has become an epidemic in the United States. It increases the risk for a variety of chronic diseases and leads to considerable health care expenditures. The hypothesis for this study addresses the relationship between BMI and health insurance status, age, gender, and race.

In this study, the researcher used a data set collected from participants who attended a local health fair. A health fair is a community health strategy used to meet community members' needs for health promotion, education, and disease prevention. Though these fairs in theory may seem like a good idea, the medical literature has often viewed them with considerable skepticism. Health fairs are neither regulated nor routinely certified in the United States, and complete data on their numbers and content are not available (Berwick, 1985). Despite these concerns, health fairs continue to attract large numbers of people.

“Celebrating Life and Health” is a locally sponsored health fair that was created around the needs of the people of Montgomery County. “Celebrating Life and Health” health fair services communities with disproportionate unmet health needs, communities with a high prevalence of health issue or with a high concentration of health-related risk factors and individuals who are uninsured or who are underinsured. Health fairs not only provide individuals in communities’ information about health but also provide a great social and fun experience for young and old (Berwick, 1985).

Analysis finds no statistically significant evidence to support a relationship between being classified as obese and health insurance coverage. When examined for differences by age and race no statistical significant difference is found. It is cautioned that the results from this

study are not directly comparable to that of other studies nor can be generalized to the adult population in Montgomery County.

Body weight gain with age is consistent with the findings of research (Flegal et al., 2010). When comparing age groups, the middle- age group has a greater percentage of body weight as fat. Results show that the age group of 35 to 44 has the highest BMI, which is consistent with previous research that states as one ages, the rate of obesity increases (Wyatt et al., 2006). There is a statistically significant relationship between an anthropometric measurement (BMI) and age. Obesity generally develops over a lengthy period of time. The hypothesis that age has an association of becoming obese is supported until elderly age of 55 is reached and then body weight decreases. Women are significantly heavier than men. Studies have shown that women have lower levels of physical activity in both work-related and leisure-time pursuits, and this lack of activity contributes significantly to higher mean BMI and greater obesity prevalence (Van Itallie, 1985).

The obesity epidemic has a greater impact on minority race/ethnic groups. The prevalence of obesity is greater in blacks than in whites. These observations are corroborated in a study by Fontaine et al. (2003) who reported that the optimal BMI for adults between the ages of 18 and 85 years ranges from 23 to 30 for blacks and 23 to 25 for whites. However, the finding for this study showed that the hypothesis that race has an association of becoming obese is not supported. The fact that participants in the “Celebrating Life and Health” health fairs are not representative of the Montgomery County population may have an impact on this relationship.

Limitations

The investigation had several limitations that must be acknowledged. Participants in the health fair were not representative of the county population, which limited the researcher’s

ability to generalize the results. Study participants were older than the county population with the average age of 50 (mainly accounting of the baby-boomer era). Some measures in the study were self-reported and were subject to recall bias. Only a fraction of participants in the health fair visit the BMI booth, which also has an impact on this study. There is no way to determine whether participants in this study are representative of people who attend that “Celebrating Life and Health” health fair. The measurement protocol for BMI was not consistent with the guidelines set by the World Health Organization or National Institutes of Health. The interdisciplinary group of health care volunteers who took the measurements of the attendees had limited formal training on how to measure/calculate BMI prior to the morning of the health fair, which could have affected some of the data recorded. There were physical limitations that may have affected the data, such as the type of surface provided for the scale. The scale should have been placed on a hard floor surface. (The surface available at the health fair was a carpeted floor, which potentially could have increased the accuracy of weight collected.) Human error also could have impacted the scale due to the frequency of the calibration that was necessary to give accurate readings. Cases could have had double recordings as there was no way of controlling it as the participants varied year to year.

Conclusion

Until recently obesity was largely neglected as a public health problem. As a nation, we have to respond as vigorously to the obesity epidemic as we do to an infectious disease. At the fundamental level, individual weight gain develops as a result of a mismatch in energy balance; the number of calories consumed does not match the number of calories expended. Although obesity is defined as an excess of body fat, it is frequently assessed with using Body Mass Index (BMI). BMI is a measure of weight relative to height and is practical to use in clinical and

community settings as well as population-based studies. The results of this particular study do not demonstrate a statistical relationship between obesity and health insurance status. Consistent with other research articles, this study does show that race, age, and gender were linked to BMI levels.

Health fairs are one of the most recognizable forms of community-based health promotion conducted in the United States. Health fairs are voluntary programs, which typically last a few days, and offer health education and medical screenings at little or no cost. Unfortunately, quality studies that assess the effectiveness of health fairs cannot be found. The few studies that exist fail to report the actual outcomes. Most do not take into account how many people received an exam by a physician and how many actually had improved health outcomes due to the health fair. The few studies that use follow-up surveys usually report only the satisfaction levels and self-reported behavior of the participants, rather than health-related outcomes.

Implications for the Profession

Public health leaders can engage community members in setting health priorities and implementing programs in response to the community needs. Community empowerment projects should be based on the community-development approach to community organization, and involve public health practitioners, community health nurses and lay health workers, called *promotoras*, who are key persons in community development.

Though health screenings offered at health fairs have the potential to reach a large segment of the public and identify people who are at risk for disease, there is a lack of evaluation that measures their efficacy. The proliferation of these screenings has proceeded largely without the guidance of any systematic evaluation of their quality, accuracy, or ultimate efficacy either

for detecting disease or for reducing risk factors for chronic disease. Virtually no data exists concerning disease outcomes (Lefebvre, Hursey, & Carleton, 1988). For most screening tests offered at health fairs, follow-up of abnormal values is important to treat the condition or to confirm the diagnosis. As such, health fairs should not be seen as a substitute for seeking comprehensive care with a physician. It can be potentially harmful if participants are not educated about the limitations of the health fair results. Participants should always be encouraged to seek a second opinion with their primary care physicians before concluding that there is no need for comprehensive medical care.

Clearly there is no easy fix or one best solution to solve this crisis of obesity in our society. Obesity has become a targeted problem that is associated with other leading health issues such as hypertension, type-2 diabetes, heart disease, and a host of other related diseases. As a public health practitioner, my purpose and focus are to provide targeted research and quality preventative programming and to manage fiscal, human, and physical resources that will create sustainable and healthier communities at large.

References

- American Cancer Society. (2010). *Cancer Facts and Figures, 2010*. Retrieved March 2011, from http://www5.cancer.org/downloads/STT/Cancer_Facts_and_Figures_2010.pdf.
- American Diabetes Association. (2008). Economic Costs of Diabetes in the U.S. in 2007. *Diabetes Care, 31*(3), 596-615.
- American Heart Association. (2010). *Heart Disease and Stroke Statistics, 2010 update*. Retrieved 2011, from: <http://circ.ahajournals.org/cgi/reprint/CIRCULATIONAHA.109.192667>.
- Andrulis, D. P., & Brach, C. (2007). Integrating literacy, culture, and language to improve health care quality for diverse populations. *American Journal of Health Behavior, 31*(1), S122-33.
- Berwick, D. M. (1985). Screening in health fairs. A critical review of benefits, risks, and costs. *Journal of the American Medical Association, 254*(11), 1492-1498.
- Beydoun, M. A., & Wang, Y. (2008). Obesity and central obesity as risk factors for incident dementia and its subtypes: a systematic review and meta-analysis. *Obesity Reviews, 9*(3), 204-218.
- Bhattacharya, J., Bundorf, M. K., Pace, N., & Sood, N. (2009). *Does Health Insurance Make You Fat*. Retrieved March 2011, from National Bureau of Economic Research (NBER Working Paper w15163): <http://www.nber.org/papers/w15163.pdf>.
- Booth, K. M., Pinkston, M. M., & Poston, W. S. (2005). Obesity and the built environment. *Journal of the American Dietetic Association, 105*(5 Suppl 1), S110-S117.
- Bundorf, M. K., & Pauly, M. V. (2006). Is health insurance affordable for the uninsured? *Journal of Health Economics, 25*(4), 650-673.

- Bungum, T., Satterwhite, M., Jackson, A. W., & Morrow, J. R. (2003). The relationship of body mass index, medical costs, and job absenteeism. *American Journal of Health Behaviors*, 27(4), 456-462.
- Centers for Disease Control and Prevention. (2008). *National Diabetes Fact Sheet: General Information and National Estimates in Diabetes in the United States, 2007*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved from: http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf.
- Centers for Disease Control and Prevention. (2009). Differences in prevalence of obesity among black, white, and hispanic adults - United States, 2006 to 2008. *Morbidity and Mortality Weekly Report*, 58(27), 740-744. Retrieved from <http://www.cdc.gov/mmwr/pdf/wk/mm5827.pdf>.
- Centers for Disease Control and Prevention. (2010). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved Feb. 2011, from: <http://apps.nccd.cdc.gov/BRFSS/display.asp?cat=OB&yr=2009&qkey=4409&state=OH>.
- Centers for Disease Control and Prevention. (2011). *Overweight and Obesity*. Retrieved July 2011, from: <http://www.cdc.gov/obesity/data/trends.html#National>.
- Cogill, B. (2001). *Anthropometric Indicators Measurement Guide. Food and Nutrition Technical Assistance Project*. Washington, DC: Academy for Educational Development.
- Das, M., Gabriely, I., & Barzilai, N. (2004). Caloric restriction, body fat and aging in experimental models. *Obesity Reviews*, 5(1), 13-19.
- Dillon, D. L., & Sternas, K. (1997). Designing a Successful Health Fair to Promote Individual, Family, and Community Health. *Journal of Community Health Nursing*, 14(1), 1-14.

- Finkelstein, E. A., Trogon, J. G., Cohen, J. W., & Dietz, W. (2009). Annual Medical Spending Attributable to Obesity: Payer-and-Service-Specific Estimates. *Health Affairs*, 28(5), w822-w831.
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and Trends in Obesity Among US Adults, 199-2008. *Journal of the American Medical Association*, 303(3), 235-241.
- Flegal, K. M., Graubard, B. I., Williamson, D., & Gail, M. H. (2005). Excess deaths associated with underweight, overweight, and obesity. *Journal of the American Medical Association*, 293(5), 1861-1867.
- Fontaine, K. R., Redden, D. T., Wang, C., Westfall, A. O., & Allison, D. B. (2003). Years of Life Lost due to Obesity. *Journal of the American Medical Association*, 289(2), 187-193.
- Formiguera, X., & Canton, A. (2004). Obesity: epidemiology and clinical aspects. *Best Practice & Research Clinical Gastroenterology*, 18(6), 1125-1146.
- Freiberg, M. S., Pencian, M. J., D'Agostino, R. B., Lanier, K., Wilson, P. W., & Vasan, R. S. (2008). BMI vs. Waist Circumference for Identifying Vascular Risk. *Obesity*, 16(2), 463-469.
- Friedman, N., & Fanning, E. L. (2004). Overweight and Obesity: An Overview of Prevalence, Clinical Impact and Economic Impact. *Disease Management*, 7(Suppl 1), S1-6.
- Gorin, A. A., & Crane, M. M. (2009). The Obesogenic Environment. In E. Jelalian, & R. Gisteele, *Handbook of Childhood and Adolescent Obesity* (Vol. 3, pp. 145-161). New York: Springer Science and Business Media LLC.

- Hammond, R. A., & Levine, R. (2010). *The Economic Impact of Obesity in the United States*. Brookings Institution, Economic Studies Program. Washington, DC: Dove Medical Press, Ltd.
- Heath, J. M., Lucic, K. S., Hollifield, D., & Kues, J. R. (1991). The health beliefs of health fair participants. *Journal of Community Health, 16*(4), 197-203.
- Heyward, V. H., & Wagner, D. (2004). Applied body composition assessment. In *Human Kinetics*. Champaign, IL: Human Kinetics Publishers.
- Hodge, A. M., & Zimmet, P. Z. (1994). The Epidemiology of Obesity. *Clinical Endocrinology and Metabolism, 8*(3), 577-599.
- Institute of Medicine. (2009). *America's Uninsured Crisis: Consequences for Health and Health Care*. Washington, DC: National Academy Press.
- Janssen, I., Katzmarzyk, P. T., & Ross, R. (2004). Waist circumference and not body mass index explains obesity related health risk. *The American Journal of Clinical Nutrition, 79*, 379-84.
- Johnson, L. M. (2011). The Genetic epidemiology of Obesity: A Case Study. In *Genetic Epidemiology*, M. Dawn Dawn Teare (ed.), Vol.713, pg. 227-237. New York: Springer.
- Keehan, S., Sisko, A., Truffe, C., Smith, S., Cowan, C., Poisal, J., et al. (2008). Health Spending Projections Through 2017: The Baby-Boom Generation Is Coming To Medicare. *Health Affairs, 27*(2), 145-155.
- Lefebvre, C., Hursey, K. G., & Carleton, R. A. (1988). Labeling of participants in high blood pressure screening programs. Implications for blood cholesterol screenings. *Archives of Internal Medicine, 148*(9), 1993-1997.

- Levin Family Foundation. (2011). *Celebrating Life & Health Fair* . Retrieved August 2011, from <http://www.levinfamilyfoundation.org/celebrating-life-and-health-fair.htm>.
- Mayer, G., Connell, J., & Villaire, M. (2004). Achieve Outcomes at Community Health Fairs. *Nursing Practice*, 29-31.
- Menifield, C. E., Doty, N., & Fletcher, A. (2008). Obesity in America. *The Association of Black Nursing Faculty Journal*, 83-88.
- Morgan, M. J., & Shapiro, H. N. (2008). *Fundamentals of engineering thermodynamics*. New York, NY: Wiley.
- Narayan, K. M., Boyle, J. P., Thompson, J. T., Sorensen, S., & Williamson, D. (2003). Lifetime Risk for Diabetes Mellitus in the United States. *Journal of the American Medical Association*, 290(14), 1884-1890.
- National Center for Health Statistics. (2008). *Health, United States, 2008 with Chartbook on Trends in the Health of Americans* (DHHS Publication No. 2009-1232). Hyattsville, Maryland: U.S. Government Printing Office.
- National Endowment for Financial Education. (2006). *Understanding Private Health Insurance*. Retrieved June 2011, from Georgetown University Health Policy Institute: http://healthinsuranceinfo.net/managing-medical-bills/Understand_Private_Health_Insurance.pdf.
- Ohio Department of Health. (2003). *Cardiovascular Health Program*. Retrieved from Ohio Department of Health Cardiovascular Quarterly Pulse. <http://www.odh.ohio.gov/ASSETS/71E4AADD5BD84696999D2918C3FCE610/cardwi03.pdf>.

Olshansky, J. S., Passaro, D. J., Hershow, R. C., Layden, J., Carnes, B. A., Brody, J., et al.

(2005). A Potential Decline in Life Expectancy in the United States in the 21st Century.

The New England Journal of Medicine, 352(11), 1138-1145.

Papas, M. A., Alberg, A. J., Ewing, R., Helzlsouer, K. J., Gary, T. L., & Klassen, A. C. (2007).

The Built Environment and Obesity. *Epidemiologic Reviews*, 29, 129–143.

Porth, C. M., & Matfin, G. (2009). *Pathophysiology: Concepts of Altered Health States*, 8th

Edition. Philadelphia, PA: Kluwer Health/Lippincott Williams & Wilkins.

Public Health – Dayton & Montgomery County. (2010). *Montgomery County Community*

Assessment 2010. Retrieved April 2011, from:

http://www.phdmc.org/images/uploads/CHA_ID_final.pdf.

Rashad, I., & Markowitz, S. (2007). *Incentives in Obesity and Health Insurance*. Retrieved

March 2011, from National Bureau of Economic Research (NBER Working Paper

13113): <http://www.nber.org/papers/w13113>.

Robert Wood Johnson Foundation. (2010, June). *F is for Fat: How Obesity Trends Threatens*

Americans Future's 2011. Retrieved 2011, from Trust for American's Health:

<http://healthyamericans.org/reports/obesity2010/Obesity2010Report.pdf>.

Scandlen, G. (2004). Commentary—How consumer-driven health care evolves in a dynamic

market. *Health Services Research*, 39(4 Pt 2), 1113–1118.

Serina, M., & Glove, S. (1991). Health fairs bring wellness concepts to life. *Nurse Education*, 16,

7-11.

Sturm, R. (2002). The Effects of Obesity, Smoking, and Problem Drinking on Chronic Medical

Problems and Health Care Costs. *Health Affairs*, 2, 245-253.

- Swinburn, B. A., Egger, G., & Raza, F. (1999). Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventative Medicine, 29*, 563-70.
- The Henry J. Kaiser Family Foundation. (2010). *The Uninsured A Primer: Key Facts about Americans without Health Insurance*. Retrieved March 2011, from <http://www.kff.org/uninsured/upload/7451-06.pdf>.
- Thorpe, K. E., Florence, C. S., Howard, D. H., & Joski, P. (2004). The Impact of Obesity on Rising Medical Spending. *Health Affairs, Suppl Web Exclusives (W4)*, 480-486.
- Tu, H. T., & Cunningham, P. J. (2005). *Public Coverage Provides Vital Safety Net for Children with Special Health Care Needs*. Issue Brief, no. 98 Washington, DC: Center for Studying Health System Change.
- U.S. Department of Health and Human Services. (n.d.). *Centers for Medicare and Medicaid Services*. Retrieved 2011 from <https://www.cms.gov/>.
- U. S. Department of Health and Human Services. (2010). *The Surgeon General's Vision for a Healthy and Fit Nation*. Retrieved January 2011, from US Department of Health and Human Service, Office of Surgeon General.
- U.S. Department of Health and Human Services and U.S. Department of Agriculture. (2010). *Dietary Guidelines for Americans, 2010 7th Edition*. Washington, DC: U.S. Department of Health and Human Services and U.S. Department of Agriculture.
- U.S. Department of Health and Human Services. (2011). *National Health Expenditure Data*. Retrieved Aug 2011, from Centers for Medicaid and Medicare Services: https://www.cms.gov/NationalHealthExpendData/01_Overview.asp#TopOfPage.

Van Itallie, T. B. (1985). Health Implications of Overweight and Obesity in the United States.

Annals of Internal Medicine, 103, 983-988.

Wee, C. C., Phillips, R. S., Legedza, A. T., Soukup, J. R., Davis, R. B., Graham, C. A., et al.

(2005). Health Care Expenditures Associated With Overweight and Obesity Among US

Adults: Importance of Age and Race. *American Journal of Public Health*, 95(1), 159-

165.

World Health Organization. (1995). *Physical Status: The Use and Interpretation of*

Anthropometry. Retrieved Feb 2011, from:

http://whqlibdoc.who.int/trs/WHO_TRS_854.pdf.

World Health Organization. (2000). *Obesity: Preventing and Managing the Global Epidemic*.

Geneva.

Wyatt, S. B., Winters, K. P., & Dubbert, P. M. (2006). Overweight and Obesity: Prevalence,

Consequence, and Causes of a Growing Public Health Problem. *The American Journal of*

the Medical Sciences, 331(4), 166-174.

Appendices**Appendix 1 – Celebrating Life and Health Data Collection Form****Celebrating Life & Health
HEALTH & WELLNESS FAIR**

Control No. _____

1. AGE _____

2. SEX

 MALE
 FEMALE

3. RACE/ETHNICITY

 AFR AMER
 CAUCASIAN
 HISPANIC/LATINO
 ASIAN/PACIFIC ISLANDER
 OTHER

4. INSURANCE STATUS

 MEDICAID
 MEDICARE
 PRIVATE INS
 NONE

5. HEIGHT _____

6. WEIGHT _____

7. BMI _____

8. WAIST CIRCUMFERENCE _____

Appendix 2 - Public Health Competencies

The following health competencies were achieved from this research project through the review of pertinent literature or through experiences and knowledge gain conducting project activities:

Domain #1: Analytic Assessment Skills:

- Defines a problem
- Determine appropriate uses and limitations of quantitative data
- Select and defines variables relevant to defined public health problems
- Identifies relevant and appropriate data and information sources
- Evaluates the integrity and comparability of data and identifies gaps in data sources
- Applies ethical principles to the collection, maintenance, use, and dissemination of data and information
- Partners with communities to learn meaning to collected quantitative data
- Obtains and interprets information regarding risks and benefits to the community
- Applies data collection processes, information technology applications, and computer systems storage/retrieval strategies
- Recognizes how the data illuminates ethical, political, scientific, economic, and overall public health issues

Domain #2: Policy Development/Program Planning Skills:

- Collects, summarizes and interprets information relevant for a problem

Domain #3: Communication Skills:

- Communicates effectively both in writing and orally, or in other ways
- Solicits input from individuals and organizations
- Advocates for public health programs and resources
- Effectively presents accurate demographic, statistical, programmatic and scientific information for professional and lay audiences
- Attitudes: Listens to others in an unbiased manner, respects points of view of others, and promotes the expression of diverse opinions and perspectives

Domain #4: Cultural Competency Skills:

- Identifies the role of cultural, social, and behavioral factors in determining the delivery of public health services
- Attitudes: Understands the dynamic force contributing to cultural diversity
- Attitudes: Understands the importance of a diverse public health workforce

Domain #5: Community Dimensions of Practice Skills:

- Establishes and maintains linkages with key stakeholders
- Collaborates with community partners to promote the health of the population
- Identifies community assets and available resources

Domain #6: Basic Public Health Science Skills:

- Defines, assesses, and understands the health status of populations, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services
- Understand the historical development, structure, and interaction of public health and health care systems
- Identifies and applies basic research methods used in public health
- Applies the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, and prevention of chronic and infectious diseases and injuries
- Identifies and retrieves current relevant scientific evidence
- Identifies the limitations of research and the importance of observations and interrelationships
- Attitudes: Develops a lifelong commitment to rigorous critical thinking

Domain #8: Leadership and Systems Thinking Skills

- Identifies internal and external issues that may impact delivery of essential public health services
- Facilitates collaboration with internal and external groups to ensure participation of key stakeholders