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Obesity and Workplace Injury in Hazardous Occupations Among the Hispanic/Latino Population

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Abstract

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PA-C, Wichita State University, 1977

BS, University of Buffalo, 1976

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Over the past 20 years, adult obesity has increased in the United States, especially among the Hispanic/Latino population. In 2010, the Occupational Safety and Health Administration Environmental and Safety News, reported that younger workers, ages 18 to19 years of age, worked in the most high-risk occupations such as agriculture, construction, fishing, and manufacturing. The reported fatality rates for these occupations were 5.6 times greater for Hispanic workers compared to other race/ethnicity groups reported by the Bureau of Labor Statistics in 2013. This study determined whether obesity contributed to workplace injury or mortality in hazardous occupations, using federal, state, and independent national databases. The independent variable was obesity, the dependent variable was injury in hazardous occupations. In addition, age, gender, race/ethnicity, socioeconomic level, educational level, and cultural context were used as mediating variables. The target population included all workers ages 18 to 65 years of age in hazardous occupations. Analysis of databases from NHANES, BRFSS, NIOSH, OSHA, and the BLS was conducted using descriptive statistics for frequency of the mediating variables' relationship to workplace injury. This study highlighted the prevalence of obesity in the Hispanic/Latino population and increased incidence of workplace injury in hazardous occupations, but found no significant relationship between the variables using the BFRSS Web Enabled Analysis Tool for linear regression and cross-tabulation. Establishing a relationship between obesity and increased injury for the Hispanic/Latino population in high-risk occupations for preventative measures will enhance positive social change within this underrepresented population in research.

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Dedication

This study is dedicated to all workers in hazardous occupations including the underrepresented Hispanic/Latino population with the hope that it may promote the changes necessary to ensure their health and safety through social awareness for social change.

Acknowledgments

First, I want to thank my family for supporting my pursuit of the goal of earning a PhD in my later years. I also want to acknowledge my chair, Dr. Chester Jones, and other members of my committee as well as Walden University for their roles in affording me this opportunity to fulfill a lifelong dream of further education. Thanks also goes out to the support I received from the Centers for Disease Control and Prevention and from Dr. P. Schulte, Director of Education of NIOSH, for encouraging me to pursue this research.

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Chapter 1: Introduction to the Study

Background

Adult obesity prevalence in the United States was 35.7% in 2009-2010 (U.S. Department for Health and Human Resources, Centers for Disease Control and Prevention [CDC], and the National Center for Human Sciences Data Brief (2010).Medical and scientific communities recognize 10 leading health indicators where overweight and obesity are considered a precursor of chronic diseases such as diabetes, cardiovascular disease, arthritis and certain cancers (CDC Healthy People, 2012; McKenzie, Pinge, & Kotecki, 2008). In addition to personal health risks factors that include age, gender, socioeconomic status (SES), and use of tobacco and alcohol, workplace hazards are known to compromise the health of workers (Shulte, Pandalai, Wulsin, & Chun, 2012).

Obesity represents a significant national financial health cost which has been reported at least as high as $147 billion annually in the United States (CDC, 2009; Schulte et al., 2012). This information suggested that obesity may even be a contributing factor for workplace injury. Vega, Rodriguez, and Gruskin (2009) noted disparities in the Hispanic/Latino population due to a social inequality framework that the above health risks have a contributory role due to the suboptimal health care which this population receives and will require further research into the interpretation and implications for public health and policy which includes workplace injuries(Vega, et al., 2009).

Problem Statement

Considering the fact that more than one third of the adult population of the United States is obese, in this study, I assessed how obesity affects workplace performance and injuries (CDC, 2012). If not considered, this could increase the cost for healthcare by negating the actual events for workplace absenteeism due to complications such as diseases related to obesity or even increase workmen's compensation cases due to injury. According to the Occupational Safety and Health Administration (OSHA) Environmental and Safety News, (2010), most high-risk occupations such as agriculture, construction, and fishing were performed by younger workers 18-19 years of age, with fatality rates of 5.6 times greater for Hispanic workers compared to non- Hispanics, African Americans, or European Americans (OSHA, 2010). In this study, I explored through, federal and independent national databases, what factors cause loss of work and how it may be related to obesity.

Although there is little published research about the relationship between obesity and workplace injuries, the phenomenon was reviewed by the National Health Interview Survey (1986-2002). The researchers suggested that the increase of obesity rates over time among employed workers not inclusive of race or gender and the relationship between obesity and occupational injury was not fully investigated with attention to injury that can involve loss or restricted work time, loss of consciousness or even death that require reporting to the Occupational Safety and Health Administration (Caban, et al., 2005). Ethical concerns, or limited mechanisms for determining obesity related injury, may be influenced by other listed factors such as chronic diseases such as

diabetes, hypertension, fatigue or sleepiness due to sleep apnea, ergonomics, or other physical limitations that may confound reporting this information (Pollack & Cheskin, 2007; Pollack et al., 2007).

Obesity is a precursor to multiple health problems such as hypertension, diabetes, cardiovascular diseases, and arthritis and can be confounders for injuries. Therefore, these were eliminated in the final analysis utilizing data only for obesity as a major contributing factor for workplace injuries. This information is especially relevant for the Hispanic/Latino population who tend to work in occupations that are more hazardous and have the higher rate of obesity as compared to non-Hispanic Whites working in the same occupations (Bureau of Labor Statistics [BLS], 2013). The data available may not be inclusive for this population. There are several reasons why there is under reporting of workplace injuries in this population. One such reason may be due to the fact that many workers are undocumented and fear for their jobs or if not illegal or undocumented have less understanding of their workplace rights (Vega, et al, 2009). Many companies list injuries as first aid to avoid workers' compensation cases and probable increase in their insurance rates (BLS, 2013).

Nature of the Study

In this secondary comparative cross-sectional study, I analyzed existing databases for comparison of workplace injuries and a possible relationship to obesity. I used resources that included the Bureau of Labor Statistics (BLS), and the Workplace Data and Statistics Gateway database provided by CDC INFO (CDC, 2012). The operational methods for determining significance included obesity as the independent variable,

workplace injury as the dependent variable, hazardous workplace as the moderating variable, and age, gender, race/ethnicity, socioeconomic level, level of education, and cultural context as the mediating variables.

The purpose of this analysis was to determine the association between BMI and injuries in hazardous work places that require special training to avoid injury. These databases included histories of pre-employment physical examinations that included diagnostic procedures such as pulmonary function and strength analysis, laboratory tests for gathering information for health status-eliminated confounders such as diabetes, hypertension or other chronic health conditions that may cause workplace injury.

The survey databases that I used for analysis had a focus on overweight and obesity, health risk factors, and exposure to hazardous workplace conditions. I conducted an evaluation of obesity related to workplace injuries, and hazardous occupations to determine whether there were correlations with the Behavioral Risk Factor Surveillance System (BRFSS), Occupational Safety and Health Administration databases, the Bureau of Labor Statistics (BLS), NIOSH, the CDC, and other databases associated with the Department of Health and Human Services (HHS, 2012). I did a review for the investigation of the health and safety rules as applied to hazardous work conditions was considered from results of the preemployment examinations established by NHANES, 2012. These included BMI measured by licensed medical providers in accordance with the standards of the NIH, blood analysis was done to rule out metabolic diseases such as diabetes, drug and alcohol screening, as well as strength testing, and pulmonary functions in accordance with OSHA regulations for the most hazardous occupations. The surveys

that I included in my study consisted of questions about health and safety factors combined into four demands of work: time, physical, mental, or interpersonal aspects related to socioeconomic level, level of education, and cultural context as related to expected output (Gates, Succop, Brehm, Gillespie, & Sommers, 2008). I will discuss these in greater detail in Chapter 3.

Research Questions and Hypotheses

Research Question 1: Does obesity have a direct influence on injury?

H_{1o}: Obesity has no direct influence on injuries in a hazardous workplace.

H_{1a}: Obesity does have a direct influence on injuries in a hazardous workplace.

Research Question 2: Is cultural context a major factor as related to race/ethnicity's interpretation of obesity that may contribute to workplace injury?

H_{2o}: Cultural interpretation related to obesity determined by race/ethnicity has no effect on workplace injury.

H_{2a}: Cultural interpretation related to obesity determined by race/ethnicity has an effect on workplace injury.

Purpose of the Study

The purpose of this secondary, comparative cross-sectional research study was to assess whether high BMI (greater than 30) contributes to workplace injuries in hazardous occupations for the Hispanic/Latino population.

Theoretical Framework

Schulte et al. (2008) theorized that there is potential relationship between the prevalence of obesity in workers and occupation-related health problems by assessing the concurrent association of occupational hazards with obesity. Schulte's research team developed a framework based on workplace injuries relating to its impact due to obesity. Schulte and his research team tested their hypotheses by using the following theories: (a) obesity affects occupational exposure-disease association, (b) workplace factors can be precursors to obesity, and (c) obesity and occupational exposures still considered for independent risk factors for disease and injury. Schulte, et al., (2008) utilized the definition for obesity established by the criteria from the NIH where obesity is defined as having a BMI of greater than 30 (as determined by the formula kg/m^2) with kg indicating weight and m measuring for height. Additionally, I did include cultural context as a mediating variable, as different race/ethnic groups especially the Hispanic/Latino population that work in hazardous occupations may have different perceptions of what is considered overweight or obese that may be precursors that lead to injuries.

Operational Definitions

Body mass index (*BMI):* Is a formula used to calculate a person's body mass ratio measure based on his or her weight in kg and height in meters squared defined by the World Health Organization in the 1980's. This method is determined by mathematically calculated by using weight in kilograms using the formula *kg* for weight and *m* for height or kg/m^2 (NIH, 2010).

Hazard: potential to cause harm as described in Occupational and Environmental Epidemiology (Oxford Dictionary, 2008).

Overweight: BMI between 25 and 29.9 measured by kg/m^2 (CDC Healthy People, 2010)

Obesity: BMI 30 or greater measured by kg/m^2 (CDC Healthy People, 2010).

Workplace injuries: includes acute sprains and strains, falls, burns, contusions, abrasions, lacerations, eye injuries, fractures, amputations, blisters, foreign bodies, punctures, bites or stings, inhalation of toxic chemicals, and other exposures not yet recognized (Pollack et al., 2007).

Assumptions

Over the past two decades, obesity has become an epidemic in the United States. This epidemic is a significant precursor to many chronic diseases, although research has yet to link this to increased workplace injury (CDC, 2007; McKenzie, Page, & Kotecki, 2008). There is little current scientific data that support the assumption that increased BMI can contribute to increased injury in hazardous occupations; however, Pollack et al. (2007) found in the medical records of eight aluminum-manufacturing plants that 85% of injured workers were overweight or obese, yet the MMWR (2010) gives limited information regarding these events. For most medical practitioners it is a known fact that significant injuries are under-reported and listed as *first aid*. Medical providers could realize the practice of underreporting although not documented.

Limitations

The limitations of this study depended upon available data regarding obesity as either documented in databases or self-reported in NHANESIII and BRFSS, as well as databases that provide recent statistics of workplace injuries in hazardous occupations reported by the Bureau of Labor Statistics and CDC INFO. Sample size for this study was dependent upon the availability of the most recent databases and what was available for determining if indeed there is a relationship between obesity and increased workplace injury.

Delimitations

This study was delimited to workers 18 to 65 years of age, with BMI's greater than 30. Only age, gender, race/ethnicity/culture, socioeconomics level, and level of education of employees that has incurred an injury that requires medical care and not first aid treatment are included. Injuries that incur workers' compensation depending upon disability, morbidity or mortality while currently working in hazardous occupations are included (BLS, 2013).

Scope

The scope of this study included secondary analyses of all available and appropriate pre-existing databases. Population-based survey data from the CDC, BLS, the Behavioral Risk Factor Surveillance System, and NIOSH will be analyzed. The sampling method included a stratified, age, gender, and race/ethnicity group ranging in age from 18-65. Inclusion criteria for the proposed analysis included participants with a BMI > 30 kg/m2 , as measured by a calibrated scale designated by the NIH (2010). The NHANES and BRFSS databases included a complete physical examination with blood analysis for

exclusion criteria that include diabetes, thyroid malfunction, and screening for drug, alcohol, and nicotine that may confound results.

Evaluation of variables was done to rule out that only obesity will be the independent variable when compared to the self-reporting BRFSS telephone survey results. Using databases that include statistics for the mediating variables such as age, race/ethnicity/ gender, socioeconomic level, education level, comparison of data was done for a possible relationship of obesity and workplace injuries especially for Hispanic/Latino workers eliminating possible confounding variables such as pre-existing chronic diseases such as diabetes, hypertension, or sleep apnea. These diseases are related to obesity which would eliminate participants who have these medical problems from this study. The final analysis was derived from federal and other pertinent databases by using SPSS Version 21 for frequency, ANOVA, MANOVA, and linear regression statistical analyses. I will also analyze the rate of injury as described by NIOSH incurred for these comparative groups who are not obese. Non-obese workers will be compared by frequency of injuries incurred during the same specified period for this study.

Significance of the Study

Obesity and overweight are epidemic in the United States (CDC, Healthy People, 2010). Establishing a statistical relationship between obesity and overweight and the predilection for workplace injuries among this population, newer injury prevention measures might be established, including health and nutrition education and promotion for both employers and employees (Schulte et al., 2012). The social reform that might

accrue could reduce worker injuries, loss of productive workdays, and reduce the high cost of workers' compensation insurance and claims (Pollack et al., 2007).

If it is found through the databases surveys that Hispanic/Latino workers are employed in disproportionate numbers in hazardous occupations, and that they are also more likely to be obese or overweight, this information would have significance. Understanding that Hispanic/Latino workers, most of whom are undocumented, employed in hazardous occupations due to lack of higher education, socioeconomic status, and lack of regular access for healthcare which may provide preventative medicine, needing to provide a reasonable living for their families are willing to take this risk. If social justice is to be included into this equation then there should be no doubt a study such as this is current.

Transition and Summary

With increasing awareness of how obesity can predispose chronic health problems such as diabetes, hypertension, and other entities that can interfere with workplace performance little research has been specifically pertaining to obesity itself as a precursor for workplace injuries in hazardous occupations. This study was based on available databases, established federal, state and local labor statistics as well as other databases that may provide insight by comparing these differences further discussed in chapter two.

Chapter 2: Literature Review

In 2000, the CDC published its Healthy People preliminary report, indicating an increase in the number of overweight and obese adults in the United States. In the report, the CDC noted an increase in workplace injuries and rising claims for workers' compensation, especially in hazardous occupations. These claims had risen to $143 billion per year between 2007 and 2010 and continue to increase (CDC 2010). What is also recognized by the scientific community, and studies that were undertaken to see if Researchers have examined whether there was a correlation between increasing adult obesity in the United States and workplace injuries in high-risk occupations (Shulte et al., 2012).

Literature Search Strategies

I searched the databases Pub Med and MEDLINE, as well as the government databases NIOSH, OSHA, CDC, EPA, and NIH. I also sought peer-reviewed, clinical journal articles about obesity and its relationship to workplace injury in hazardous occupations. Until the CDC recognized that obesity was becoming epidemic in the United States, with at least 60% of the adult population overweight (CDC, 2010), there had been little study of whether obesity might lead to increasing workplace injuries. This increase was noticed first by workers' compensation insurance agencies tracking trends over 1999-2009 (BLS, 2013). The Johns Hopkins School of Public Health Center for Injury Research and Policy was the impetus for further investigation by Pollack and Cheskin, (2007).To find peer-reviewed articles on the topic, I used the search terms *obesity*, *overweight, Hispanic overweight, workplace injury and overweight hazardous*

work and overweight, effects of overweight on workplace injuries, ethnic minorities and obesity, increased body mass index, and similar terms that would lead to appropriate sources of information. From the site that these terms led to, I pursued sub-elements such as *age, gender, race/ethnicity, socioeconomic level*, and *education*.

Background

The purpose of this study was to analyze a relationship between obesity in the Hispanic/Latino population regarding increased workplace injuries in hazardous occupations through analysis of existing databases. Until the time the CDC recognized that recognized that obesity was becoming an epidemic in the United States, with at least 60% of the adult population overweight (CDC, 2012), little study had been done determining whether obesity might lead to increasing workplace injuries. Pollack & Cheskin, 2002 first reviewed this hypothesis and later in 2007 in collaboration with the Johns Hopkins School of public Health Center for Injury Research and policy (Pollack & Cheskin, 2007). There has been little research about the relationship between obesity and injury, increased adult obesity in the United States has been documented to be a precursor for chronic diseases and problems related to increased body mass index (BMI; CDC, 2012). Until about 2007, there was scant research on the correlation of obesity with workplace injuries. Obesity has become an epidemic in the United States, with approximately 37.9% of the adult population, a condition that can lead to chronic health problems that may interfere with the work place (Schulte, et al, 2012).

The incidents of obesity are increasing (Pollack & Cheskin, 2007). The NIH reports the Hispanic/Latino population as 39.1% obese and 78.8% overweight (NIH,

2012). By reviewing recent data on occupational safety (NIOSH, 2012) the question is if obesity has a direct influence on injury, or do diseases such as diabetes, hypertension, cardiovascular disease, or arthritis associated with obesity influence and increase the probability of accidents leading to injury especially in the Hispanic/Latino population or is it not related to only this particular population of workers in hazardous occupations? Other considerations and variables such as age, socioeconomic level, and level of education or pre-existing medical conditions due to other than obesity may negate this prediction since they can be considered as confounders.

Obesity

For the purposes of this study, obesity is defined as a BMI of 30 or greater (CDC Healthy People, 2010). BMI is measured by weight in kilograms divided by height in meters squared, the formula defined as kg/ m2 (NIH, 2010; Romero-Corral et al., 2008). The relationship of obesity delineated by the CDC included the leading health indicators associated with obesity as (a) amount of physical activity; (b) mental health; (c) environmental quality; and (d) access to healthcare which considers overweight and obesity as precursors to chronic diseases such as diabetes, cardiovascular disease, hypertension, arthritis, and certain cancers (CDC, 2010).

According to Kline and Huff" study (2007), the diffusion of innovation and social cognitive theory were compared to help support and possibly develop a theoretical framework that includes health behaviors influenced by culture, ecology, race/ethnicity, age and gender. Recognizing there are differences in perception of healthy lifestyles based in cultural context this may help explain inequalities in healthcare intervention,

accessibility, socioeconomic level, level of education, and the importance of support needed for community-based intervention and prevention programs (Kline & Huff, 2007). Each theory has significant factors and can be employed individually or as an amalgam for mapping a healthier lifestyle and decrease in BMI (Bartholomew et al., 2006; Kline & Huff, 2007). These are explained further under the section titled Theories and Conceptual Framework in this proposal. Research for developing a framework that can help explain how obesity can contribute to workplace injury was first explored by Pollack and Cheskin (2007) and later redefined by Schulte, Wagner, Downes, and Miller (2008), which is explained in detail later in this chapter.

There are significant economic consequences of obesity as defined by the CDC, 2012) which has estimated the total medical costs for obesity in the United States in 2008 dollars at $147 billion. Overweight and obesity, with their associated health problems, significantly affect United States healthcare organizations through both direct and indirect costs. Direct medical costs may include diagnostic, preventative, and treatments incurred related to obesity. Indirect costs relate to morbidity and mortality. The morbidity costs, according to the CDC, are defined as value of income lost from decreased productivity, activities that are restricted, absenteeism from work, and bed days. Premature death due to mortality costs are defined as value lost for future income (CDC, 2009). If workplace injuries related to overweight and obesity were validated this information could be incorporated into developing a new paradigm for healthcare costs .

Injury

OSHA was created, during the administration of President Richard M. Nixon, to ensure healthful conditions for the workforce by regulating standards for healthy workplaces defined as:

> injury or illness as any abnormal condition or disorder ranging from injuries that include minor cuts to amputations. Illness would include both acute immediately needing medical care and chronic conditions developed from long exposure to toxins in the work environment [such as] asbestos. Further differentiation would include traumatic injury such as concussion, fracture, burn, or laceration caused by an external force which affects a specific part or function of the body with an identifiable time and place where the injury incurred such as a single work shift.

> Occupational illness or disease must meet reported conditions that do not include traumatic injury but relate to a systemic infection such as respiratory illnesses [and] gastrointestinal illnesses that are related to occupational exposure to hazardous materials, repeated stress and strain or other exposures that result in harm or loss of function. (OSHA, 2010)

Defining hazardous occupations can be based on the number of related job fatalities in a given occupation, which are recorded as *fatality frequencies*. Another method is based on fatality rates that take into account differing total numbers among occupations. This includes occupations of nonfatal injuries and illnesses that are measured by days away from work. These processes can result in complex statistical methods not always relevant or accurate and are estimated as chances of occupational injury or illness expressed as the cumulative number of workers injured in a specific group when compared with the number of workers not injured in that group.

An example is that truck drivers have a ratio of 1:15 chance of serious injury in any year. Also calculated is the number of median days to recuperate from an injury (Toscano, 1997). The CDC (2010) estimated 3.9 million workers in private, state, and local government have a nonfatal occupational injury or illness each year. Also noted was that of those workers, 2 million were transferred, placed on work restrictions, or took time away from work due to injury or illness. According to NIOSH (2012), 2.6 million workers were treated in emergency departments for occupational injuries and illnesses, with 110,000 of these workers hospitalized. Some of the most dangerous industries include (a) agriculture, (b) commercial fishing, (c) aviation in Alaska, (d) construction,

(e) firefighting, (f) logging, and (g) commercial motor vehicle operation such as long haul trucking (CDC, 2011).

Mechanism of injury is defined as how the injury occurred for occupational injury and can be a wound or damage caused to the body from an event in the work environment (OSHA, 2012). Conventional injuries are classified in several categories, depending upon how the injury incurred. The most typical injuries include (a) penetrating, (b) nonpenetrating or blunt, (c) blast overpressure, (d) thermal, and (e) chemical. Other injuries included are crush and barotraumas.

Descriptions of Types of Injury Related to Hazardous Occupations

According to NIOSH (2012), workplace illnesses can also include:

1. Skin diseases or disorders caused by exposure to chemicals, plants or other substances that produce an inflammation that includes contact dermatitis, eczema, or rash friction blisters, and ulcers.
2. Poisonings that are identified by abnormal concentrations of toxic substances in the blood, tissues, body fluids and breath caused by either adsorption or ingestion into the body. Examples include lead, mercury, arsenic, and other heavy metals as well as noxious gases such as hydrogen sulfide, organic solvents such as benzene, carbon tetrachloride, insecticide sprays such as parathion or lead arsenate, as well as exposure to formaldehyde.
3. Respiratory exposures, including breathing hazardous biological agents, chemicals, gases, dust, fumes, vapors that are associated with diseases such as

pharyngitis, rhinitis, and acute congestion as well as chronic diseases such as asbestosis, silicosis, pneumonitis, farmers' lung, and tuberculosis,

4. Hearing loss induced by noise with change in the hearing threshold as compared to the baseline audiogram considered to be an average of 10 db or more at 2,000, 3,000, and 4,000 hertz in either ear where the employee's total hearing level is above the audiometric zero to be 25 or above which is also averaged by 2,000, 3,000, and 4,000 hertz in the same ear(s).
5. Heat stress that includes exhaustion/stroke, freezing, frostbite, effects of non-ionizing radiation that include welding flash burns, ultra-violet rays, and lasers, ionizing radiation that includes exposure to isotopes, x-rays, and radium. Other illnesses considered occupational include bloodborne pathogenic diseases that include HIV, hepatitis B/C, brucellosis, tumors that are malignant or non-malignant, histoplasmosis, and coccidioidomycosis. (NIOSH, 2012)

Work safety programs were developed by the BLS in accordance with statistical data compiled by NIOSH that relate to the industries reporting the most morbidity and mortality. These include agricultural safety, anthropometry, commercial aviation, commercial fishing, confined spaces, construction, electrical, highway work zones, logging, motor vehicle, and machine safety. There are several case study research programs directed by NIOSH to continue investigation for changes in environmental hazards that delineate where further investigation is needed for change in exposure to certain chemicals such as lead in companies that dispose of lead from car batteries and if

their employees are adequately prevented from exposure as well as other toxic chemicals used in processing plants. Yearly physical exams are provided to determine blood lead levels for these workers as well as pulmonary function tests to determine lung damage (NIOSH, 2012). This is not always the case in states with lower EPA standards (OSHA, 2012). In this research I analyzed the databases from the Bureau of Labor, as well as NIOSH, citing results for type of industry and hazardous exposures as well as the results from types of yearly tests on the workers to determine if upper limits of exposure may cause disease and help clarify what and why the statistical data can support the need to change safety regulations. For example, in 2009, the EPA reported excessive levels of lead exposure for the Exide Technologies Lead Smelters in Vernon California (EPA, 2009).

Workers' Compensation based on Type of Injury

Workers' compensation Insurance reporting is based on case characteristics that are delineated for determining work-related injury or illness that include the following: (a) nature of injury/illness determining principal physical characteristics of disability, and (b) part of body that has been affected that is directly linked to the nature of injury or illness that has been cited. These, for example, include sprains of back, finger cuts, or carpal tunnel syndrome associated with the wrist. Others include the source of the injury or illness such as object inflicting injury, substance, exposure or bodily motion that can be responsible for directly inducing or inflicted a disabling condition. This is further differentiated into bodily motion of an injured or ill worker such as pushing, pulling, lifting heavy objects, exposure to a toxic substance, and exposure to flame/fire.

Event or exposure includes the manner in which the injury or illness occurs, was produced, or inflicted by overexertion, falls, or lifting. Examples include median days away from work. Measures used for summary for length of absences from work as compared to days away from work of other cases to discern half cases that involved more or less days as reported. For example, musculoskeletal disorders that include injury related to soreness, pain, strain, sprain, tears, carpal tunnel syndrome, hernia, and when reported this event leads to injury by bodily reaction that with demands for bending, crawling, climbing, twisting, repetition, and over exertion will help to determine if the injury is significant requiring medical care or a needing first aid intervention. This also includes exposure to toxic substances that require medical care (NIOSH, 2012). The importance of this information help determine cost indexes for worker's compensation cases. By determining from the data the most type of injury and in what industry helps also to establish newer safety guidelines Leigh (2011) documented the economic burden of occupational injury and illness in the United States and published the findings in the *Milbank Quarterly*. Leigh stated that the costs of indirect and direct medical costs of occupational injuries and illnesses to be at least as much as the cost for cancer. The findings included the fact that workers' compensation covers less than 25% of costs, which illustrates that society shares the burden, and total costs are more than originally assumed.

The last reported number of injuries in 2007 was estimated to be more than 5,600 fatal and 8,559,000 nonfatal at a cost of $6 billion. Illnesses were estimated at more than 53,000 fatal ($67 billion) and nearly 427,000 nonfatal ($12 billion). The total estimated

costs were approximately $250 billion that have been adjusted for inflation. This information was compiled to show relative costs associated with occupational injuries and illnesses for the purpose of allocating funds for future preventative measures, including injuries and diseases (Leigh, 2011). The CDC (2010) reported that more than 4,500 United States workers have died from occupational injuries from 2007-2010 at the time this report was published, and although it is difficult to enumerate, about 49,000 deaths annually are attributed to workplace illnesses.

The Patient Safety and Quality Improvement Act of 2005 was established as a voluntary reporting system for improving and enhancing data to assess and resolve patient safety and health care issues, including analysis of medical errors. This is especially important for information collected and created during analysis and reporting of patient safety events. The act became effective in 2009 (HHS, 2005).

Theoretical Foundation for Cultural Context and Obesity

In 1988, the Institute of Medicine recognized that the social environments that people live in affect their lifestyles and behaviors that could influence the incidence of illnesses in the respective populations. Conversely, engaging actively in community health decision-making by self-intervention supported by the community would improve health promotion, protection, and possible disease prevention (CDC, 1998). Furthermore, the CDC reported that community norms may be held responsible for phenomena that molds behaviors through modeling that contribute to weight gain and may be due to differences in individual attitudes of acceptance for overweight and obesity and are included as culture norms based in ethnicity/race, (CDC, 2007-2010; Hang, 2009).

Interventions that encompass all populations have not proven successful in the past. In fact, the results suggest evidence of increasing obesity in the United States, with the Get America Fit Foundation reporting almost 60% of the adult population now in this category. The evidence has shown that no one strategy will reduce obesity (CDC INFO, 2012). Therefore, when selecting a theoretical model, consideration should include not only cultural context, includes socioecological model that considers the demographics, politics, and subcultures in a selected community (Center for Excellence, 2007).

The causative inequities in healthcare, intervention, education, and promotion are associated with variables that cannot be modified or changed, such as age or gender, race/ethnicity, as well as geographic location (Center for Excellence, 2007). What might be altered is socioeconomic status, level of education, and decreased risk factors by change in lifestyle, including health education and promotion.

Factors that contribute to success of programs advocating behavioral change include the following:

1. Environmental: collaboration of groups that include favorable a political and social climate, groups, and agencies seen as leaders.
2. Membership: cross-section of members that have mutual respect, understanding, trust, and ability to compromise.
3. Process/structure: ownership for sharing process and outcome, collaboration of decision-making groups, clarity of roles, guidelines, and ability to sustain change.

4. Communication: frequent, open dialogue, with sharing of information through informal or formal interaction
5. Purpose: clear goals are realistic to all partners with a shared vision.
6. Sustainable resources; in kind contributions, proficiency in grant writing, mentoring capabilities. (Bartholomew, Parcel, Kok, & Gottlieb, 2006; CDC, 1998)

In an attempt to better understand where obesity and workplace injuries have a relationship this study will include reference to two theoretical models chosen for representation and discussion. They are the social cognitive theory and diffusion of innovation and will be discussed separately to review how they may be utilized for developing safety for workers through education as well for prevention of obesity. The reason for these choices is based on objective descriptions of the health-related problems caused by obesity especially related to Hispanic/Latino populations with noted high incidence of overweight and obesity that work in hazardous occupations and that workplace injuries may be exacerbated because of increased BMI. The social cognitive theory of Bandura (1962) is based on the premise that three factors interact and constantly influence each other: people, environment, and behavior (Miller & Dollard, 1941). Miller and Dollard (1941) suggested that modeling, developing self-control, and self-efficacy through observation, self-monitoring, reinforcements, and possible rewards for positive results could result in behavioral change. Learning emotional coping responses through training in problem solving and stress management and reciprocal

determinism, a person could change through multiple choices influenced by environment and behavioral changes (University of Twente, 2002).

Since most human behaviors are learned through observation or vicariously, Kline and Huff (2007) suggested four constituents that govern this modeling: (a) attention and perception, (b) retention, representation, and remembering, (c) using appropriate actions production, and (d) motivation. Keeping in mind that ecology differs according to cultural context is most likely the strongest influence of certain behavioral life-styles that be counterproductive to health. That race/ethnicity, age, gender, socioeconomic level, and level of education the community may not recognize the resulting consequences of long term participation in unhealthy behaviors. Additionally it may be noted that the Hispanic/Latino populations may have higher prevalence of occupational injuries due to the fact that they work in more hazardous occupations coupled with the increased incidence of overweight and obesity. Increasing modeling of beneficial behaviors may help establish a new paradigm thereby decreasing workplace injuries. By influence through verbal persuasion as utilized in the diffusion of innovation theory an intervention by role modeling supported by leaders of a community that have social impact and may help in mastering experiences that enhance positive behaviors while eliminating negative ones which then allows for the development of higher self-esteem and self-efficacy leading to the goal of achievement--in this case decrease of BMI (Kline & Huff, 2007). Behaviors that are socially determined are complex and include health issues through social support, participation and organized communication looking for impact, risk, and compatibility to lifestyle. The major ecology is determining if these methods are

applicable in change and may alter behavioral change that may be sustained and help prevent future injury in the workplace. The textbook by Kline and Huff (2007), *Health Promotion in Multicultural Populations: a Handbook for Practitioners and Students,* was designed to help practitioners working outside their own culture/ethnicity/race address issues related to health problems and workplace-related injuries when their patient's BMI greater than 30 was supporting greater chance for injury in their designated workplace. This may suggest a newer paradigm for evaluation significance for performance in a designated hazardous workplace environment. Through the application of social cognitive theory and behavioral modification that is culturally sensitive, although beyond the scope of this study, may increase awareness of health providers of how cultural context explains how, where and when obesity is acceptable to certain populations without regard to consequences. This information may eliminate potential harm by denial of employment in hazardous occupations to those physically unfit for overweight and obese applicants.

The Diffusion of Innovation Theory (Rogers, 1995) may support change over a period of time through certain channels in a social system. The rate of acceptance and adoption of the intervention program methods are determined through characteristics such as (a) relative advantage for change, (b) compatibility with cultural context, (c) complexity of innovations for behavioral change, (d) trial ability for ease of change, and (e) observation of the social system. If indeed certain populations that work in hazardous occupations are less concerned about the impact of overweight and obesity and how it may add to increased chance of injury it has a major impact that has not been addressed.

These concepts can be supported by further diffusion through modeling, conversations, social media and community support throughout the target community with active communication. The acceptance or rejection for the changing attitudes related to healthy lifestyle and in this case decreasing obesity are not evaluated in an empirical manner, but are subjective and determined by the fact that they have been accepted by closely related peers, family, or community leaders. The rate of adoption for a new idea and acceptance for these newer concepts is the key factor for gaining the knowledge base for innovative changes. The innovator that has accepted these newer concepts and recognized by the given community then becomes the leader for influencing the rest of the community acting as a role model (Bartholomew et al., 2006; Rogers, 2003). The portents of theories in this study that include the social cognitive theory (Bandura, 1962) and the diffusion of innovation theory (Rogers, 1995) when applied to the increasing healthcare problems associated with obesity have been found to have neither positive or negative results and still are questioned for success or failure as noted in these examples. It is noteworthy to address the need for future studies that incorporate cultural context to interpretation of obesity and how it may increase probability for workplace injury in hazardous occupations.

Social Cognitive Theory Relating to Obesity

Although this secondary study will explore the relationship between obesity and workplace injury it is important to keep in mind how certain behavioral theories may apply although not fully appreciated. Therefore I have included social cognitive theory for possible future study for this variable and if in sub-context does indeed contribute to

the overall statistics. This study is related to adults but it is in childhood exposure to what the environment one is raised there is a mindset developed for what is considered the acceptable norm such as lifestyle and how it is interpreted. The major concepts of the social cognitive theory include these perceptions that the environment also containing outside physical influences, cultural, and economic factors may also have influence by providing opportunities for social support through which self-efficacy, coping, self-control and expectations to name a few can be possibly achieved through psychosocial and behavioral change (Glantz, Rimer, & Lewis, 2002). The impact of developing a cultural recognition of differences in the Hispanic/Latino population and their interpretation of healthy weight and who work more than most other populations in hazardous occupations has reason for further consideration. Additionally the value of family for social support to form good eating habits and encouraging behaviors that include exercise regularly as discussed by Gruber and Haideman (2009) supports the influence family has on development of weight control and physical activities promoting weight loss through the reciprocal nature of the adult-child relationship in influencing healthy behaviors. Conversely not all families hold high standards for healthy eating. It should be noted that at present there is no theory for involving family behavior. Gruber and Haideman stressed that the parents play a significant role in behavioral change, and as adults are considered in this study, indeed the direction that adults may not understand is how families influence has been directed. The barriers that exist for change through family health changes may be influenced by conflict with cultural context to dietary changes. Programs that are community or school based that have a coordinated approach

to child health may be directed to the future workers that may have no choice but to work in hazardous occupations. It is important to recognize that the major gap that is formulated by loss of advantage for higher education and to compete for better occupations have found more success when parents or other authority figures in the family were involved. The major challenge is in influencing adoption of healthy behaviors that include diet change and increased physical activity although not well defined by the beliefs of all families who have a different perception of health based in cultural context. The significance for this ultimately may be in actuality becoming precursors for future choices for workplaces and may be accounted for how obesity could actually becomes a variable that increases the chances for future health problems or workplace injuries. If not addressed at the primary level of family and community interpretation of obesity and its consequences indeed this has socioeconomic consequences on healthcare. In analyzing databases on workplace injury and possible relationship to obesity should include knowledge of background cultural context of the Hispanic/Latino population analyzed for this study.

Marghani Reever (2008) suggested that a significant barrier to weight loss and weight maintenance is the social environment especially in families. This includes what value the particular society places on food and how easy access to food can sabotage a weight reduction/control program. In addition, food may also be used to fulfill emotional needs. Influence of the social environment, coupled with a lack of physical activity, has been shown to be a significant barrier to behavioral change. Cognitive behavioral treatment components integrated within a behavior change intervention should be

considered for the definition of success in attaining these goals. The treatment strategies Reever outlined in the cognitive-behavioral interventions for obesity included (a) motivational interviews, (b) self-monitoring, (c) stress management, (d) hypnosis, (e) cognitive restructuring, and (f) social support. To help prevent relapse, the plan included multiple acting-out situations that may sabotage the goals by implementing the newer plan. The controversy of to what degree of cognition and behaviors contribute as compared to genetics or metabolic factors is still up for debate (Reever,2009).

Annesi (2012) suggested that a change in exercise behaviors, psychosocial factors, and behaviors of eating can be influenced by defining how these variables are compared During a 26-week study with either a standard nutrition education paradigm (n = 183) that included a cognitive-behavioral method emphasizing self-regulation and calorie tracking and cognitive restructuring with eating cue awareness (n = 24). The results showed that both methods of treatment included (a) self-efficacy, (b) self-regulation, (c) mood, (d) self-regulation in eating, (e) increased consumption of fruits and vegetables, (f) exercise, and (g) weight. Waist circumference was significantly greater in the cognitive-behavioral nutrition state statistically and showing that changes in exercise, eating related self-efficacy (R^2 = 0.40, 0.17) respectively along with self-regulation changed with exercise and mood change showed results as (R^2 = 0.43, and 0.20) respectively. The final analysis showed that self-efficacy for behavioral change and exercise were found to be associated with an improvement in BMI (β = 0.53 and 0.68 respectively). Annesi proposed development of longitudinal testing of different and newer approaches for behavioral treatments and to observe participants after the study for

significance in developing a healthier lifestyle through diet and exercise. Few studies include minority populations sometimes due to lack of statistical data which supports the need for a paradigm shift. Populations that are more vulnerable to obesity based on race/ethnicity as well as socioeconomics that do not have the tools for needed changes is the reason this study includes this variable.

Diffusion of Innovation Theory Relating to Obesity for Cultural Context

The behavioral theories are not integrated in most databases but if recognized may indeed be an integral premise that contributes to how obesity is viewed by the populations most likely to be injured in hazardous occupations and help determine how most vulnerable populations are indeed in danger. The premise for Everett Rogers theory of *diffusion of innovation* (1995) can be related to social change through changing behaviors not only for individuals but also for communities. When introducing newer concepts related to the complex issue of obesity it should be noted that consideration be made for the inclusion of cultural context. Demographics can be a strong determining factor of how food is valued. Geographic location may determine the availability for accessing healthier dietary choices. Dissemination of information of healthier lifestyles may need to be framed for the target population. By understanding how information is disseminated in the community based on age, gender, race/ethnicity, and cultural values could be the key actor for successful intervention programs.

The use of mobile e-health interventions for obesity supported by Tulfano and Karras (2005) supported using the Internet and cellular phones for dissemination of messages for modifying behavior. Conventional methods of information dissemination by

health providers was questioned when it was recognized that 57.2% of American clinicians were not conveying the information (Tulfano & Karras, 2005). The prospectus used in social ecological models whose efforts are to change health behavior are more likely to be successful when they work within the sphere of community, family, schools, workplaces, and religious organizations, especially in low income groups where there is a need for increasing knowledge, skills, and self-efficacy by diffusing innovations from the top down. Using accepted community leaders that present information that is spread by word of mouth or social media has the potential for promoting behavioral changes and decreasing the morbidity and mortality associated with obesity (Washington State Department of Health, n.d.).

Dearing (2009) showed that dissemination for science needed to be designed on evidence-based practices as a priority not only for internal validity but to increase external validity for diffusion of innovation theory. Dearing also noted that it was important to communicate why innovation works. Taking the basic concepts of the theory of diffusion through innovation and by adapting those aspects to the environment for use most likely the cultural context will shape the infrastructure since in essence the theory is really a natural phenomenon that involves new ideas and concepts as well as patterns of behavior in community settings.

Association of Injuries and Obesity

In Healthy People (2010), the CDC acknowledged the impact of obesity on morbidity and mortality for Americans and noted that obesity ultimately increases the cost of healthcare because of chronic diseases associated with the condition. However,

the CDC did not discuss whether obesity resulted in an increase for injury (CDC, 2010). In a cross-sectional analysis Finkelstein, Chen, Prabhu, Trogdon, and Corso (2007) quantified a relationship between BMI and rates of injuries needing medical treatment caused by falls, motor vehicles, sports, and injuries that included strains/sprains, lower extremity fractures, and dislocations with associated treatment costs. Combined datasets from 1999-2000, 2000-2002, and 2001-2002 from the Medical Expenditure Panel Survey resulted in a final analysis of 42,304 adults in the sample (Finkelstein et al., 2007). Measures included injury rates by mechanism, nature of injury, and related treatment costs. Estimating the odds of sustaining any of the injury types by mechanism or nature for obesity or non-obesity with populations compared three different groups of obese adults and a normal weight control group. The second set tested for a specific injury that obese individuals sustained and incurred greater injury treatment costs showed that slightly more than one in five adults did have an injury each year requiring medical treatment with odds of injury: 15% (over weight) to 48% (Class 3 obesity). Without significant explanation of how the authors summarized their results medical as well as NIOSH cannot verify correlation between obesity and workplace injury from this study; however, the authors of this study concluded that there was a clear association between BMI and the probability of sustaining an injury that increased as obesity increased (Finkelstein, Chen, Prabhu, Trogdon, & Corso, 2007). This information if indeed significant may help to determine possible injury related to obesity as compared to other variables such as lack of safety information or proper training in the workplace becomes significant. More studies are needed to confirm these results. Without the variable of

cultural context related to race/ethnicity as to which populations are more vulnerable is the reason for including this concept in this study (IOM, 2009).

Matter, Sinclair, Hostetler, and Xiang, (2007), compared characteristics of injuries of obese and non-obese inpatients. Using discharge records from the 2002 Nationwide Inpatient Sample of the Healthcare Cost and Use Project, Matter et al. analyzed records compared with an International Classification of Diseases, Ninth Revision, Clinical Modification injury diagnosis code (ICD-9-CM). Using records exclusively considering obesity as a co-morbidity, proportionate injury ratios with 95% confidence intervals were compared to characteristics of obese to non-obese persons hospitalized for injury. They analyzed 160,707 discharge records for type and cause of injury requiring hospitalization and found obesity status was significant, with $p < 0.001$ and more frequently caused by falls, overexertion, and poisoning compared to non-obese persons (Matter et al., 2007).

Bouchard, Pickett, and Janssen (2010) considered older age as another moderating variable besides obesity. The sample included 52,857 men and women 65 years or older, from the Canadian Health Survey and was focused on weight, height, and type of injury incurred. Although the participant studied were no longer actively employed, this study provided a comparison of anatomical sites most likely involved in injuries in obese individuals such as lower limbs. Bouchard et al. found that obese individuals had a higher risk for sprains/strains at any anatomical site (odds ratio, 95% confidence interval: (men 1.48, 1.48-1.62. and women 1.14, 1.10-1.27) due to increasing age. An interesting observation from this study was that obese individuals were less likely to sustain a fracture for any anatomical location (men 0.56, 0.50—0.63), (women 0.66, 0.51—0.92).

The study concluded that obesity may provide some protection against fractures, but higher odds for sprains and strains (Bouchard, Pickett, & Janssen, 2010).

Examining the effect of obesity on falls, injury and disability, Himes & Reynolds (2012) developed a longitudinal population-based survey for the Five Waves of the Health and Retirement Study (HRS), 1998 through 2006. ten thousand five hundred fifty five respondents aged 65 and older were used in thirty one six hundred two time frames recorded. In any two-year interval there were nine thousand six hundred twenty one recorded falls. Of those, three thousand one hundred thirty one required medical attention. Assistance in daily living (ADL) due to falls was two thousand one hundred sixty two events for the 2-yeartime span studied.. Obesity was divided into three classes based on BMI: class 1 (35.0-39.9 kg/m^2), class 2 (greater or equal 40.0 kg/m^2) and class 3, which were calculated from self-reports for weight and height along with doctor's diagnosis of diabetes mellitus, stroke, or arthritis. The greater risk of obesity appeared to be associated with falling in older adults as well as the need for assistance in daily living. Being underweight was not related to risk of falling. The odds ratios (OR) for falling risk were 1.12 (95%) confidence interval (CI) = 1.01-1.24) for obesity Class 1, 1.26 (95% CI = 1.05-1.51) for obesity Class 2, and 1.50 (95% CI = 1.21-1.86 for obesity Class 3). There was a suggestion that Class 3 obesity may prevent fracture injuries. Himes and Reynolds (2012) related that further investigations were needed to learn how obesity and falls were correlated.

Obesity is a complex medical problem related to genetic precursors. Additionally it is now recognized also a behavioral problem with the need for use of social cognitive

theory and diffusion of innovation by learning behavioral lifestyle changes that affect healthy lifestyles. Although not until recently has these theories become prevalent due to the recognition that cultural context affects of how lifestyle is a determining factor for interpretation of or acceptance for obesity as the norm. Populations that participate in hazardous workplaces need to be able to accomplish this goal through health maintenance recognized through community based programs sensitive to their needs and presented by a trusted gate keeper. Recognizing that both the social cognitive theory and the diffusion of innovation theory include methods of behavioral change either through self-evolving or by modeling the innovator/motivator by coupling these theories may be incorporated as the framework for lifestyle changes that decrease the potential for workplace injury due to increased BMI. Changes may be achieved through planning health promotion programs by industry to develop environmental conditions affecting both the at-risk population as well as the agents that control the workplace. Incorporating community stakeholders as well as upper and middle management along with reinforcement for positive behavioral changes can help determine attitude and outcome expectations again repeated for clarity of need (Bartholomew, Parcel, Kok, & Gottlieb, 2006). An in-depth discussion of the social, psychological, genetic, and cultural aspect of the complex nature of obesity is beyond the scope of this study but to the changing demographics of the United States work force in hazardous occupations, mainly Hispanic/Latinos and recognizing that lack of access, availability, and health education for not only the populations discussed, but also for the management level there will be no change in interpretation of what safety requires and decrease in injuries.

Obesity and Workplace Injuries in Hazardous Occupations

Recognizing differences in cultural context, biological, and behavioral aspects as precursors for obesity, a researcher would involve the community studied as well as individual responses (Baranowski et al., 2009). Pollack and Cheskin (2007) used peer reviewed literature for meta-analysis beginning January 1980 through 2005 from which 12 studies for risk of injury of obese vs. non-obese employees were examined after the authors followed up with their own cohort study that included eight industrial plants located in the East, Midwest and South. Pollack and Cheskin's results showed a slight increase in risk of injury for obese workers compared to non-obese workers, but results were not statistically significant. The results from this study had limited exploration of mechanisms of injury such as lifting heavy equipment, pushing or pulling heavy equipment, and falls for obesity-related injuries as related to non-obese injuries which then suggested that further exploration was needed relationship of increased injuries due to obesity. Increased fatigue or sleepiness, ergonomics, chronic diseases, and physical limitations were the most hypothesized for increased workplace injuries. The conclusion was that further studies were needed for evaluating how obesity influences workplace injury. Included were the needed to explore environmental as well as socio-cultural risk factors about weight.

According to Schulte, Wagner, Downes, and Miller (2008), suggest the framework for determination of obesity and workplace hazards be developed by including several concepts, while seemingly independent, may together be related to injuries. These include:

- Relationship between occupational hazards and obesity
- The impact of occupational morbidity, mortality, and obesity on workplace absence, which incurs decreased productivity, disability and increases healthcare costs
- Workplace preventative programs
- Comprehensive healthcare promotion for workers
- Recognizing and instituting ethical, legal and social issues associated with the framework (Schulte, et al., 2008).

Huang, Drewnowski, Kumanyika, and Glass (2009) used a systems-oriented approach to learn the multiple factors and levels associated with the affects of obesity. Included were "the biological mechanisms of differing metabolisms, cultural context of interpretation of obesity, economics as it functioned in socio-environmental groups, and behavioral aspects as variables for interpreting the concept of obesity and how it interacts with lifestyle" (Huang, et al., 2009, p.1). There are significant gaps in the training of medical providers as well as management of workplaces that take into consideration the cultural context of how obesity and injury are related.

Literature Review Related to Key Variables, Relationships, and Contrasts

A study conducted at the Johns Hopkins School of Public Health Center for Injury Research and Policy was published in the *American Journal of Epidemiology.* It included statistics for 7,690 workers at eight manufacturing companies using a cohort study to examine the distribution of odds of occupational injury between January 1, 2002, and December 31, 2004. The results showed that more than 28% of injuries occurred among

employees classified as overweight, with 30% in the obese categories I and II (BMI 30 - 34.9 Class I; BMI 35-39.9 Class II) and 34% in category III (BMI > / = 40)as defined by NIH (NIH, 2012). The severely obese had BMIs greater than 40 that accounted for the most hand and wrist injuries, 22%, compared to other injuries in other weight categories. Leg and knee injuries accounted for 10% in the obese category III as compared to 7% of other workers classified as overweight (Pollack et al., 2007). This information was extracted from annual physical medical examinations where the BMI was categorized for 29% of employees (*n* = 2,221). The odds ratio of injury relating to obesity continues to be debated.

Schulte et al. (2007) used a retrospective, cohort study that obesity may be a co-risk factor for occupational asthma and cardiovascular diseases, and modified response to stress and immune response to chemical exposures and disease from occupational neurotoxins. Schulte et al., developed five conceptual models of interrelationships of work and obesity that highlighted the ethical, legal, and social issues related to the role of obesity and occupational health and safety. Schulte et al., recommended (a) an investigation into the relationship between occupational hazards and obesity; (b) an exploration of the impact of occupational morbidity and mortality in workplace absence due to obesity; (c) an assessment of the workplace for preventative programs; (d) promotion of a comprehensive approach to workers health; and (e) studying legal, ethical and social issues associated within the framework. They concluded there was growing evidence of a relationship of obesity to workplace injury and reiterated the need for further study of associated ethical and social problems.

In another study, Ostbye, Dement, and Krause (2007) attempted to correlate BMI to numbers and types of workers' compensation claims associated with costs and workdays lost using a retrospective cohort study. Participants were 11,728 health care and university employees (34,858 full-time equivalents with at least one health risk appraisal between January 1, 1997, and December 31, 2004). Stratified main measures were based on workers' compensation claims, associated costs, employment duration, lost workdays calculated by BMI, sex, age, race/ethnicity, and smoking status. Body parts affected, as well as the nature of injury, and cause of illness or injury were also investigated. Using a Poisson multivariate regression model, Ostbye et al. examined BMI effects, controlling for demographics and work-related variables and found a clear linear relationship between BMI and rate of claims compared to appropriate weight employees and the effect on lost workdays. Employees in obesity class III (BMI greater than40) had 11.65 claims per 100 full time employees (FTE). Recommended-weight employees had 5.80. The effects of lost workdays were 183.63 versus 14.19 workdays per 100 FTE. Medical claims costs were $51,0191 vs. $7,503 per 100 FTE, while indemnity claims costs of 59%, 196 versus %5396 per 100 FTE. The claims most strongly related to BMI were lower extremity, wrist or hand, and back with the nature of illness related to inflammation, sprain/strain, contusion or bruise, falls, slips, lifting or exertion. They also noted types of injuries and injured body parts and conclude that the combination of obesity and high-risk occupations was particularly detrimental.

A marginally significant association between extreme obesity and elevated risk for injuries was observed by Xiang, Smith, Wilkins, Chen, Hostetier, and Stallones

(2005) comparing obese to non-obese workers through the Center for Injury Research and Policy at Columbus Children's Institute and Children's Hospital at Ohio State University. The study of adults 18 years or older took place from January 1999 to October 2000 and was based on BMI and injuries incurred compared to obese and non-obese respondents. Xiang et al. (2005) used a multivariate logistic regression study that controlled for confounding demographics. An estimated 7% of underweight individuals reported injuries (BMI < 18.5). Injuries by gender was reported as 26% of men and 21.7% of women with BMI > or = 35.0 reported injuries. The odds ratio of individuals with a BMI > or + 35.0 was 2.00 (95% confidence interval = 1.07-3.74, $p < 0.05$) controlling for gender, age, education, marital status, family income status, and residence area.

Ford, Hegmann, White, and Holmes (2005) reported the tendency towards meniscal tears and obesity. Using surgical case data from 1996-2000 from electronic databases of two large Utah hospitals, they found significant associations between BMI and meniscal surgeries in both genders of obese and overweight adults.

An article in *Insurance Networking News* reported tracking trends over a 10-year period from 1999-2009 by analyzing the differences between obesity and nonobese claims for workplace injuries, types of injuries, and treatment patterns for more than 7,000 claimants with obesity as a secondary diagnosis compared to 20,000 claims of identical characteristics that included gender, industry identity, state, age and no obesity. Dramatically higher medical costs associated with these claims to be types and nature of

injuries sustained by obese or morbidly obese U.S. workers that resulted in permanent disabilities.

Caban, Lee, Fleming, Gormez-Martin, Le Blanc, and Pitman (2002) analyzed the relationship of obesity and occupation using the National Health Survey through self-reported weight and height reported annually for U.S. workers 18 years or older from 1986-1995 and 1997-2002 (Caban et al., 2002). Occupation, race, and gender-specific rates of obesity based on BMI of > 30.0 kg/m2 were calculated by pooling the data from both surveys (n > 600,000), along with annual occupation-specific prevalence rates and their time trends. The results showed obesity increased over time regardless of race or gender, with a yearly increase of 0.61% (+ /- 0.4) during 1998-1995 to 0.95% (+ /-11) during 1997-2002 with pooled obesity prevalence rates highest in motor vehicle operators (31.7%) in men and (31.0%) in women. The conclusion was there was a need for weight loss prevention programs.

Gates, Succop, Brehm, Gillespie, and Sommers (2008) published a detailed procedure in which they correlated obesity and lost work days as well as how BMI affected workplace productivity using randomly selected manufacturing employees (n = 341) that were assed through height/weight measurements, demographic surveys, wage data, and the Work Limitations Questionnaire based on four dimensions of productivity. Using ANOVA and ANCOVA, they computed identity of productivity based on BMI. Gates et al. (2008) showed moderately or extremely obese workers with BMI > or = 35 experienced the greatest health-related work limitations, especially those associated with physical demands. The results showed workers with these limitations experienced a 4.2%

health-related loss in productivity, greater than 1.18% than other employees which equated to an additional $506 annual productivity loss per worker. Gates et al. concluded there was a relationship between BMI and absenteeism as a threshold effect that showed extremely or moderately obese workers were significantly less productive than those who were mildly obese.

To date, studies are still limited, but the increasing rate of obesity in the United States indicates the problem exists. According to the CDC, WHO and Healthy People 2010, the average work days lost to injuries can be at least 6 weeks to a year and may even end the ability to work (CDC, Healthy People 2010). When multiplied by the cost to replace an injured worker, which slows down production through the training of a new employee, and the medical expense incurred for treatments of the injured worker, this is a significant issue for a company (NIH, 2007; CDC, Healthy People 2010).

Most high risk occupations, as defined by the Labor Commissioner of Occupations, are those that present a clear and significant life-threatening danger, require exercise of discriminating judgment or care (Department of Labor, Labor Commissioner of Occupations, n.d.). These occupations are usually staffed by younger workers, as reported by the OSHA Environmental and Safety News (2010), which also stated that the fatality rate for younger Hispanic workers is significantly higher at 5.6 times more than non-Hispanic, European American, or African American workers. If this population is overweight or obese, that fact may contribute to workplace injury or mortality (CDC, Healthy People, 2010; OSHA: EHS Today, 2010). According to the CDC, three reasons may for these phenomena may be differences in behavior that contribute to weight gain,

differences in individual attitudes towards overweight or obesity, and cultural norms (CDC, 2010; Huang, 2009; NIH 2007). Studies of obesity and workplace injuries have been limited because it may have larger implications for discrimination (Ostbye et al., 2007; Pollack et al., 2007).

The American epidemiological approach to work place injury control was begun by William Haddon Jr. MD, MPH, then president of the Insurance Institute for Highway Safety (Haddon, 1990). Newer studies are postulating increased disability, morbidity, and mortality related to injuries incurred by obese workers (Caban et al., 2005; Ostbye et al., 2009; Pollack et al., 2007; Schulte et al., 2007, 2008).What has been recognized is improper ergonomic job design, a factor that accounted for about one third of costs for compensation of state workers according to OSHA (policy almanac.org, 2002). Additionally, underreporting is significant not only for treatment and rehabilitations of workers, but also for accurate gathering of epidemiological data and planning interventions (U.S. House of Representatives, 2008).

Sorteriades, Hauser, Kawachi, Critintiani, and Kales (2008) examined the association of obesity and risk of 358 firefighters in Massachusetts for a statewide medical surveillance program in a prospective cohort study to determine utilizing a multivariable-adjusted Cox proportional hazard model for associated BMI with disability. The results showed that those with BMIs < 27.2 had a 5% less events of injury than those with BMIs equal or greater than 30.2. There was a significant dose-response relationship of risk within the highest categories of BMI of 60%-90% risk of job disability compared to the lowest or normal weight categories (Soteriades et al., 2008).

Janssen, Bacon, and Pickett (2011), a Canadian research team developed a premise about the relationship of obesity and occupational injury for the Canadian workforce that incorporated a biophysical framework for addressing this hypothesis. Janssen et al. determined that there had been a shortcoming in theory development in previous studies that linked obesity to workplace injury due to "limitation of cross-sectional studies, small sample sizes, a narrow breadth of the workplaces studied, and poor recognition of different injury types and locations" (Janssen, et al., 2011, p.1). Theories about the relationship of obesity and increased risk for occupational injuries is based on existing evidence and risk factors for unintentional injuries and related to physical attributes that could contribute to the development of a biophysical framework. The study population reported through the National Population Health Survey from the 1998-2000 cycles consisted of a longitudinal analysis examining how BMI status in 1998 predicted reports of occupational injury in the 2000 work population.

In addition, Janssen et al. (2011) used the number of risk factors for injuries, increased use of psychotropic medications, and altered gait and balance which could contribute to falls, sleep apnea, increased extremity friction, and fatigue. What they noted also was that increased BMI may prevent bone fractures because excess fat may cushion falls. However, risk factors outweigh the benefits of increased BMI. The confounding variables included in the analysis were gender, age, occupation category, race/ethnicity, smoker or not, alcohol use, income, education, and pre-existing medical conditions. Occupations were stratified as sedentary or moderately active based on a generalized list of 25 groups described by the 1991 Standard Occupational Classification. Race/ethnicity

was divided into *white* and *other*; alcohol intake was calculated from the number of drinks for the week prior to the interview. Nondrinkers had zero consumption, moderate drinkers had one to seven drinks per week, and heavy drinkers had eight or more drinks per week. Participants were either current smokers at the time of the survey or former smokers if they smoked more than 100 cigarettes in their lives. Co-morbidities of pre-existing medical conditions were found to be too low for consideration of modeling process. Association between BMI and occupational injuries were categorized as minor, moderate or serious, and location, using analysis adjusted for age, sex, smoking, alcohol, race/ethnicity, income, education, and type of occupation. Analyses were included according to gender and age groups (< 40 versus > / = 40).

The population attributable risk factor (PAR) was to detect effect size (OR) of 1.5 or greater for obese or normal weight statistics that were estimated for obesity prevalence of the Canadian workforce and risk of occupation (Janssen et al., 2011). More than half of the participants were male, less than 40 years of age, employed in sedentary occupations, and overweight or obese. Strains/sprains were the most common injury reported, usually of the lower limb related to obesity (1.5 fold increase in adjusted relative odds of serious occupational injury) due to some accidental incident reported within the first 12 months of completion of the survey.

The PAR estimates in the Janssen et al. (2011) study, calculated based on adjusted risk estimates and observed prevalence of obesity, showed 8% for any occupational injury and 10% for serious injury that included the entire cohort. Further evaluation for PAR estimates were female worker for each type of injury listed = 16%, and when

compared to sedentary workers equal to or greater than 40 years of age = 19% and 15% respectively. What Janssen et al. reported as primary findings from this national Canadian study was that obese workers experienced risks for injury that were approximately 40-49% higher than cohorts of normal weight. This was more evident in women more than 40 years of age as well as sedentary workers.

Summary of Most Recent Data of Obesity's Relationship to Workplace Injuries

The Janssen et al. (2011) findings are the most recent and significant to date. Most high-risk occupations in the United States are performed by younger workers as reported by the OSHA Environmental Health and Safety News (2010), which also stated that the fatality rate for younger Hispanic male workers was significantly higher at 5.6 times than that of non-Hispanic, white, or African American workers. It has also been documented by CDC Healthy People 2010 that Hispanic/Latino populations suffer from a greater proportion of overweight and obesity, which could be a contributing variable for my proposed study. obesity in the United States and the possible increased injuries in high risk occupations.

Other factors may contribute to lack of sufficient data, including the possibility of under-reporting of workplace injuries by undocumented workers for risk of losing their jobs or deportation (Occupational Health and Safety Administration, 2012). Another factor announced by the CDC is a newer method for measuring overweight and obesity instead of the BMI. This newer ratio is a waist to height ratio since the waist circumference is more accurate for determining overweight/obesity if the ratio is greater than one half the height (CDC, 2012).

The question to ask is whether reports of workplace injuries are reliable and whether there has been sufficient screening based on physical ability required for the occupation. The major impedance appears to be influenced more by economics than public health regarding whether research will be done. In addition, thorough research will reveal other factors, which will opens new avenues for multiple studies, not only for quantitative values, but also for qualitative aspects such as how different cultures perceive what obesity is. In Chapter 3 I will describe the methodology I used to conduct this study.

Chapter 3: Research Method

Introduction

Although the CDC Healthy People (2010) declared obesity at epidemic proportions in the United States for over 33.9% of the adult population, there have been few peer-reviewed studies linking this factor to increased workplace injuries in hazardous occupations, particularly for ethnic minority populations (Huang, Drewnowski, Kumanyika, & Glass, 2009; Ostbye, Derment, & Krause, 2007; Schulte, Wagner, Downees, & Miller, 2008; Schulte, Wagner, Ostry, Blanciforti, et al., 2007; Soteriades. Hauser, Kawqchi, Christiani, & Klaes, 2008). In my research I assessed whether obesity increases workplace injury in hazardous occupations. I also explored whether obesity in lower socioeconomic levels, lower levels of education including the Hispanic/Latino population that tend to work in hazardous occupations are more prone to these events.

Databases Explored

Federal and state databases that I used included CDC INFO, which included the database links for NHANES and BRFSS to clarify obesity status and including NIOSH for determination of injury. The Bureau of Labor Statistics was also analyzed for the most recent data available for workplace injuries as well. These resources were used to help determine if there is a correlation between obesity and workplace injuries and included obesity as the independent variable, and the dependent/moderating variable for injury in hazardous workplaces such as manufacturing, fishing, transportation as a few examples using inclusive records of injury based on obesity only eliminating mediating variables such as obesity with pre-existing medical problems that may be confounders.

Proposed Methodology

This was a secondary analysis of existing databases to determine if there is a relationship between obesity and increased injury in high risk occupations. In this way, direct measurement of BMI as well as waist ratio to height, number and types of injuries was used to determine if indeed they correlated to increased overweight and obesity and injury. Overweight/obesity was the independent variable, and workplace injury was the dependent variable. Moderating variables such as gender, age, occupation, education, economic status, and race/ethnicity, culture may influence injury instead of obesity. The moderating variables were considered in the cultural context of the participants the least explored venue regarding what is considered to be obesity. The importance of including cultural context is based in social justice. That is to say that most hazardous workplace occupations employ persons that have lower levels of education and are from socioeconomically deprived communities willing to chance injury for the better pay afforded to them with accepting the risk If injured, they receive minimal care or dismissed from their work. The Hispanic/Latino population may also come from neighborhoods that lack access to nutritious foods at reasonable prices or not at all. The target population was participants 18 to 65 years of age with BMI 30 or greater (defined as overweight or obese).

The sample size was based on recent available data for each of the variables listed above for participants employed that have BMI 30 or greater and considered obese, working in high risk occupations. The BRFSS database and the NHANES database was

used to compared overweight and obese participants with normal weight participants and type of injury incurred during the same time based on available data from the aforementioned databases. Frequency of relationship between obesity and workplace injury could only be defined by descriptive statistical methods for determining percentages of incurred injury. There are no other statistical methods utilized in this study since there were no available databases for level of education, or cultural-context related to either the independent or dependent variables from the Bureau of Labor Statistics or other databases -available from the CDC for the possible relationship of obesity to injury (BRFSS, 2012; BLS, 2013, CDC, 2012).

Research Questions and Hypotheses

Research Question 1: Does obesity have a direct influence on injury?

H_{1o}: Obesity has no direct influence on injuries in a hazardous workplace.

H_{1a}: Obesity does have a direct influence on injuries in a hazardous workplace

Research Question 2: Is culture as related to race/ethnicity interpretation of obesity contribute to workplace injury?

H_{20} Cultural interpretation related to race/ethnicity has no effect on workplace injury

H_{2a} Cultural interpretation related to race/ethnicity has an effect on workplace injury

Research Design

This study I designed and based as a secondary quantitative analysis of databases government and private database sources for relationship of obesity to workplace injury.

Databases were further analyzed for variables, reliability, and external and internal validity based on proposed hypotheses and applying the statistical methods mentioned above.

Obesity Databases

The National Health and Nutrition Examination Survey (NHANES) is a survey that combines both a physical medical examination and an intensive interview covering a variety of health issues and nutrition, and risk factors for developing certain diseases or conditions. Lifestyle aspects included smoking, alcohol consumption, drug use, physical fitness and activity, weight, and dietary intake. Other aspects were heredity and environment that may affect health.

The NHANES began in the late 1960s and is now a continuous series of surveys for different populations and different health topics. It is the major program for the National Center for Health Statistics (NCHS). The NHANES III study for obesity were used in this research using databases from surveys from 2010-2012. To assure validity, the NHANES survey oversamples persons 60 years and older as well as African Americans and Hispanics. The physical examination consists of medical, dental, and physiological measurements, as well as laboratory tests conducted by trained medical personnel. The database files described are considered public domain and do not require permission for use. There are restricted databases in the National Center for Health Statistics and the Department of Health and Human Services available for professional researchers. Direct identifiers such as name, social security number, and address cannot be accessed, but by using data linkage products through the Restricted Data Center, I

located indirect identifiers such as dates, geography, and facility ID when these variables are combined with other data leading to identification. I were used no identifiers, and thereby did not encroach on any ethical areas. Bias were controlled by using only the datasets available without interjection of other data (e.g., [CDC], 2012).

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based telephone system for health surveys originating from the CDC with more than 400,000 adults interviewed per year. For most states, this is the only means for accessing a population-based source for evaluating health behavior data concerned with chronic disease prevalence and behavioral risk factors. Two major changes have been made to BRFSS: cell phone numbers will be used for the survey after recognizing that many American adults use cell phones only and replacement of *post-stratification* weighting method with *iterative proportional fitting* ranking which are a more advanced method for measuring data (Bazzare, 2009).

In addition, the BFRSS data are consistently reviewed for quality, validity, and reliability through multiple peer-reviewed studies that either look at particular topic areas or the three that provide original and secondary analyses across topic areas and an overview of the BRFSS as the fourth evaluation, which includes data quality, challenges for the system, and future actions through recommendations. BRFSS includes interactive databases and survey data and includes downloads, general information, and questionnaires. The interactive database systems that were used in this study include injury, chronic disease, health risk behavior (obesity), and occupational health (hazardous workplaces). Prevalence and trends data for overweight and obesity measured by BMI,

will be analyzed across states for variable that include underweight BMI 12.0-18.4, normal weight BMI 18.5-24.9, overweight BMI 25.0-29.9 and obesity BMI 30.0-99.8. The variables studied will consist of age, gender, race/ethnicity, socioeconomic level, education level, and cultural context if available. The BRFSS 2011 used three types of variables: (a) variables used to stratify and weight the data; (b) intermediate variables or variables derived from a response question response to calculate another variable or risk factor; and (c) variables used to classify or categorize respondents with the common focus on health behaviors associated with a risk for illness or injury.

NIOSH Hazardous Workplaces Databases

NIOSH provides national as well as worldwide leadership to prevent work-related illness, injury, disability, and death by gathering information and research of products and services for improving safety and health in the workplace based on the Occupational Safety and Health Act of 1970. The burden of work-related injuries and illnesses are costly. NIOSH research through its many affiliates helps to identify risk for potentially severe work-related injury and diseases. NIOSH operates in every state for improving health and safety of workers by evaluating workplace hazards with solutions requested by employers, workers, or state and federal agencies. Its funding is through grants and cooperative agreements with universities and other organizations and are subsets of databases affiliated with NIOSH are available for delineating diseases and illnesses related to workplaces as well as the most hazardous workplaces (BLS, 2013). These databases include data sharing and privacy through the CDC privacy rules for the

protection of "certain individually identifiable health data, a board of scientific counselors, as well as providing appropriate public health purposes as soon as possible without compromising privacy concerns, federal and state confidentiality, propriety interests, national security interests, or law enforcement activities" (CDC, 2012, pp.1-2).

In addition NIOSH activities also conform to scientific excellence in occupational safety and health for current needs, either alone or with outside collaboration for learning answers to research questions for application and dissemination. The National Occupational Injury Research Symposium (NOIRS) provides a forum in partnership with the Liberty Mutual Research Institute for Safety and the National Safety Council (2011) presenting current data regarding hazardous workplaces. I will concentrate on the variable factor of anthropometry and its potential relationship to increased workplace injury in hazardous occupations. Additional databases used for this research study include CDC Resources which provides the database Work-Related Injury Statistics Query System, and Workplace Data, and Statistics Gateway.

Injury/Illness Databases

The Bureau of Labor Statistics is the principle fact-finding agency of the federal government designated as an independent national statistical agency within the Department of Labor for collection, processing, analyzing, and disseminating statistical data essential for Congress, federal agencies, state and local governments, the American public, and business and labor. Two major surveys have been used for accumulating data yearly since the inception of the Bureau of Statistics in the early 1990s (CDC Resources, 2012). One is the Census of Fatal Occupational Injuries (CFOI). This program collects

data on all fatal work injuries each year in the United States. By using diverse data sources from state, federal, as well as independent data sources to identify, verify, and describe workplace fatal injuries helps assure that the counts are accurate and complete within acceptable limits. Over 20,000 unique source documents were reviewed in 2011 as part of the data collection (BLS, 2012). The other is the Survey of Occupational Injuries and Illnesses (SOH) which reports frequency and incidence rates identified by industry along with circumstances for all nonfatal work resulting in absenteeism by calculating days away from work. Information posted on the BLS Internet site includes case circumstances and worker characteristics with technical information about how to procure the statistical data.

Other Injury, Illnesses, and Hazards Databases

Data and statistics can be assessed by industry sector, including the Occupational Research Agenda (NORA) in 21 specific areas. NORA is focused on research problems of greatest relevance for workers and employers, as well as occupational safety and health practitioners including major industrial sectors of agriculture, healthcare, construction, mining, manufacturing, service transportation, and trade. This tool provides key statistical health surveillance information that is produced by NIOSH, state and federal agencies. Examples that were used in this study include: Coal Workers Health Surveillance Program, Mining Statistics, Fire Fighters Fatality Investigation and Prevention Program, National Occupational Exposure Survey (NOES), National Occupational Mortality Surveillance (NOMS), Occupational Respiratory Disease

Surveillance (ORDS), Work-Related Lung Disease (WORLD) Surveillance System, and Worker Health Chart book (BLS, 2013).One particular area of interest for this study is the area of health disparities, a program focused on socioeconomic status, discrimination, and work organization for studying how health and safety are related to race/ethnicity.

Descriptions of Methods of Statistical Analysis

Using the relevant databases listed above will determine the methods of analysis used in this secondary study. The Pearson correlation matrix will be used to determine if there is a relationship between obesity and increased workplace injury with the inclusion of age, gender, socioeconomic level, education, race/ethnicity and cultural context which can be used for relating the dependent variable injury with the independent variable obesity and then relating mediating variables of age, gender, race/ethnicity to socioeconomic level, education and cultural context. ANOVA and/or MANOVA can be used to see what probability of injury is related to obesity. Finally, to confirm if the databases have provided enough information, I were usedlinear regression. If the databases do not provide a statistical tool such as SPSS Version 21 then Med Calc version 12.75 last modified 10/9/13 for Cox-proportion hazards regression will be used for analysis (MedCalc software bvba, 2013).

Study Variables

The independent variable helps define probable cause or the ability to influence or affect outcomes(Creswell, 2009). Often the independent variables are described as

treatments or variables that are manipulated or act as predictors or antecedents. The independent variable in this study is *obesity* defined according to the CDC Healthy People 2010 as having a BMI of 30 or greater. BMI is measured by weight in kilograms divided by height measured in meters squared with the formula defined mathematically as kg/m^2 (NIH, 2010). Although BMI is the most-used measurement, Romero-Corral et al. (2008) define obesity as a diagnosis using BMI as well as percentage of body fat and lean body mass. Romero-Corral et al. asserted that the diagnosis of obesity excludes the detection of excess body adiposity adequately. I will attempt to reproduce the method these researchers developed from the Third National Health and Nutrition Examination Survey that measured bioelectrical impedance analysis for estimating the percentage of body fat (BF%). Additionally, the World Health Organization (WHO) reference standard will be used for obesity: BF% > 25% in men and > 35% in women for testing correlation between BMI, BF%, and lean body mass defined by the mediating variables age groups and gender. The results were BMI defined for obesity greater than 30 kg/m^2 which was present in 21% of men and 31% of women compared to BF% which defined obesity as 50% in men and 62% in women. These values will be used as standards where possible for measurements.

Statistical Analysis of Existing Databases for Obesity Based on BMI of > 30

Independent Variable

The NHANES III Survey and BRFSS databases will provide the information to statistical analyze for determining overweight and obesity for the variables age, gender,

race/ethnicity, socioeconomic level, level of education using SPSS Version 21. Comparison of workplace injury to BMI using ANOVA and MANOVA will use to determine probability or relationship. To evaluate correlation of BMI to injury the Cox-proportional-hazards regression using MedCalc software will provide additional statistical analysis.

Determining Hazardous Workplaces for Injury and Illness: Dependent Variable

Injury as defined in this paper described by NIOSH utilizes databases by the CDC Resources for Work-Related Injury Statistics Query, and Workplace Data and Statistics Gateway. Again, age, gender, race/ethnicity, socioeconomic level, education, and cultural context will be the areas of interest. Hazardous workplaces and occupations are determined by several methods. One method is based on the number of job fatalities in a given occupation recorded as fatality frequencies. Another method is based on fatality rates that take into account differing total numbers among occupations. Nonfatal injuries and illnesses were determined by days away from work to recuperate. The resulting complex statistical methods are not always relevant or accurate. What has been estimated is chance of occupational injury or illness expressed as the cumulative number of workers injured in a specific group compared with the number of workers in that group. An example is that truck drivers have a 1 in 15 chance of serious injury every year. Another method used is based on calculated number of median days to recuperate from an injury, a definition originally presented by Toscano (1997). The CDC (2010) estimated 3.9 million workers in private, state, and local government had a nonfatal occupational injury

or illness (CDC, Healthy People 2010). Also noted was that of those workers, 2 million were transferred, placed on work restrictions, or took time away from work due to injury or illness. According to NIOSH (2012), 2.6 million workers were treated that year in emergency departments for occupational injuries and illnesses, and 110,000 of these workers were hospitalized. Examining these data sources relate to how, where, what, how, and why accidents happen and what demographics are more prone to these incidents. Using the above mentioned statistical methods will

Mediating and Confounding Variables

Data for confounding variables that may skew data could include chronic diseases associated with obesity that may contribute to workplace injury. This information will be used to exclude pre-existing medical problems related to obesity that will not considered in this study. These include diabetes, hypertension, cardiovascular disease and arthritis for example. Another factor to consider is use of alcohol, smoking, and substance abuse again these variable will not be considered in this study. Mediating variables, according to Creswell (2009) are constructed by the researcher and have an additive effect when multiplying one variable by another. In this study this could include the additive effect of cultural context for determining attitudes toward lifestyle that may be contributing to obesity and its impact on workplace injury. Recognizing "population- level variations" in diet, ecological correlations of lack of support for risky lifestyle choices, and whereby obesity rates differ in certain socioeconomic environments may be more important than once thought as contributing to workplace injuries (Huang et al., p.7 2009). This can be

determined through an analysis from existing databases such as OSHA (2012), NIOSH (2012), BLS (2012), and other CDC resource databases described above.

Target Population

The target population were Hispanic/Latino obese workers identified in hazardous workplaces of both genders, by race and ethnicity, and who are ages 18-65. Statistics for socioeconomic level, education, gender and cultural context were included if available. Sources will include CDC Healthy People (2010), OSHA (2010), BRFSS (2012), NHANES (2012), NIOSH (2012), and BLS (2012).

Constraints with Research Choice and Resources

The validity of the results of this study depended upon database reliability and accuracy. Since all databases that was analyzed in this study are government agencies, it is assumed that they are compiled by competent professionals, that all data are scrutinized before publication, and that there is no way to contaminate and slant the data. The NIOSH Board of Scientific Counselors provides the guidance and advice to the NIOSH for the development and evaluation of research hypotheses through systematically documenting findings, disseminating results, and conforming to scientific excellence. Delimitations for this study currently are determined by the small amount of peer reviewed material and databases for review. Although obesity has been an increasing problem in the United States research on the possible correlation of increased workplace injuries has only been presented in 2007(Schulte, Wagner, Ostry, Blanciforti, Cutlip, Krajnak, et al., 2007).

Ethical Considerations

Data privacy and sharing is protected by the CDC/ATSDR policy on releasing and sharing data, which ensure that NIOSH will routinely disperse data to its partners for public purposes. This data released and shared is without compromise regarding privacy, federal and state confidentiality, national security, proprietary interests, or activities concerned with law enforcement (CDC, 2012). I will be using public domain databases and will not know participants. Bias control strengthened by using published databases.

Calculating Tools for Obesity and Workplace Injury Used in Databases

The calculating tools will be determined by the databases. For, obesity a medical model was used in the NHANES III Survey which included a complete medical examination, in-depth adiposity testing using physiological means, as well as a health questionnaire that was also supported by additional laboratory blood test analyses (2004). The self-reported BRFSS Survey participants gave estimated height and weight measurements for determining BMI (2010) The methods for determining injury will be described by NIOSH (2012) and related databases described above with explanations of mechanisms of injury and anatomical areas that were injured, filed workers' compensation insurance claims, work days lost, morbidity, mortality, and disability statistics where available (CDC INFO, 2012).

Calculating Tool for Injury

Determining whether workplace injuries in hazardous occupations are related to obesity has been prominent in insurance claims and is not easily determined. What may

be determined in this study using the newer definition of obesity is correlating this relationship of increased probability for injury. Recognizing that most pre-employment examinations for hazardous occupations will test requirements for fulfillment of tasks, there is still the probability that not all issues will be investigated due to cost and need for qualified workers as well as out of concern for appearing discriminatory. What I hoped to discover is the impending chance for injury.

Software Used for this Analysis

Database statistical analysis as well as SPSS Version 21.0 will be used for this study. The statistical methods for individually comparing obesity, injuries, and hazardous workplaces described in NHANES III (2004), BRFSS (2010), NIOSH (2012), OSHA (2012), and BLS (2012). Other CDC resources using the variables described above include frequency for testing the hypotheses and measure for what variables are strongly related. After accumulating data for each of the variables from each database for obesity, injury, and hazardous workplaces, I will compare them using MANOVA and then see if linear regression and correlation data are related and if indeed there is significant relationship between obesity and workplace injury.

Summary

The purpose of this study is to learn whether there is a relationship between obesity and increased workplace injuries in hazardous occupations that may also relate to race/ethnicity and cultural context. Available databases that include age, gender, race/ethnicity, socioeconomic level, level of education and cultural context are limited. Although the CDC has declared that obesity has become an epidemic in the adult

population of the United States (2012) there has been little research on how this may affect workers in hazardous occupations (CDC. 2012). Statistical analysis for how, what, where, why, and when injuries occur will be based on evidence-based medicine. I analyzed databases that include variables such as age, gender, race/ethnicity, socioeconomic level, level of education and cultural context and then include the variable of obesity. Extrapolation of this information was used for determining whether obesity contributes to workplace injury in hazardous occupations.

Chapter 4: Results

Introduction

The purpose of this study was to determine whether there is a relationship between obesity and workplace injury in hazardous occupations for the Hispanic/Latino population. According to the CDC's National Health and Nutrition Examination Survey 2009-2010 more than 35% of United States men and women were obese. Adult obesity for Hispanics is 42.5% in the United States (CDC, 2012). In 2010, The Occupational Safety and Health Administration (OSHA) reported that most high-risk occupations were held by younger workers (ages 18 to 19) with fatality rates of 5.6 times greater for Hispanic workers compared to non-Hispanics, African Americans, or European workers (OSHA, 2010).

Research Questions and Hypotheses

Research Question 1: Does obesity have a direct influence on injury?

H_{1o}: Obesity has no direct influence on injuries in a hazardous workplace

H_{1a}: Obesity does have a direct influence on injuries in a hazardous workplace

Research Question 2: Is culture as related to race/ethnicity interpretation of obesity contribute to workplace injury?

H_{2o} Cultural interpretation related to race/ethnicity has no effect on workplace injury

H_{2a} Cultural interpretation related to race/ethnicity has an effect on workplace injury

Data Collections

The databases that I used for this study included: NHANES, BRFSS, NIOSH, OSHA, and BLS. The National Health and Nutrition Examination Study (NHANES) 1999-2009, a cross-sectional survey whose main goal and design consisting of interviews conducted in participant's homes, standardized physical examinations and laboratory tests consisting of blood and urine samples conducted in mobile medical examination centers (NCHS, CDC, 2009). The sample populations for NHANES study is determined by complex, multistage probability designs. In 2009-2010, Hispanic persons, age 60 or greater, and persons with low incomes were oversampled to obtain reliable estimates for these subgroups health and nutritional status (NHANES, 2010). The NHANES public-used data files released in 2-year cycles, an on ongoing process covering all civilian age groups. The Current Population Survey of totals for 2009-2010 were calculated as an estimate of the number of obese individuals.

The Behavioral Risk Factor Surveillance Survey (BRFSS) measures height and weight through self-reported state-based surveys with the data released on a yearly basis. NHANES only provides national estimates, not state-specific. The CDC used information from this study in 2009 for estimating state-specific prevalence for obesity among adults eighteen years of age and older (BRFSS, 2009). The method used by BRFSS researchers consist of an annual telephone survey of United States civilian, non-institutionalized adults monitoring behaviors, health conditions, for evaluating and development of risk preventative measures. Utilizing body mass index (BMI) measured in weight [kg]/ height

measured in[m]^2. The person's self- reporting of having a BMI greater than30 defines them as obese. Since 1996, all states have contributed to this survey.

The National Institute for Occupational Safety and Health (NIOSH) databases consists of surveillance data and statistics relating to occupational injuries covers multiple issues regarding health and safety in the workplace. In 2012 an estimated 3.8 million private industry workers, federal, state and local government workers suffered from either a non-fatal injury or illness. The emergency departments recorded treating approximately 2.9 million workers for occupational injuries and illnesses of which 150,000 were hospitalized (NIOSH, unpublished data, 2013). The CDC *Health Disparities and Inequalities Report-United States*, 2013, published in the Morbidity and Mortality Weekly Report (MMWR), underscored the need for consistent data on population characteristic lacking in health surveys. Factors leading to health disparities listed among race/ethnicity, geographic, socioeconomic is to develop and provide accurate and useful data such as the potential impact of obesity on work-related disease and injury (CDC, 2013).

The Occupational Safety and Health Administration (OSHA) is a small agency servicing with only 2,200 inspectors for the health and safety of at least 130 million workers meaning there are about one compliance officer for every 90,000 workers (OSHA, 2012). In 2013, 4,405 were workers killed on the job. From the statistics available this included 797 Hispanic/Latino workers reported, that is two deaths every day all year. The major cause reported for fatalities included falls, struck by an object, electrocutions. Most of these jobs are construction related (OSHA, 2014).

The Bureau of Labor Statistics (BLS) reported, in their Survey of Occupational Injuries and Illnesses (SOII), that nearly 3.0 million nonfatal workplace injuries and illnesses reported by private industry in the year 2011, indicating the results as an incidence rate of 3.5 cases per 100 equivalent full-time workers (BLS, 2013). This was unchanged during the last ten years in which the total recordable cases (TRC) for injury and illness incidence rate among private industry. Agriculture, forestry, fishing and hunting in two private industry sectors due to increases in crop production and animal production (dairy cattle and milk production) accounting for an increase rate of injuries and illnesses. More than 2.8 million of nearly 3.0 million nonfatal occupational injuries and illnesses were injuries (94.8%). Goods-producing industries accounted for the 17.5 percent of private industry covered by this survey in 2011(BLS, 2013).The Bureau of Labor Statistics has generated estimates for injuries and illnesses for many industries defined in the 2007 *North American Industry Classification System* (NAICS) Manual, available electronically for current and prior years. The inherent underreporting of illnesses can be located in Chapter nine of the *BLS Handbook of Methods* (BLS, 2012). I created the independent variable, obesity, from the NHANES and BRFSS databases for age, gender, race/ethnicity, socioeconomic level, and level of education for percentage for ages 18-65 years of age and the incidence of obesity in each of the mediating variables. None of the databases gave reference to culture and the possible influence it has on obesity. The databases from NIOSH, OSHA and BLS were referenced for the dependent variable injury. Additionally the mediating variables: age, gender, race/ethnicity, socioeconomic level, and level of education for ages 18-65 years of age

were explored to support incidence rates. There was no reference to cultural context, or level of education in the databases.

Completing my evaluation of databases that I used in this study did not provide sufficient information for statistical studies' analysis. The variables provided insufficient information regarding obesity and relationship to workplace injuries in hazardous occupations for the Hispanic/Latinos population. To date there is scant available studies on the possible correlation of obesity to increasing the probability of workplace injury in hazardous occupations. Although there is no way to provide statistical analysis for this study due to the lack of data relating individual's obesity measurements to workplace injury, results from the databases that I studied supported the potential correlation between obesity and workplace injury in hazardous occupations for the Hispanic/Latino population.

Tables 1-4 results refer to obesity demographics for the mediating variables, age, gender, race/ethnicity, socioeconomic level, level of education and cultural context when variables were available and if the data could be used to be calculated using the Web Enabled Analysis Tool (WEAT) provided by the Behavioral Risk Factor Surveillance System for frequencies, linear regression and cross-tabulation. Tables 5-7 for the NIOSH and BLS databases' software, *Occupational Injury and Illnesses Classification System,* was used for calculating injuries in hazardous occupations for the same mediating variables if available (Caution suggested in reviewing table results since all information may be void of represented variables).

Results

Table 1.

Age-adjusted Prevalence of Overweight (OW), Obese (O), and Extreme Obesity (EXO) Among Adults Aged 20-74, by Sex: United States. Selected Years 1960-1962 through 2011-2012

Variable	Total population	Men	Women
Overweight	33.3 (1.4)	37.3 (1.5)	29.5(2.0)
Obese	36.3 (1.4)	33.9 (1.5)	36.6 (1.8)
Extremely Obese	6.6 (0.6)	4.5 (1.0)	8.8 (0.7)

Note. Survey Period: 2011-2012; *n* =4,574

*Estimate has a relative standard error greater than 30% and less than or equal to 40% and should be used with caution because it does not meet standards of reliability or precision.
Overweight is body mass index (BMI) greater than or equal to 25.0 kg/m^2 and less than 30.0 kg/m^2 Obese is BMI greater than or equal to 30.0 kg/m^2
Extremely obese is BMI greater than or equal to 40.0kg/m2 Age-adjusted by the direct method to the year 2000 U.S. Census Bureau estimates using the age groups 20-39, 40-59, and ages 20-74. NHES 1960-1962 included adults aged 18-79 and NHANES 1971-1974 and 1976-1980 did not include over age 74 so trend estimates is the base for ages 20-74. (Analysis for pregnant women excluded)
Adapted from CDC/NCHS: National Health Survey and National Health and Nutrition Examination Survey Retrieved from http://www.cdc.gov/nchs

Table 2 references comparison of prevalence for obesity in the Hispanic/Latinos population to non-Hispanic White populations only. The lack of comparison to other underrepresented groups leaves a gap in understanding how interpretation for obesity prevalence differs for different race/ethnicity populations. The statistical data information can be used in future research. Adapted from *(CDC, 2012).Summary Health Statistics for U.S. Adults* Retrieved from http://www.cdc.gov/data/series/sr_10_25

Table 2.

Age- adjusted Percentages of Person 18 years of Age and Over Who are Obese, 2011 Persons were considered obese if they have a Body Mass Index (BMI) of 30 or Greater. National Health Interview Survey (NHIS)

Gender	Hispanic/Latinos	Non-Hispanic White	Hispanic/Non-Hispanic White Ratio
Men	30.9	27.7	1.1
Women	32.6	24.8	1.3
Total	31.8	26.2	1.2

Note: Cross Tabulation Information from the Behavioral Risk Factor Surveillance System the world's largest telephone survey in the United States tracks risky health for producing frequencies and percentages generated for the independent variable *obesity* with cross tabulation of the mediating variables age, gender, race/ethnicity, education and income.

Table 3 provides demographic information for overweight or obesity risk factor divided into range of age (18-24, 25-44, 45- 64, 65 +) the table also displays demographic information for 8 race/ethnicity categories.

Table 3.

Cross- tabulation of demographic overweight or obese-risk factor

	18-24	25-44	45-64	65 or older	Row Total
Not at Risk					
Sample Size	385	780	1,002	627	2,794
Row %	28.8	33.8	25.5	11.9	100.0
Column %	56.1	32.3	29.0	32.7	36.5
Total %	10.2	12.0	9.1	4.2	36.5
(Weighted)					
Sample Size	343,118	402,583	304,129	141,882	1,191,712
(Weighted)					
At Risk					
Sample Size	1,520	8,745	9,161	4,623	24,049
Row %	12.8	47.0	30.5	9.7	100.0
Column %	49.4	70.5	77.5	70.9	68.7
Total %	8.8	32.2	20.9	6.7	68.7
(Weighted)					
Sample Size	2,884,372	10,561,070	6,849,632	2,186,318	22,471,393
(Weighted)					
Column Total					
Sample Size	3,210	12,882	12,158	6,875	36,125
Row %	17.8	45.7	27	9.4	100.0
Column %	100.0	100.0	100.0	100.0	100.0
Total %	17.8	45.7	27	9.4	100.0
(Weighted)					
Sample Size	5,840,295	14,965,019	8,839,256	3,082,190	32,726,761
(Weighted)					

Note: Race/ethnicity included White only, non-Hispanic, Black only, non-Hispanic, Asian only, non-Hispanic, Native Hawaiian or Pacific Islander only, non-Hispanic, American Indian or Alaskan Native only, non-Hispanic, Other race only, non-Hispanic, Multiracial only, non-Hispanic. This table describes descriptive statistics on the demographic examined for obesity excluded the Hispanic/Latino population. There is no reason for exclusion given. This helps explain difficulty in developing social change for underreported populations due to lack of sufficient statistical data.
Adapted from Behavioral Risk Factor Surveillance System Retrieved from http: http://nccd.cdc.gov/s/broker/broker/weatsql.exe/wear/data_anlysis_fr.hsql

Table 4 Demographic information income level (Hispanic) =$10,000 <=income <$15,000 and demographic information education level (Hispanic) = Grades 1-8 (Elementary)

Table 1.

Cross- Tabulation on Demographic Information: Hispanic Risk for Overweight and Obesity Based on Level of Education and Income Level

	Hispanic	Row Total
Not at Risk		
Sample size	184	610
Row %	57.0	100.0
Column %	24.5	27.7
At Risk		
Sample size	547	1,411
Row %	66.7	100.0
Column %	75.4	72.3
Column Total		
Sample size	731	2,021
Row %	64.0	100.0
Column %	100.0	100.0

Note. This table represents the lower income level based on lower education level for the Hispanic/Latino population and how it may contributes to the percentage of obesity. Adapted from Behavioral Risk Factor Surveillance System Retrieved from: http://nccd.cdc.gov/s_broker/broker.exe
Obesity tends to be most prevalent in populations that lack higher levels of education a precursor for lower income levels. The Hispanic/Latino population is subject to both variables. Statistical data derived from Healthy People 2010 has indicated the high-risk for obesity (CDC, 2012).

Table 5 represents occupational injuries and illnesses derived from the Bureau of Labor Statistics which developed the Occupational Injury and Illness Classification System (OIICS, 1992) which was redesigned in 2010 with subsequent revisions in 2012 providing statistical information regarding fatal, non-fatal occupational injuries and

illnesses reported incidence (BLS, 2013). In collaboration with the National Institute for Occupational Safety and Health (NIOSH), the BLS developed a web site and software application as a resource utility for occupational safety and health researchers.

Table 2.

Numbers of Nonfatal Occupational Injuries and Illnesses by Case Type and Ownership for Selected Industries, 2011 (thousands) no relationship to race/ethnicity

Industry	Total-Cases Recorded
Natural Resources	
Agriculture, forestry, Fishing, and hunting	48.3
crop production	19.7
animal production	12.4
forestry, logging	2.5
Fishing and hunting, trapping	0.2
Mining	17.2
Oil and gas extraction	1.4
Mining (except oil and gas)	7.3
Construction	
Construction of buildings	39.1
Heavy and civil engineering construction	27.6
Support trade contractors	123.5
Manufacturing	
Food manufacturing	502.7
Beverage and tobacco	80.5
Product manufacturing	12.5
Textile mills	4.2
Textile product mills	3.8
Apparel manufacturing	3.5
Leather and allied product	1.7
Wood product manufacturing	20.9
Paper manufacturing	13.6
Printing and related support activities	13.2
Petroleum and coal products	2.3
Chemical manufacturing	19.3
Plastics and rubber products	31.0
Nonmetalic mineral products	19.5

Industry	Total-Cases Recorded
Primary metal manufacturing	24.3
Fabricated metal products	74.4
Machinery manufacturing	46.3
Computer and electronic products	15.2
Electrical equipment, appliance, and component manufacturing	11.2
Transportation equipment	70.6
Furniture and related products	17.7
Miscellaneous manufacturing	18.1
Trade, Transportation, and Utilities	
Truck transportation	68.0
Warehouse and storage	32.2
Leisure and hospitality	
Accommodations and food services	278.6
Accommodation	68.8
Food services and drinking places	209.8

Note: Case results of injury and illnesses for the annual average employment 2011 (no race/ethnicity noted).
This additional statistical data that is not included in this table for case results of injury and illnesses listed by occupation and number of cases of injury and illness: Agriculture, forestry, fishing, and hunting 974.9, Crop production 413.8, Animal production 163.5, Forestry and logging: 57.1, Fishing, hunting and trapping 8.6, mining 669.7, Oil and gas extraction: 149.4, Mining (except oil and gas) 208.1, Construction 5,576.7, Construction of buildings 1,259.5, Heavy and civil engineering construction 826.4, Specialty trade contractors 3,490.6, Manufacturing 11,627.7, Food manufacturing 1,458.8, Textile mills 186.2, Textile product mills 120.8 , Apparel manufacturing 119.6, Leather and allied products 163.3, wood products 338.1, Paper manufacturing: 386.1, Printing and related support: 478.1, Petroleum and coal products: 109.5, Chemical manufacturing 808.2, Plastics and rubber productions: 632.2, non-metalic mineral products 367.4, Primary metal 37.9, Fabricated products: 1,312.3, Machinery manufacturing 1,015.6, Computer and electronic products 1,091.4, Electrical equipment, appliance and component manufacturing 366.9, Transportation equipment manufacturing 1,337.6, Furniture and related products 363.9, Miscellaneous manufacturing 575.8, Trade, transportation, and utilities 24,924.5, Leisure and hospitality 13,514.8.

Totals include data for industries not shown separately. *North American Industry Classification System*- United States, 2007 used. Agriculture- excludes farms with fewer than 11 employees. Data for mining (Sector 21 in the *North American Industry*

Classification System- United States, 2007 include establishments not governed by the Mine Safety and Health Administration rules and reporting such as those in Oil and Gas Extraction and related support activities. The data is for mining operators in coal, metal, and nonmetal mining, as provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor and independent mining contractors excluded from the coal, metal, and nonmetal mining industries. The data do not reflect the changes the Occupational Safety and Health Administration made to its recordkeeping requirements effective January 1, 2002. Estimates for these industries are not comparable to estimates in other industries because of rounding components that may not add to totals (BLS, 2011). Adapted from the U.S. Bureau of Labor Statistics, U.S. Department of Labor Employment expressed as an annual average derived primarily from the BLS Quarterly Census of employment and Wages (QCEW) program. Retrieved from: http://wwwn.cdc.gov/wizards/oiics/

Table 6 provides mediating variable for age, gender, and race/ethnicity for number of non-fatal injuries and illnesses in several hazardous occupations such as manufacturing, building supplies, and warehouse and storage industries.

Table 3.

Worker Characteristics (Gender, Age, Race/Ethnicity: Occupation for Number of Nonfatal Injuries and Illnesses Manufacturing, Building Material and Garden Equipment Supplies Dealers, Warehouse and Storage, Private Industry, 2013(most recent data)

	Food manufacturing	Building supplies and garden equipment supplies dealers	Warehousing and storage
Gender			
Male	33,280	25,940	17,500
Female	16,560	8,950	6,390
Not reported	-	80	
Race or ethnic origin			
White only	15,030	6,830	7,460
Hispanic or Latino only	14,540	1,250	6,390
Black only	5,190	620	21,030
Asian only	1,540	90	2,000
American Indian or Asian Native only	150	20	-
Native Hawaiian or Pacific Islander only	310	-	30
Hispanic or Latino and other race	60	-	-
Age			
16-19	870	1,270	440
20-24	5,340	5,090	3,230
25-34	11,740	7,810	6,460
35-44	11,480	6,810	5,310
45-54	12,440	7,650	5,070
55-64	6,450	5,040	2,830
65 and over	920	1,190	360
Not reported	670	40	400

Note. The Dash indicates data do not meet the publication guidelines.
Adapted from U.S. Bureau of Labor Statistics, U.S. Department of Labor This table represents hazardous occupations and the demographics of workers.
Demographic statistical data is presented here to determine if there is a relationship for non-fatal workplace injury and illness based on gender, age, race/ethnicity.

Table 7 provides information regarding the incidence rates for injuries and illnesses selected for hazardous occupations as defined by the Bureau of Labor Statistics (BLS, 2013).

Table 4.

Incidence rates of Nonfatal Occupational Injuries and Illnesses by Selected Industries, 2011

Industry	2011 Annual Average	Incidence Rate	Number of Cases (thousands)
Agriculture, Forestry, fishing And hunting	974.9	5.2	45.8
Mining	669.7	2.2	16.6
Construction	5576.7	3.8	184.7
Manufacturing	11827.7	3.9	455.6
Trade, Transportation, Utilities	24924.6	3.8	782.1
Warehousing Storage	636.8	5.3	31.2
Accommodation Food services	11499.2	3.7	269.2

Note. The incidence rates represent the number of injuries per 100 full-time workers and calculated as: (NEH) x 200,000 where N= number of injuries, EH = total hours worked by all employees during the calendar year, 200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year). Totals include data for industries not shown separately. The *North American Industry Classification System* United States, 2007 used for data clarification. Employment expressed as an annual average and derived primarily from the BLS Quarterly Census of Employment and Wages (QCEW) program. Farms industry with less than 11workers is not included in this table. The statistical data is for mining operators in coal, metal, and nonmetal mining provided to the BLS by the Mine Safety and Health Administration, U.S. Department of Labor. Independent mining contractors is not included from the coal, metal, and nonmetal mining industries. The data does not reflect changes the Occupational Safety and Health Administration made to its recordkeeping requirements effective January 1, 2002; therefore, estimates for these industries are not comparable to estimates in other industries. Because of rounding components may not add to totals (BLS, 2011). Industry scope changed in 2009. Because of rounding, components may not add to totals.

Adapted from U.S. Bureau of Labor Statistics, 2013: Retrieved from: http://www.cdc.gov/wizards/oiics

Summary

No database supported my hypothesis for obesity as a predictor for workplace injury. Examination of multiple databases showed each database to be independent and not correlated. There was significant information provided by federal, state, and local databases for both obesity and workplace injury, but this information was not collected in a representative table.

After examination of the available databases I was unable to find a predictor of obesity for injury in the Hispanic/Latino population. The reason may be due because:

- Lack of databases
- Too many variables that make up obesity
- Under-reporting of workplace injury

If social change is to occur for predicting obesity and a possible relationship to workplace injury for the Hispanic/Latino population there is need for inclusion in research studies. Social choice may be determining factor as well as social awareness for social change to occur.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

With increasing evidence that overweight and obesity may have a relationship or impact workplace performance or injury as suggested by the National Institute for Occupational Safety and Health (NIOSH, 2007), this intriguing idea suggested an opportunity that stimulated my interest for further research. The NHANES and BRFSS databases were primary sources for analyzing obesity. Workplace injury in hazardous occupations were reviewed and analyzed from the databases of NIOSH, OSHA and the BLS for this secondary-cross sectional comparative study was developed (CDC INFO, 2012). The Hispanic/Latino was the target population for this study because of high prevalence of obesity and high incidence for workplace morbidity and mortality (BLS, 2012; CDC, 2012).

I was unable to complete my evaluation of the databases that I used in this study did not provide sufficient information for statistical analysis. The variables matched with insufficient information regarding obesity and relationship to workplace injury in hazardous occupations. Understanding for obesity is not a singular problem but compounded by genetics, behavioral risk factors, and culture context for acceptance. Even appreciation for increased BMI still recommends further investigation.

The databases that I used for this study relating to incidence of obesity for statistical analysis were NHANES and BRFSS. The NHANES survey is a face-to face interview. The BRFSS is a phone survey. Both of these databases and highly scientifically respected for reliable results, but there are chances that either can collect

erroneous information. Face-to face interviews can be intimidating whereby the interviewee may give what they thought was the right response. BRFSS is a self-reported response to what they consider as their body weight and height.

Databases for workplace injury that I used in this study included NIOSH, OSHA and BLS databases. The NIOSH and the BLS partnered to form the database that although had the mediating variables used in this study for age, gender, race/ethnicity, income level, it did not have in its database the variables level of education or injury. This made it impossible to statistically cross- tabulate relationship for obesity and injury due to compounding actors and different sampling data available, as presented in Chapter 4, did not correlate to obesity and the relationship to injury. Because obesity is recognized as a precursor for other health pathologies such as diabetes, hypertension, cardiovascular disease, as well as other diseases, it needs to be observed over time for specific individuals who are obese working in hazardous occupations when compared to controls (BLS, 2013). This may need a longitudinal study for future research.

To date, few researchers have investigated the possible the relationship of obesity and increased workplace injuries (Pollack & Cheskin, 2002; Schulte, et al. 2012). This may be due to limited resources both physical findings for obesity and workplace injury and financial resources for further studies. It may also be due to reluctance of reporting of workplace injuries by the involved industries or the workers. The CDC's recognition is that at least 60% of the adult United States population is overweight (CDC, 2010). When workers' compensation insurance agencies began tracking the changing trends over 1999-2009 (BLS, 2013), where it was estimated to be paying out in benefits over $143 billion

per year did it become an issue that needed exploration. The Johns Hopkins School of Public Health Center for Injury Research and Policy urged further need for study of the possible relationship of obesity and workplace injuries in hazardous occupations by Pollack and Cheskin (2002).

Schulte and his colleagues at NIOSH began studying the possible relationship of obesity leading to chronic health problems and possible workplace injury (Schulte, et al, 2012). Additional studies by Pollack and Cheskin in 2007 added more support for this hypothesis (Pollack & Cheskin, 2007). My study was not a meta-analysis of the previous studies used for relationship of obesity for workplace injury. In this study I utilized standard federal, state and local databases in order to strengthen or discount the idea if obesity contributed to workplace injuries in hazardous occupations related to the Hispanic/Latino population who are most likely to be working in these situations. The NIH reported that the Hispanic/Latino population as having a rate of obesity as 39.1% and 78.8% overweight (NIH, 2010). These data may be useful for further evaluations regarding workplace injury and relationship to obesity for these specific populations.

Interpretations of the Findings

While there is anecdotal evidence that obesity or overweight may correlate to producing occupational injury there are no databases that concretely reflect this notion. In fact depending on how the available variables are analyzed from database to database the findings are different (CDC, 2007). I described The Social Cognitive Theory and the Diffusion of Innovation mentioned in Chapter 2 of this study because these theories suggest a significant choice for intervention of obesity. This could be relating to

race/ethnicity based communities with high incidence of obesity. Theoretical analysis was beyond the scope for this research.

Limitations of the Study

The databases that I used for this study did not provide sufficient results that applied regarding cultural context and how it may contribute to the interpretation of obesity. Obesity is too complex of pathology to single out one particular cause but it remains as an easy target for predicting injuries in the workplace due to ease of measurement. Additionally, according to the Bureau of Labor Statistics (BLS)many workplace injuries are under-reported or not reported. (BLS, 2013) This implies that the validity and reliability of databases available may not be complete and a problem that is recognized by the BLS, NIOSH and OSHA (BLS, 2013).

Recommendations

Presently there are no methods to measure the correlation of obesity to workplace injuries in hazardous occupations. There is also no specific way to correlate the Hispanic/ Latino population as being more likely to have accidents because there are no significant statistics available. It is important to understand that for social change to occur there must be focus on social choice. Developing social competence in understanding how obesity may affect ability to perform certain jobs safely perhaps will diminish the morbidity and mortality rates for the Hispanic/Latino population (BLS, 2013).

Further research needed to prove or disprove that overweight and obesity have direct influence on workplace injuries provided by:

- Increasing awareness for assuring the occupation matches the ability of the applicant regarding physical attributes as well as comprehension of the dangers that may be involved with the work in hazard occupations.
- Safety lessons provided on regular basis may also diminish incidents of injury (NIOSH, 2012).
- Decreasing the prevalence of obesity in the Hispanic/Latino population through recognition of this problem and methods that are in the cultural context.
- Development of research for underrepresented populations that are high-risk for obesity and possible workplace injury.

Implications

The majority of Hispanic/Latino population is working in agriculture, manufacturing, and resort hotel housekeeping (BLS, 2013). These occupations are defined as the lowest paid employment and most prone to chance of workplace injury (BLS, 2013). The basic lack of results for correlation of obesity and workplace injury in hazardous occupations implies more focus and attention can help improve this public health problem. Social change can only occur with the consciences for social awareness and choice for change.

Conclusion

The databases that I used in this research are widely used for tracking trends in obesity as well as workplace injuries but did not show significant statistical data that correlated a relationship for obesity and workplace injury in hazardous occupations.

There was also no specific relationship regarding the Hispanic/Latinos population who may be most affected due to the prevalence of obesity for this population and the incidence of workplace injury in hazardous occupations (CDC, Healthy People 2010; BLS, 2013).

Obesity may not be a valid indicator for workplace injury, but only as a percentage of overall contributing factors. Underrepresentation in research for Hispanic/Latino populations contributes to the difficultly to predict if social change can occur to decrease the prevalence of obesity and incidence of workplace injury.

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