2017

Contributing Factors of Obesity Among Over-the-Road Truckers

Shari Weiss
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Shari Weiss

has been found to be complete and satisfactory in all respects,

and that any and all revisions required by

the review committee have been made.

Review Committee

Dr. Faith Foreman, Committee Chairperson, Public Health Faculty

Dr. Mary Lou Gutierrez, Committee Member, Public Health Faculty

Dr. Daniel Okenu, University Reviewer, Public Health Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University

2016

Abstract

Contributing Factors of Obesity Among Over-the-Road Truckers

by

Shari Weiss

MPA, Binghamton University, 2008

BA, SUNY Cortland, 1990

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

November 2016

Abstract

Obesity among over-the-road truckers (OTRs) is an epidemic creating significant public health issues among this population. The consequences of obesity (hypertension, diabetes, heart disease) put both truckers' health and their medical clearance at significant risk. The purpose of this study was to examine the impact of gender, physical activity, diet, and sleep on obesity among OTRs. Through a socioecological lens, this study examined whether obesity is significantly impacted by gender, physical activity, nutrition, and sleep. This study also examined the impact of the trucking environment on obesity. The study used a quantitative research design and data were collected through a national online survey. Descriptive statistics were used to characterize the sample. The final sample size analyzed consisted of 105 adult men and women. The findings of the research questions were that the source of food for truckers impacted obesity. Truckers who got their food from truck stops and restaurants had a higher incidence of obesity than those who got their food from grocery stores. In addition, those truckers who consumed most or all of their meals/food on the road had higher levels of obesity than those who consumed most or all of their meals in a home environment. In this study, gender was a compelling variable, as women had twice the rate of obesity as men; however, there were more women than men who participated in the study. Limitations included small sample size, unequal gender distribution, and limited ability to advertise the study. Helping the trucking industry understand what contributes to obesity could be the key to creating positive social change through health policy development and implementation. This in turn has the potential to create a healthier workforce in the trucking industry.

Contributing Factors of Obesity Among Over-the-Road Truckers

by

Shari Weiss

MPA, Binghamton University, 2008

BA, SUNY Cortland, 1990

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

November 2016

Dedication

I dedicate this study to the strong and courageous men and women who travel this nation's highways and roadways in order to ensure that everyone has the goods and services they need and/or desire. The hours are long, the sacrifices are many, and miles are never-ending. "Truckers deliver everything but the baby."

Acknowledgments

I am extremely grateful to a number of people. First, I would like to thank my committee members. Dr. Foreman, you have been my guide, my mentor, my sounding board, my time keeper, my cheerleader, and kept me focused and on track. Dr. Gutierrez, you have been my advisor, my statistics guide, kept me focused, and given me great encouragement. As my committee members, you have inspired me to achieve academic excellence and provided me with a unique and educational experience.

I wish to thank my boss Nancy Johnson, Residential Director, and my Executive Director, Carole Coppens, for giving me support, encouragement, inspiration, and flexibility with my schedule to allow me to have the time I needed when I needed it.

I wish to thank my father and my grandmother, who have been sources of encouragement, inspiration, and examples of what hard work, dedication, and commitment to a purpose mean.

I wish to also thank my many friends and loved ones who were patient with me while I spent countless hours writing instead of participating in other things that at times were much more fun. Your continued support helped to get me here.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

Obesity is a public health issue that has been at the forefront of many public health promotion campaigns. The purpose of this study was to examine the impact of gender, physical activity, diet, and sleep on obesity among over-the-road truckers (OTRs). Obesity is an epidemic that is proving to be a considerable burden on the trucking industry because of the physical consequences and health issues that it impacts. These issues create a problem for OTRs because they must remain medically certified to drive. The sections in this chapter include background of the study, impact of sleep deprivation, health impact of truck driving, potential contributors of obesity for truck drivers, statement of the problem, nature of the study, research question and hypothesis, definition of terms, significance of the study, limitation, and summary and transition.

Background of the Study

Obesity is considered a significant public health issue that meets the criteria for being classified as an epidemic. The Centers for Disease Control and Prevention (CDC) estimated that 34.9% of adult Americans are obese (CDC, 2014). Baskin, Franklin, and Allison (2005) noted that obesity impacts individuals regardless of culture, gender, race, religious affiliation, sexual orientation, educational level, or socioeconomic status. This prevalence rate of obesity is a serious concern for public health professionals across all disciplines, particularly because obesity often leads to other health complications such as heart disease, type-2 diabetes, hypertension, and certain types of cancers (CDC, 2012).

The literature regarding causal factors of obesity among commercial truck drivers (OTRs) is fairly limited (Wiegand, Hanowski, & McDonald, 2009). Obesity rates for OTR populations fall somewhere between 53% and 85% (Apostolopoulos et al., 2011; Wiegand et al., 2009). Obesity among truckers creates two potential crises. The first is the overall impact of obesity on the health and well-being of truckers, including high blood pressure, high blood sugar, high cholesterol, and heart disease. The second impact is that the health issues associated with obesity can lead to a medical disqualification or short-term medical clearance, with the outcome being either a resolution of the health concerns or potentially the revocation of a commercial driver's license (CDL). A disqualified driver has to either be able to bring medical issues into acceptable limits as defined by the Federal Motor Safety Administration (n.d.) or their CDL will be terminated. The increasing obesity epidemic among OTRs has placed record numbers of drivers at risk of losing their medical clearance. This risk not only affects the personal well-being of OTRs but may result in less drivers being available to meet the freight demands of the industry.

The trucking industry is responsible for transporting a tremendous amount of freight in and around the United States on a regular basis. The Transportation Safety Administration (TSA) stated that commercial vehicles and American roadways are the primary method for delivering and distributing this country's "most basic and most critical goods" (TSA, 2014). Additionally, there is both a high demand for freight to be transported via trucking routes and a shortage of drivers to meet these freight demands (Hagenbaugh, 2008). Given this information, if the obesity rates among truck drivers

continue to increase, there is significant risk that the health of this population will deteriorate to a point where drivers will become too ill to drive, and there will not be enough truck drivers to meet the needs of the industry. Current data estimates suggest that truckers have an overweight/obesity prevalence that at its highest may be around 85%, almost double the rate of obesity among the general population of adults in the United States (Apostolopolous, 2011).

Impact of Sleep Deprivation

Sleep apnea or sleep deprivation among OTRs has been a focus of recent studies, though the connection between sleep and obesity has not been widely examined. Due to irregular schedules and the pressure of time demands made on truckers, it is very challenging for OTRs to be able to have regular intervals of restful sleep. Industry demands create a high stress environment where freight is the priority, not the well-being of the driver. The very nature of the freight industry creates very difficult expectations and deadlines that present significant challenges to the trucking population. The result of this is sleep deprived and overly tired drivers who then are at risk for various health issues including obesity.

Health Impact of Truck Driving

Truck driving as an industry has historically been viewed as an unhealthy occupation, filled with risks both from the facets of the lifestyle of truckers and from the risks associated with negotiating America's highways and all that it entails. Recently, Apostolopoulos, Sonmez, Shattell, and Belzer (2010) conducted a review of literature that assessed various illnesses and health issues among U.S. truck drivers. They found a

host of public health issues that had a direct correlation between health and the occupation of being a trucker. For example, the issue of sleep deprivation due to environmental and occupational pressure was found to contribute to increased fatigue related accident rates and metabolic issues (Apostolopoulos et al., 2010).

Though few researchers have examined the health issue of obesity and OTRs in the United States, there is some research being done on the international level to demonstrate the health impact of commercial truck driving. Diabetes and cardiovascular disease are two health issues that are highly correlated with obesity (CDC, 2014). Some studies done outside of the United States, such as one conducted in New Zealand, indicated that commercial truck drivers who have issues such as diabetes or cardiovascular disease have higher accident rates than drivers who do not have these issues (Taylor & Dorn, 2006). High obesity rates (60%) and subsequent physical health issues/complaints among truck drivers in Hong Kong, China were found to be a significant public health concern (Wong et al. 2012).

The Federal Motor Carrier Safety Administration (FMCSA) allows OTRs to drive for a total of 11 hours and to be on duty doing various tasks associated with truck driving and maintenance for an additional 3 hours (FMCSA, 2013). This provides for a total of 14 hours of service that can be, and often is, used by an OTR. The average American work day is considered to be around 8 hours, with many of those hours being between 9am and 5pm. Even if a person is working a second or third shift job, they are still doing it within an average of 8 hours, thus leaving approximately 16 hours to conduct personal business, personal hygiene, spend time with families, attend to chores or other

responsibilities, and sleep. An OTR working for the entire 14-hour period (which most of this population does per the FMCSA) has approximately 10 hours to accomplish these tasks. This timeframe includes tending to paperwork and regulatory requirements, taking a shower, getting laundry done, cleaning their living space, eating, communicating with family and friends (through internet or phone calls), leisure or physical activities, planning the next day's route, and sleeping.

Additional risks to the overall health of OTRs are behaviors that increase the chances of health complications. These behaviors include smoking, alcohol use, illicit drug use, and engaging in sexual activity with sex workers (Apostolopoulos, 2010). A 2007 study on the causes of mortality among unionized truckers, which represents only a portion of the overall trucking industry, indicated that heart disease, lung cancer, and accidents were disproportionately higher among that population (Laden et al., 2007).

Potential Contributors to Obesity for Truckers

As noted earlier, there is a great deal of research about the health concerns surrounding obesity as an epidemic, but there is not a lot of research or data on contributing factors of obesity among OTRs. Perhaps the most significant work has been the examination of sleep deprivation and driving (Marquez et al, 2012; Moreno et al 2006). Though sometimes mentioned in these studies, obesity is one of many variables that are discussed or examined. However, more evidence is leading to the suspicion of sleep issues and how they impact obesity in many Americans, including truckers (Moreno et al, 2006).

Nutrition and physical activity are two factors that play a key role in the overall examination of obesity within the scope of the American public. The CDC (2011) suggested proper eating and nutritional guidelines along with physical activity are needed in order to achieve overall improved public health and decrease both obesity and the consequences of obesity. For example, the Center of Excellence for Training and Research Translation is bringing research and practice together with the focus on nutrition, physical activity, and obesity. A program for employers called *LEAN Works!* is designed to help employers create healthy environments that promote obesity prevention (CDC, 2011). With the emphasis on nutrition and physical activity as primary prevention of obesity, it is logical to investigate if these two factors play a role in the obesity epidemic among OTRs. This is based on the understanding of the sedentary nature of driving coupled with limited physical activity facilities and lack of access to nutritious food at the locations where truckers stay between loading cargo and time on the road.

Gender plays a role in trucking because the majority of truckers on the road are male. There are between 9 and 14 million commercial drivers on the road in the United States (Kales & Strabel, 2014; TSA, 2014). Females make up only 12 to 15% of the trucking workforce in the United States with an estimated 360,000 female drivers on the road (Layne et al, 2009). Gender is a factor that should be examined because there are some differences between men and women in regards to obesity rates. In a recent study examining the prevalence of obesity in the United States between 2011-2012 , Ogden, Carroll, Kit, and Flegal (2014) found that age-adjusted rates of obesity among adult women from all sampled populations was 36.1%, while the same type of rate for men

was 33.5%. On average, within the U.S. population, women have higher rates of obesity than men. Though it has not yet been thoroughly studied, it is entirely possible that one gender (most likely females) may have a higher rate of obesity than another in the trucking realm. Layne and Randolph (2009) found that there were a number of health disparities between men and women truckers, with slightly more females smoking than men and slightly more men exercising regularly than women in their limited sample.

The CDC (2014) reported the highest rates of obesity in the United States are among non-Hispanic Black women (47.6%) and Hispanics (42.5%). Women of lower socioeconomic status (42%) and men of higher socioeconomic status (32.9%) have higher rates of obesity (National Center for Health Statistics (NCHS), 2010). Across the nation, there are some differences between men and women regarding rates of obesity. If this pattern holds true, gender should have some impact on obesity among OTRs.

Statement of the Problem

The trucking industry plays an integral part in both the American workforce and the American economy because it is the primary way in which goods are transported within this country. One of the key health issues facing the population of OTRs today is obesity. It is estimated that approximately 85% of the OTR population is either overweight or obese, and OTRs are at higher risk for high blood pressure, type 2 diabetes, and obesity (Apostolopoulos et al., 2011; Whitfield et al., 2007). There is a dearth of literature examining this specific issue, which results in a narrow scope of understanding in regards to what impacts obesity among OTRs. However, obesity is an epidemic among this population, therefore creating the potential for drivers to lose their medical

certification due to health complications from obesity. Nutrition, physical activity, sleep, and gender are all possible contributors to obesity. If the OTR workforce does not learn about what is contributing to this public health epidemic, there may be a decrease in an industry that already reports having a shortage of drivers. Fewer healthy drivers on the road due to medical suspensions from complications of obesity will result in significant lost wages for this population and a potentially serious economic impact on the rest of the nation.

Nature of the Study

In this study, I used a quantitative cross-sectional study design to collect and analyze data. The examination of the contributing factors of obesity among OTRs included a specific set of independent variables (nutrition, physical activity, sleep, gender), and these variables were examined quantitatively to determine their impact on the dependent variable of obesity. The cross-sectional design allowed for an examination of the relationships between each independent variable and the dependent variable, using data from a single convenience sample.

The theoretical framework for this study was the social ecological model. The social ecological model (SEM) was developed over 15 years ago and focuses on the relationships between environment, behavior, and "well-being" (Stokols, 1996). SEM is a model that examines a wide variety of variables and their connections to behavior, environment, influential factors (interpersonal, intrapersonal, institutional), and gains and understanding of behaviors as they relate to these factors and influences (Glanz, Rimer, & Vizwanath, 2008). The CDC (2014) uses SEM to examine the interconnecting

elements between individuals, their relationships, communities, and social factors as a way of understanding all the different forces involved in human behaviors when it comes to health and well-being.

In this study, I examined specific variables to see if they are a primary influence on obesity. The SEM was an appropriate model for this study because each of the independent variables being examined is greatly influenced by many different factors. For example, the variable of nutrition is influenced on the individual level through personal choices of what kind of food an OTR might be in the mood for eating that evening. At the relationship level, nutrition might be influenced by the nutritional habits and preferences of family and friends, and possibly other truckers. At the community level, nutrition might be influenced by the impact the community has on nutritional options. Encouragement of healthy nutritional practices by the community is one way that community can influence behaviors. At the social level, nutrition might be influenced by whether or not an OTR will be more apt to eat at the trucks top with other drivers or by his/herself in the cab of the truck alone. These factors work together to influence the choices OTRs make in regards to nutrition and also work together to influence the impact nutrition has on their overall well-being. Table 1 is an illustration of the SEM as outlined by the CDC (2014) and how it can be applied to this study.

Table 1

The Social Ecological Model

Socioecological level	Description of domain
Individual	Biological and personal experiences over a lifetime

Relationship	Friends, family, Coworkers, and other kinds of relationships influence behaviors
Community	Home environments, truck stops, warehouses, terminals influence behaviors and attitudes
Social	Social and cultural norms of the trucking industry influence behaviors and attitudes

Note. From "The social-ecological model: a framework for prevention" CDC, 2014

Research Questions and Hypotheses

The research questions for this study are as follows: What are the contributing factors of obesity among over-the-road truckers (OTRs), and what is the impact of the environmental factors of hours and service and truck stops on obesity rates among OTRs? My hypothesis is that gender, nutrition, physical activity, and sleep have a direct impact on obesity among this population.

1. Are gender, nutrition, physical activity, and sleep the contributing factors of obesity among over-the-road truckers (OTRs)?

$H_0$1: Gender, nutrition, physical activity, and sleep have no impact on obesity among over-the-road truckers (OTRs).

H_a1: Gender, nutrition, physical activity, and sleep have a significant impact on obesity among over-the-road truckers (OTRs).

2. Does the trucking environment, specifically truck stops and the hours of service, have an impact on the rates of obesity among OTRs?

$H_0$2: The trucking environment, specifically hours of service and truck stops, have no significant impact on obesity among OTRs

H_a2: The trucking environment, specifically hours of service and truck stops, have a significant impact on obesity among OTRs.

Definition of Terms

Commercial driver's license (CDL): This is a required license to operate a vehicle that weight over 26,000 pounds (FMCSA, 2013).

Federal Motor Carrier Safety Administration (*FMCSA):* The federal agency that regulates all standards and regulations required for operating a commercial vehicle.

Obesity: The term to identify individuals who have a BMI of 30 or higher according to specific height and weight calculations (CDC, 2013).

Over-the-road trucker (OTR): Term used to identify the primary population being studied. This term also identifies a CDL holder who drives a commercial vehicle on an interstate basis.

Significance of the Study

Though obesity is a significant health concern in the United States, there are very few studies that specifically address obesity among truckers. Previous researchers have focused on only one variable at a time (sleep, nutrition, etc.) but have not examined several variables at once in order to explore any correlation between them. What is understood is that obesity is a growing threat to the health and well-being of OTRs and their continued ability to do their jobs. The FMCSA requires that all commercial truck drivers pass a Department of Transportation physical that includes screenings for hypertension, diabetes, BMI, vision, and hearing (FMCSA, n.d.). Hypertension and diabetes are a few of the health consequences associated with obesity that are threatening

to severely impact the number of OTRs able to meet the medical qualifications required for their CDL, which in turn will impact the entire workforce.

With such a high rate of obesity among the OTR population, it is critical that the public health arena understand the contributing factors of obesity in order to minimize the health and employment consequences of this disease. This study has the potential to impact positive social change by discovering some of the issues related to a significant health concern, and perhaps creating reasons or opportunities for future research and testing of interventions that will hopefully reduce the risk and harm of obesity on the OTR population. Conducting a comprehensive study of the contributing factors related to obesity among OTRs may be of significant interest to both public policy makers and public health professionals, in addition to the potential interest for trucking companies and trucking advocacy groups. Public health policy professionals may be able to design interventions that can potentially impact the obesity epidemic among this population. Public policy makers may be able to craft policies that provide for healthier and safer working environments that promote overall driver wellness.

Limitations

According to Crosby, DiClemente and Salazar (2006), there are many benefits of a cross-sectional study design, including assessing how widespread disease is, gauging the attitudes and beliefs of a target population, and determining if there is a correlation or relationship between specific variables. However, there were several potential limitations for this study. The population being studied was quite large, and therefore obtaining a representative sample was challenging. The sample obtained was relatively small and

low power which impacted the results. The resources available to me were limited as was the amount of time available to complete this research, which may have resulted in missing data. Height and weight data, nutritional data, physical activity data, and gender data were all self-reported, which may lead to a reliability limitation. Though the survey was anonymous, there is potential that the data may not be as accurate as being able to collect these data through reviewing actual medical records, observations, or other ways of confirming the data. One other possible limitation may be that the survey to collect the data may not have been widely enough disseminated through the methods being used, which could have resulted in a smaller or insufficient sample. Finally, bias is a possible limitation. I am a former OTR and therefore a former member of the population being studied. Though I took as many precautions as I could to minimize personal influence on the data collection and analysis, there was always potential for some bias to be called into question.

Summary and Transition

In this study, I examined four factors that may contribute to obesity among OTRs. An extensive literature review has been conducted demonstrating the limited amount of research that has been done on this issue, as well as demonstrating the gaps in the literature that need to be explored further. Through a quantitative analysis, using data collected through an online survey, the dependent variable of obesity was examined to see if the independent variables of nutrition, physical activity, sleep, and gender have an association indicating that they impact this variable. This study provides statistically significant information on whether or not obesity is impacted by the independent

variables. This may set the stage for future research and the development of successful interventions.

Chapter 2: Literature Review

Introduction

Obesity is a public health issue that has been at the forefront of many public health promotion campaigns. The purpose of this study was to examine the impact of gender, physical activity, diet, and sleep on obesity among OTRs. Obesity is an epidemic that is proving to be a considerable burden on the trucking industry because of the physical consequences and health issues that it impacts. These issues create a problem for OTRs because they must remain medically certified to drive. The sections for this chapter include the following: Literature Search Strategy, Obesity and the Trucking Industry, Nutrition and Obesity in Trucking, Physical Activity and Obesity in Trucking, Sleep and Obesity in Trucking, and Gender and Obesity in Trucking.

Literature Search Strategy

The literature used for this study was found in three databases through the Walden University Library system. Academic Search Complete, Medline with Full Text, and ProQuest Central were all used to find existing literature on the topics of trucking and obesity. Keywords used included *over-the-road trucking and obesity, trucking and obesity, nutrition and trucking, gender and trucking, physical activity and trucking, trucker health, sleep and trucking*, and *obesity and sedentary workplaces*. Additional data and information were collected from the CDC main website, the Department of Transportation main website, the FMSCA website, and the Owner Operator and Independent Driver Association (OOIDA).

Obesity and the Trucking Industry

Obesity, as a public health issue, has been the focus of a large body of research and continues to fuel a variety of studies. Within this body of research there is an emphasis on examining obesity through the lens of sociodemographics in order to identify those populations most at risk and to create policy and intervention strategies in an effort to reduce these risks (Yun, Zhu, Black, & Brownson, 2006). One identified high risk population that has been identified is OTRs.

Research regarding obesity in the trucking industry focusing particularly on the OTR is a fairly recent phenomenon. This is mostly due to the impact the consequences of obesity have on the ability of an OTR to maintain their CDL and therefore their livelihood. The physical qualifications for drivers (49 CFR Part 391.41) details the specific standards required for commercial medical certification (FMCSA, n.d.). These qualifications have become a litmus test for the health and well-being of OTRs, and the issue of obesity has become a focus for research and the industry.

Obesity in the Unites States has reached epidemic levels. There are a variety of studies that have confirmed this assertion. According to the CDC (2013), approximately 35.7% of adults in the United States are considered obese. Obesity spans many different cultures, with non-Hispanic Blacks having the highest rates (49.5%) among the studied cultural populations (CDC, 2013). Socioeconomic status does have an impact on obesity rates, but with surprising results (CDC,2013). Among those who have the highest rates of obesity (non-Hispanic Blacks) are males with higher income levels; low-income women have higher rates of obesity than high-income women; education does not have a

significant impact on obesity rates except that women with college degrees have lower rates than women who do not; and obesity rates increased for all populations between 2007-2008 (CDC, 2013).

Apostolopoulos et al. (2011) claimed that the rate of obesity or being overweight among OTRs is approximately 85%. They completed a socioecological analysis of both truckers and their working/living environment. The authors noted that the health of truckers is highly correlated with their environment, including schedule, food options (vendors, restaurants), warehouses, trucks, and social/recreational activities (Apostolopoulos, et al., 2011). The study was fairly broad in scope, and though Apostolopoulos et al. studied more than just the variable of obesity, they demonstrated how the many aspects of the trucking industry and trucking environment impact health related complications such as obesity.

Sedentary worksites that are similar to the trucking environment provide another example of just how serious the issue of obesity is. One particular study conducted in 2006 addressed issues of obesity in the manufacturing industry as part of a Community Based Participatory Research project (Gates, Brehm, Hutton, Singler, and Poeppelman, 2006). The authors pointed out that manufacturing is a very sedentary type of work environment and though these are ideal places to promote obesity prevention and wellness, they often lack the ability to provide interventions (Gates et al., 2006). Gates et al. (2006) discussed that obesity related health care costs have been estimated to be tens of billions of dollars annually for U.S. employers. This type of economic burden

demonstrates the impact that obesity has on the U.S. workforce in general and can be extrapolated to sedentary work environments such as OTR trucking.

Another brief study examining obesity among truckers was done in Manchester, England, in which 102 drivers were examined for BMI and blood sugar levels, among other indicators (Anonymous, 2006). Over two-thirds of the participants had a BMI of higher than 30, and blood sugar levels that were above normal (Anonymous, 2006). The CDC (2011) defines an individual as being obese if they have a BMI over 30. Though the sample size was small, the evidence presented is very compelling regarding the prevalence of obesity among this population.

Nutrition and Obesity in Trucking

Nutrition on the road is a very challenging obstacle for most OTRs. Apostolopoulos et al. (2011) conducted a study on the challenges of healthy eating for truckers. This study was done using the eco-social model as the theoretical framework and a qualitative analysis using several instruments (CHEW, NEMS-S, SWAT, HEAT-WAI, and HESSE) that examined a variety of nutritional options including vending machines, fast food, restaurants, and other nutritional environments (Apostolopoulos et al., 2011). The essential findings were that trucking worksites, as they were referred to, have a significant lack of nutritional options and tend to contribute to the obesity epidemic due to the promotion of unhealthy eating (Apostolopoulos et al., 2011).

The U.S. Department of Health and Human Services issued dietary guidelines for Americans in 2010 that promote healthy eating choices combined with physical activity. Additionally, the U.S. Department of Health and Human Services (2010) created a set of

guidelines that include the right proportions of fat, sodium, sugars, and grains. Theoretically, these are essential to maintaining a healthy weight and a healthy lifestyle. For OTRs, however, these guidelines are extremely challenging because they do not have ready access to the types of foods recommended or the ability to exercise regularly.

Whitfield, Prawitz and Lukaszuk (2007) hypothesized that nutrition was not important to overweight or obese truckers, and that their preference would be high calorie, high fat foods. They found that truckers were highly limited in healthy meal options in truck stop restaurants, and their study participants wanted access to the healthier foods, even if they were overweight or obese (Prawitz & Lukaszuk, 2007). They examined the food choices and the level of importance of healthy food of 79 overweight and 52 obese truckers, with 92 being validated as participants ($N = 92$). The authors discussed the challenges that truckers face in trying to find healthy options for their meals, and being overweight or obese does not mean that they would not choose better options if available (Prawitz & Lukaszuk, 2007).

Apostolopoulos et al. (2011) discussed that the rules and regulations create an environment where OTRs have to eat either quick meals or lots of snacks while they are on duty, and then they often have a larger meal once they are done for the day. Some truckers are able to keep healthier on board their rigs because they have a refrigerator and/or microwave and can therefore cook their own meals and control portions and quality of ingredients. Truck stops offer their food choices in the form of restaurants, fast food, snacks, and convenience foods. One of the biggest attractions of truck stops is that there are varied choices as well as ample parking for vehicles that are on average 72 feet

in length and cannot be parked in average lots or spaces legally or safely (Whitfield et al., 2007). Food consumption is not just a physical imperative, but also an emotional experience for many, particularly OTRs (Apostolopoulos et al, 2011) . The lifestyle of a trucker requires long periods of time away from loved ones, family, and friends in order to make enough money to fulfill their responsibilities. The industry is stressful, and there is a great deal of pressure on OTRs to meet deadlines, maintain compliance, pass inspections, keep accurate records and paperwork, accurately navigate the roadways, and professionally represent the industry. Food, particularly food that is known as "comfort food," provides an emotional respite to many truckers. The truck stop restaurants often advertise their food as being the equivalent to a meal made at home, though the types of meals that are being advertised are high in fat and calories. Foods that may not be nutritious but taste good and remind a driver of meals at home can create an emotional connection that is a comfort to a lonely trucker.

Physical Activity and Obesity in Trucking

Regular exercise and other forms of physical activity are very hard to participate in while driving over the road. Truck driving is considered a sedentary job because a driver is required to sit for long periods of time (8 hours or more) while performing their job duties. There are several available studies that address the impact of sedentary work on obesity. One such study involved the quantitative examination of low and high activity occupations in conjunction with low and high leisure physical activity. This study, which used a combination of data from of national health assessments and individual interviews, found that 42% of those sampled (N = 4,889) who had low occupational activity and no

leisure physical activity were likely to be obese (King, Fitzhugh, Bassett Jr., McLaughlin, Strath, Swartz, and Thompson, 2001). The current literature has limited availability regarding physical activity specifically among the trucking population. There are, however, studies that have been done examining the trucking lifestyle and they include aspects of physical activity on the road. For example, Roberts and York (2000) examined a wellness program designed for OTRs and found that lack of exercise, among other issues, was an important health issue for OTRs who were struggling with their health. Those who felt they were in better health reported exercising regularly, among other healthy lifestyle choices (Roberts & York, 2000). Truckers News magazine (2007) featured a small prospective study following five truckers participating in a specially designed fitness and wellness program for a 1-year period of time. The goal was to see if this fitness program would be effective in helping OTRs lose weight and achieve a healthier lifestyle because physical exercise (as well as diet) is extremely challenging to do on the road and the lack of it contributes to obesity and poor health for this population. The results were promising because each participant achieved all or most of the goals they set for themselves.

Sleep and Obesity in Trucking

A few studies have been conducted focusing on trucker health linking sleep deprivation and sleep apnea as potential contributors to obesity. Moreno, Louzada, Teixiera, Borges, and Lorenzi-Filho (2006) examined the correlation between sleep issues and obesity among truck drivers in Brazil and found that 28.3% of the sample had a BMI of greater than 30, which according to CDC BMI standards meets the definition of

obesity, and 29.6% of these individuals had sleep issues that could be classified as a type of obstructive sleep apnea (OSA). Smith and Phillips (2011) authored a study that looked at OSA in 595 truck drivers in the United States and found that 69.6% of those sampled met the criteria for obesity (BMI > 30), 78.3% of those sampled were considered either hypertensive or obese, and 20.5% indicated that they had fallen asleep at a traffic light (Smith & Phillips, 2011).

Circadian rhythms, which are correlated to sleep patterns, are often disrupted for OTRs, leading to negative metabolic changes that may lead to obesity and other health issues (Marqueze, Ulhoa, & Moreno, 2012). These authors also found that work that is done in irregular shifts, such as overnight into early morning, have a negative impact on sleep patterns and may also lead to issues with obesity (Marqueze et al., 2012). Similar studies in the United States have yielded results indicating that almost 70% of truckers who had sleep apnea also met the criteria of being categorized as obese (BMI > 30; Smith & Phillips, 2011). Studies such as these can lead researchers to draw strong conclusions regarding the impact of sleep on obesity among OTRs.

Pulmonary Reviews (2009) published information about a study of OSA in OTRs. In this study, the issue of obesity and how it is related to OSA is discussed, along with the connection between OSA and OTR crashes and accidents. Four hundred and fifty-six commercial drivers (OTRs) were examined to identify the prevalence of OSA among this population, and 17% of those sampled were found to have symptoms that identified them as having OSA based on screening criteria (Pulmonary Reviews, 2009, p.22). Research like this, which is rooted in the obesity epidemic among OTRs, had a significant impact

on FMCSA regulations changing to include a mandatory OSA screening for drivers who have a BMI of 35 or higher (FMCSA, n.d.).

Some of the research on sleep, OTRs, and obesity has occurred outside of the United States but is still relevant. A study of 4,478 truckers in San Paolo, Brazil addressed sleep patterns and biometrics to determine if sleep duration contributed to health issues, including obesity (Moreno et al., 2006). Moreno et al. (2006) noted that shorter sleep duration was correlated with obesity in previous studies done of the overall population. Moreno et al. found that 29.6% of their study sample had both a higher BMI and shorter sleep patterns (6 hours or less) based on biometric measurements and self-reported data. One limitation of this study, noted by the authors, was that the sleep patterns were self-reported and could not be verified in anything short of a "well-controlled study;" however, the evidence was still quite compelling (Moreno et al., 2006).

Gender and Obesity in Trucking

One of the potential contributing factors of obesity among OTRs is gender. As a public health issue, there have been numerous studies on gender and obesity. The National Health Interview Survey (NHIS) conducted from 1995 to 2002 examined obesity rates among individuals within different occupations (Caban et al., 2005). The NHIS study found that for this study, the highest rates of obesity among women (22.6%) were those employed as motor vehicle operators, and this group was also listed as having increasing rates of obesity over the time-frame of the study. Males in the NHIS study who were motor vehicle operators also had the highest rates of obesity for their gender

(19.9%) but were not listed as one of the groups who had a "significant increase" in obesity rates (Caban et al., 2005). This study seems to indicate that rates of obesity among female motor vehicle operators are higher than males, and that females have a greater increase in rates of obesity on an annual basis.

In 2006, Muennig, Lubetkin, Jia, and Franks conducted a study to examine mortality and disease rates, with gender as a contributing variable. Muennig et al. used burden of disease estimates and a 2000 survey on medical expenditures to examine rates of mortality, rates of obesity between men and women, and quality of life indicators to conduct a quantitative analysis. The findings indicated that women have disproportionate rates of obesity and disproportionate burden of disease due to differences in quality of life indicators (Muennig et al., 2006).

Layne, Rogers, and Randolph (2009) found that there were approximately 360,000 female Truckers on the road. Their pilot study regarding gender and Trucking was small but compelling. Of the females sampled by the study authors, 58% reported not exercising at all, and reports of hypertension, back pain, and other chronic health issues were among the primary health concerns reported (Layne, Rogers, and Randolph, 2009). This study noted both the need for wellness facilities and health care access on the road as well as the need for healthier food options. They note that the sedentary lifestyle and stressful conditions of the trucking industry pose significant health risks for drivers of both genders (Layne, Rogers, and Randolph, 2009). Sedentary lifestyle, stress, and chronic health conditions are all factors that relate to obesity.

The literature on the variable of gender as it relates to obesity and the trucking industry is significantly lacking. There have been relatively few studies done specifically examining gender and obesity in the trucking industry. What studies have been done suggest that there is a potential impact of gender on obesity among OTRs, and that women may have a higher risk for obesity than men.

Summary and Transition

As this literature review indicates, there is compelling evidence that there are very specific factors related to obesity among Over the Road Truckers. Nutrition, physical activity, sleep patterns, and gender are all variables that the literature suggests may have an impact on obesity rates among OTRs. The body of literature examining these variables is small and promotes opportunities for additional studies. Few if any studies have been done examining all four variables and how they may or may not contribute to obesity among this population. What the literature does suggest is that this type of study will provide valuable insight and has the potential to add significant data to the existing knowledge base. Increasing the level of valid and reliable data may help to create foundations for future interventions that can address this serious health epidemic among this population.

Chapter 3: Research Method

Introduction

Obesity is a public health issue that has been at the forefront of many public health promotion campaigns. The purpose of this study was to examine the impact of gender, physical activity, diet, and sleep on obesity among OTRs. Obesity is an epidemic that is proving to be a considerable burden on the trucking industry because of the physical consequences and health issues that it impacts. These issues create a problem for OTRs because they must remain medically certified to drive. The sections in this chapter include Research Design and Approach, Setting and Sample, Instrumentation and Materials, Data Collection, Data Analysis, Dependent Variable, and Independent Variables.

Research Design and Approach

Examining the contributing factors of obesity among OTRs has several options in regards to a research design and approach. After examining these options, I have determined that a quantitative design and approach was the best choice. A quantitative design allowed for the collection and analysis of hard data that were relevant to the dependent variable of obesity and the four independent variables: gender, diet, sleep, and physical activity. In this research project, I examined whether the probability of obesity was amplified by gender, nutrition, physical activity, and sleep. I also examined whether the probability of obesity was influenced in any way by the trucking environment, with a focus on trucks tops and hours of service.

Setting and Sample

The setting for this study was nationwide and consisted of OTRs who were driving within the continental United States. These drivers either have been company drivers or independent owner-operators. This population is highly mobile and was found in various parts of the country.

The sample for this study was selected using convenience sampling. Because this population is highly mobile, convenience sampling was the most practical approach. Those selected to participate in the study must have met the following criteria:

1. Be at least 21 years of age.
2. Hold a valid CDL in the United States.
3. Have at least 1 year of over the road driving experience.

The following are criteria that excluded an individual from participating in the study:

1. Be under the age of 21.
2. Have only local driving experience (never driven out of state).

Faul, Erdfelder, Buchner, and Lang (2009) developed software called G-Power, which is downloadable from their website. This software is designed to determine power and sample size through running an exact *a priori* power analysis. The appropriate sample size for a low power sample with a 95% confidence level, according to G-Power, is 115 (Faul et al., 2009).

According to the Bureau of Labor and Statistics (2012), the majority of tractor-trailer and heavy haul drivers are long haul drivers (or OTRs). There are approximately 1.7 million drivers employed as OTRs in the United States (Bureau of Labor and

Statistics, 2012). I used a sample size calculator to also try to determine the appropriate sample size for this study. Using a web based sample size calculator located at http://www.surveysystem.com/sscalc.htm, I calculated the sample size, based on a population of 1.7 million, a confidence interval of 5, and a 95% confidence level to be 384. The best sample size for this study was somewhere between 115 and 384, with the understanding that a larger sample size would yield more valid and reliable results.

Instrumentation and Materials

I examined a number of surveys to see if there were any that had the specific questions I needed to address my independent and dependent variables. I found two surveys that provided validated questions that could be tailored or adapted as necessary to collect the data needed for this study. The 2013-2014 National Health and Nutrition Evaluation Survey (NHANES) sponsored by the CDC had specific questions that are able to determine dietary behavior (CDC, 2014). This same survey also provided some guidance for the variable of physical activity; however, Trone (2007) published an article in a military based journal that had a survey designed to measure physical fitness and activity among U.S. Marines. This article provided some good examples of what types of questions to ask regarding physical activity and how to categorize some activities. Dr. Johnston from the Decker School of Nursing at Binghamton University authored a survey examining the issue of obesity among children and adolescents in Binghamton, New York in 2013 (citation pending). Her survey had several validated questions in the areas of sleep, nutrition, physical activity, and biometrics that were tailored or adapted for this study.

There are five sections of the survey, with approximately 1 to 5 questions in each section. The survey questions consist of multiple choice answers or yes/no answers depending on whether the variable is dichotomous or continuous. IRB approved this study and instrumentation and the approval number is 07-31-15-0087628.

Obesity

Obesity, as it is currently understood in the realm of public health, is identified using a specific height and weight calculation called a BMI (CDC, 2013). The specific formula as defined by the CDC (2013) for calculating BMI is weight (lbs.)/[height (inches)]^2 x 703. This formulaic measurement is thought to be a reliable and affordable way to calculate the amount of body fat a person has and where that person is on the spectrum of obesity. However, the CDC also noted that there are limitations to the BMI measurement due to variables like age, gender, and muscle mass. Currently, the BMI measurement is the preferred method for calculating obesity and was the method I chose to designate obesity as a variable.

According to the CDC (2013), BMI is categorized as underweight, normal weight, overweight, and obese. Underweight is determined by a BMI or 18.5 or lower. Normal weight is considered to be a BMI of 18.5 to 24.9. An overweight BMI is 25 to 29.9, and obese is categorized as having a BMI of 30 or higher. For the purposes of this research project, obesity was a dichotomous variable. Participants were either obese (0) with a BMI of 30 or higher, based on height and weight calculations, or not obese (1) with a BMI of less than 30, based on height and weight calculations.

Gender

Gender is the category of biological gender that an individual identifies as. In public health, there are various gender identifiers (Male, Female, Male to Female, and Female to Male) due to the various populations that coexist. In order to be respectful of the participants and to keep the variable of gender dichotomous, the participants were asked what gender they identified as, providing a way for participants to self-identify and avoiding the appearance of insensitivity.

Physical Activity

Physical activity is an ordinal variable that was measured in four categories: strenuous, moderate, minimal, or none. Physical activity and exercise have very specific definitions according to an article published back in 1985, and have not really changed over the years. Caspersen, Powell, and Christansen (1985) defined physical activity as being correlated with fitness through muscle movement and energy expenditures, while exercise was defined as all of the previous plus the incorporation of specific and repetitive movements and the intention to improve overall fitness. Given the environment and population used for this study, the variable of physical activity was defined as activity that is consistent with muscle movement and energy expenditures through walking, running, or doing resistance exercises.

Nutrition

Nutrition is a complex variable because it can be operationalized in many ways: amount of food consumed, types of food consumed, amount of calories or fat consumed, or number of times food is consumed. This study was limited by time and resources and

therefore required a measurement of the variable that could be valid and generalizable without being too complex. The NHANES of 2005-2006 (CDC, 2006) had valid and reliable questions related to nutrition. Specific questions were tailored, with the permission of the CDC, to gather data related to diet and nutritional choices made by OTRs. The variable of nutrition was continuous.

Sleep

Sleep was a continuous variable for this study, which was operationalized through a self-report on hours slept in one night. There are various theories on what is considered an adequate amount of sleep for an adult. However, for this study the ideal amount of sleep for an individual 21 and older will be somewhere between 6 and 8 hours a night. Sleep was measured by number of hours per night up to and including 8 full hours. Additionally, respondents were screened regarding whether or not they have been diagnosed with OSA. Respondents were identified as having sleep apnea or not having sleep apnea.

BMI was calculated using the CDC (2013) calculation of weight (lbs.)/ [height (inches)] ^{2} x 703. Sleep duration was compared to individuals whose BMI rates them as obese or morbidly obese. Respondents were classified as obese or not obese. Those classified as obese had their sleep duration calculated to determine if there is a correlation between obesity and less sleep or sleep apnea.

Demographic Information

The first section contained mostly questions seeking descriptive data. Information about having a CDL, being at least 21 years of age, number of years on the road, and

whether a participant was a local or OTR were the primary data collected. Respondents identified themselves as either company drivers or owner-operators. These types of data helped to ascertain inclusion or exclusion based on the participant answer as well as provided some general descriptive data about the sample population.

Independent and Dependent Measures

The next section of the survey collected data on gender, weight, and height. Height and weight, as mentioned earlier, were used to determine BMI. BMI was used to derive the binomial, dependent measure for obesity. Participants were categorized as either Obese (1) or Not Obese (0). Gender, sleep, nutrition, and physical activity were the independent measures.

Gender is a descriptive variable that is also dichotomous. Gender was designated as either male (0) or female (1). The data in this section of gender were used as a dichotomous variable and one of the predictors for the study. The variables in this section helped with providing context for the study by creating a snapshot of the participants from the sample population. Each variable, aside from gender, had a section of questions designed to gather as much data as possible about it. Sleep, nutrition, and physical activity had specific questions related to behaviors and traits about the variables.

Questions for sleep included information regarding a standard night's sleep on the road, and separately while off the road/at home. Participants were asked how many hours of sleep a night they get while on the road and how many hours of sleep a night they get while at home. This question treated sleep as an ordinal variable, using a range of hours to quantify the answer. The range was 4 hours to 9 hours and was coded as follows: 4

hours or less (0), 5 or 6 hours (1), 7 or 8 hours (2), and 9 hours or more (3). Additionally, participants were asked that if they felt tired at any time and how many days a week they felt tired. The question of feeling tired was an ordinal variable with responses ranging from 0 days to 7 days. The range was coded as follows: 0 days (0), 1 day (1), 2 days (2), and following in order up to 7 days (coded as 7).

Nutrition questions focused on how many times a day respondents eat and whether they eat meals or snacks. The choices given to the participants for the survey were based on choices determined the most common as used in the NHANES completed in 2013 (CDC, 2013). The responses for this nominal variable focused on three meals a day with snacks (coded as 0), three meals a day without snacks (coded as 1), one meal a day and snacks (coded as 2), two meals a day and snacks (coded as 3), five or six small meals a day (coded as 4), or various eating patterns (coded as 5).

Participants were also questioned about where they get their food from (store, truck stop restaurant, home). This question used nutrition as a categorical variable. The responses were coded as follows: truck stop only (coded as 0), truck stop and store (coded as 1), store only (coded as 2), home only (coded as 3), or home and store (coded as 4). Respondents were asked to rate how healthy they feel their overall diet is and how many meals they consume that are prepared at home versus prepared on the road. The question regarding level or healthiness used nutrition as an ordinal variable with a range of answers going from extremely healthy (coded as 0) to extremely unhealthy (coded as 5). The question regarding meals not prepared at home used nutrition as an ordinal

variable with a range of none (coded as 0), at least one a day (coded as 1), at least two a day (coded as 2), ending with all meals (coded as 3).

Physical activity data were gathered using questions focusing on specific activities (walking, running, weightlifting), and duration of these activities. The questions examined physical exercise on the level of vigorous cardio activity, moderate cardio activity, and strength training. With these questions, physical activity was an ordinal variable with a range of 0 days (coded as 0) to 7 days (coded as 7) for each level of activity. Participants were also asked to provide physical activity data relevant to time on the road and time off the road, with similar coding for this ordinal variable.

Participants were asked how many hours a day they spend in the driver's seat as a way to measure the length of time that they are engaging in sedentary activity. This variable categorized physical activity as an ordinal variable with a range of answers that began at 9 to 11 hours, (coded as 0) to less than 3 hours (coded as 4).

To better demonstrate and operationalize constructs and measurements and to demonstrate the data coding, Table 2 of operational measures has been created.

Table 2

Operational Measures

Variable	Description	Response categories	Variable type
Obesity	BMI > 30	1 = Obese 0 = Not obese	Binomial
Gender	Gender Identity	1=Male 2=Female	Dichotomous
Nutrition	Number of Meals per day	0=3 meals no snacks 1-3=# meals w/ snacks 4=5-6 meals 5=# meals varies	Ordinal

(table continues)

	How healthy is diet	Range of Extremely Healthy to Extremely Unhealthy (0-5)	Ordinal
Sleep	Number of hours of sleep on the road	Range of 4-9 hours (0-3)	Ordinal
	Number of hours of sleep off the road	Range of 4-9 hours (0-3)	Ordinal
	Number of days not enough sleep or rest	Range of 0-7 days (0-7)	Ordinal
Physical activity	Number of days a week vigorous activity (on and off the road)	Range of 0-7 days (0-7)	Ordinal
	Number of days a week moderate activity (on and off the road)	Range of 0-7 days (0-7)	Ordinal
	Number of days strength training	Range of 0-7 days (0-7)	Ordinal
	Exercise pattern (on or off road)	Same, more, less, or none	Nominal
Trucking environment	Number of hours in the driver's seat?	Range of 9-11 hours (0-4)	Ordinal
	Number of meals per week eaten on the road	Range of no meals to all meals (0-4)	Ordinal
	Where food is acquired	Truck stop only, Home only, Store only, or some combination of the above (0-4)	Nominal

Data Collection

Social Media and Online Trucking based websites were the primary sources for data collection. Websites of major trucking resources such as Women in Trucking, Owner Operator Independent Driver Association (OOIDA), social media such as Facebook and Twitter, trucking company websites and truck stop websites were used to

promote and advertise the study and the associated link to the survey. I also attempted to get the major truck stop monthly publications to advertise the study

The study was conducted using the online resource Survey Monkey. Survey Monkey collected the data, maintained confidentiality, and maintained the integrity of the data. The survey was added to the Survey Monkey database and assigned an individual link. The link was advertised and distributed through the various routes: websites, social media, print media, etc.

The survey was advertised and opened for approximately four months. Participants were not offered any compensation for participation. The sample is a one-time cross-sectional sample. Survey Monkey maintains the data collected and I checked periodically to ensure that the survey was being utilized. At one point there was a significant reduction in survey activity, and I re-advertised through the various sources being used. With social media, I advertised the link and the survey on a weekly basis throughout the life of the survey.

Because of limited resources, all data is considered self-reported. I was not able to collect specific body measurements or medical records. The questions are designed to try to validate the information as best as possible. Confidentiality and anonymity is ensured through the use of identifiers that are established through Survey Monkey. Based on sample size calculations, the sample needed is between 115 and 384.

Data Analysis

Descriptive Statistics

Descriptive data will be collected to identify age, gender, years in trucking, and whether they are a company driver or owner operator. Age will be collected because this study seeks to examine Over the Road Truckers (OTRs). Federal Motor Carrier Safety Administration **§ 398.3** Qualifications of drivers or operators, (c) (1) prohibits anyone under the age of 21 from having a commercial license and driving a commercial vehicle (U.S. Department of Transportation, n.d.). Because of these regulations, the identifier OTR will be a driver who is 21 years of age or older. Any participant under the age of 21 will be excluded from the study.

Years in trucking will be asked because it will not be beneficial for a participant to have less than one year's driving experience as a truck driver. Adapting to the trucking environment and being able to accurately report their experiences regarding the independent variables will anecdotally require at least a year of OTR experience. This will make the data more valid and reliable. The data regarding whether a participant is a company driver or owner operator is for informational purposes and may end up being of some value to the data analysis. Gender will be discussed in another part of this chapter. A frequency report will determine how often a variable appears in the data analysis and Histograms will be completed on each of the independent variables to examine their respective relationships to the dependent variable (Norussis, 2010).

Research Questions and Hypothesis

The research questions for this study are: What are the contributing factors of obesity among Over the Road Truckers (OTRs) and does the Trucking environment, including both truck stops and the Hours of Service, have an impact on the rates of obesity among OTRs? My hypothesis is that gender, nutrition, physical activity, and sleep have a direct impact on obesity among this population.

1. Are gender, nutrition, physical activity, and sleep the contributing factors of obesity among over-the-road truckers (OTRs)?

$H_0$1: Gender, nutrition, physical activity, and sleep have no impact on obesity among over-the-road truckers (OTRs).

H_a1: Gender, nutrition, physical activity, and sleep have a significant impact on obesity among over-the-road truckers (OTRs).

2. Does the trucking environment, specifically truck stops and the hours of service, have an impact on the rates of obesity among OTRs?

$H_0$2: The trucking environment, specifically hours of service and truck stops, have no significant impact on obesity among OTRs

H_a2: The trucking environment, specifically hours of service and truck stops, have a significant impact on obesity among OTRs.

Statistical Testing

A one-sample t-test will determine if the population I am sampling has a known mean for continuous variables (sleep, weight, diet, physical activity) and the categorical variable of gender (Norussis, 2010, p.243). When examining the variable of gender, a

Chi-Square analysis will examine how gender cross tabulates with obesity. Additionally, gender will be examined to determine how gender cross tabulates with the other independent variables in order to establish if the null hypothesis is correct (Norussis, 2010, p. 366-367).

Finally, ANOVA was conducted to examine the means between the dependent variable (obesity) and the independent variables (gender, nutrition, physical activity, sleep). The null hypotheses will be tested to determine if there are any differences in the means for each of the independent variables (Norussis (2010). Assuming that the sample being used is an independent random one, the sample is evenly distributed and variances will be equal, an analysis of variance (ANOVA) is the appropriate test for the null hypothesis (Noussis, 2010, p. 309).

If the null hypothesis is correct, then the ANOVA will show that there is no variance in the means between obesity and the various groups associated with the independent variables (Norrusis, 2010, p. 308). For example, if the null hypothesis is correct, than an ANOVA will demonstrate that there is no difference between male truckers who are obese, male, don't exercise, don't eat enough servings of fruits and vegetables, and sleep less than 7 hours a night; and a male trucker who is not obese, exercises three times a week, eats recommended servings of fruits and vegetables and sleeps at least 7 hours a night.

The relationships between the independent variables and the dependent variables will be analyzed to determine if they are causal in any way, if there are differences between the means of different groups, and to see if there is a way to explain them. The

data analysis used for this study will determine if the observations made through the logistical regression technique are or are not statistically significant.

Chapter 4: Results

Introduction

Obesity is a public health issue that has been at the forefront of many public health promotion campaigns. The purpose of this study was to examine the impact of gender, physical activity, diet, and sleep on obesity among OTRs. Obesity is an epidemic that is proving to be a considerable burden on the trucking industry because of the physical consequences and health issues that it impacts. These issues create a problem for OTRs because they must remain medically certified to drive. The sections in this chapter include Data Collection, Data Analysis, and Results.

Data Collection

Data for this study were collected using an online survey tool called Survey Monkey. Survey Monkey is a well-established and widely used service that provides the ability to collect data confidentially or anonymously by allowing the user to set up specific data collection protocols, custom design survey questions, design a unique URL for a link to a survey, and store data securely for an indefinite period of time.

Once IRB approval was given, the survey questions for this study were uploaded to Survey Monkey, and the URL https://www.surveymonkey.com/r/truckerstudy was designated as the direct link to the online study. This link connected a participant initially with the informed consent section of the study, and if the participant chose to continue, they were given access to the survey. The survey was released on a national level through a variety of online resources (trucking companies, social media, trucking advocacy

groups). The survey was open from July 28, 2015 through November 13, 2015 for a total of 4 months.

Social media was a significant online resource used for this study. Facebook and Twitter were the primary sources. I used Facebook to spread the word about the survey to the trucking community through encouraging truckers to take the survey and share the survey in order to gain as large a sample as possible. Facebook Groups such as Women in Trucking Association, Truckers Caring for Truckers, Sisters of the Highway, and Female and Male Long Haul Truckers advertised the survey with the following text:

> Calling all Truckers! I am a former Over the Road Trucker who is now a Ph.D. Candidate at Walden University. I want to help improve the health of Truckers across this country. I am conducting a study to look at what might be causing obesity among Over the Road Truckers. If you are at least 21 years of age and willing to take my short and completely anonymous survey, please go to:
>
> https://www.surveymonkey.com/r/truckerstudy
>
> Thanks and Stay Safe Out There!

Trucking Company Facebook pages such as Roehl Transport, Inc., Heartland Express, Schneider Trucking, Western Express, May Trucking, Crete Carrier Corporation, TMC Tranpsortation, US Xpress Drivers, and Sage Truck Driving School were all contacted about the study and provided the media text and link for the survey. Roehl Transport, Heartland Express, Schneider Trucking, and Sage Truck Driving School all agreed to promote the study on their pages.

Other Trucking Facebook pages such as Trucker News, Landline Magazine, NextTruck, Sirius XM's Road Dawg, and The Dave Nemo Show were contacted about the study and survey. Trucker News, Landline Magazine, and the Dave Nemo Show all responded and agreed to promote the study on their pages.

Advocacy groups for Truckers, specifically Women in Trucking, and OOIDA were contacted about the study. Women in Trucking agreed to promote the study using both their newsletter and their Facebook Page.

The three major truckstop companies, Travel Centers of America (TA)/Petro, Pilot/Flying J, and Loves, were all contacted about the study and asked to help promote the study. TA did not respond to repeated requests. Loves responded stating they were involved in another marketing campaign and did not wish to add anything else to their agenda. Pilot/Flying J were very interested in the study. There were numerous emails between myself and the representative of the company to try to seek permission to promote the survey. The company representative stated they were very interested in anything that would promote the health of truckers, and that they were just about to release a new line of products designed for healthier eating. After several correspondences, the company agreed to promote the survey with a post on their company Facebook page.

Twitter was another social media platform that was used to promote this study. The following is the script approved by IRB and used for sample recruitment:

Truckers…check out this survey on Truckers and Obesity: https://www.surveymonkey.com/r/truckerstudy Please help me collect this important information

This script was sent out on Twitter once a week for the 4-month period of data collection.

The bulk of participants completed surveys within the first 2 months of the survey being promoted. The remaining participants responded within the last 2 months of data collection. The initial goal for the sample size was calculated between 115 and 384. However, at the end of the data collection period, a total of 106 surveys were completed. Some surveys had missing answers, which resulted in the sample size varying between 99 and 105 depending on the variable being measured and the type of statistical testing being performed.

Descriptive Analysis

Descriptive analysis of frequencies was done to determine valid and missing data. There were a total of 38 male respondents and 67 female respondents. The age of respondents ranged between 23 and 72. The majority of respondents were in their mid-40s or older. The survey was set up to verify age by self-report, and all respondents indicated they were at least 21 years of age when they began the survey.

Years in trucking varied between 1 to 45 years of trucking experience. The mean of trucking experience was 15.75 years, and the standard deviation was 12.59. However, the data analysis suggests that the majority of respondents had between 3 and 8 years driving experience, with the next highest frequency being 16 years. The majority of respondents, 62%, were company drivers and 36% identified as owner/operators.

BMI was calculated using the CDC standardized calculation. Respondents for my survey provided height and weight data, and these data were applied to the CDC BMI calculation. Respondents were classified as either obese or not obese. Out of the 99 respondents sampled, 69 were classified as Obese and 30 were classified as Not Obese. Table 3 represents the descriptive statistics data analysis for this study.

Table 3

Descriptive Statistics

Characteristic	*N*	%
Gender		
Male	38	35.8
Female	67	63.2
Type of trucker		
Owner/Operator	38	35.8
Company driver	66	62.3
BMI		
Obese	69	65.1
Not obese	30	28.3

Physical exercise was analyzed on three levels: vigorous, moderate, and strength training. An additional exercise variable was measured regarding whether drivers exercised more on the road, at home, or not at all. Over half (55.8%) reported doing no vigorous exercise. The remainder reported mostly doing vigorous physical exercise 1 to 2 days a week, and only 1.9% reported vigorously exercising more than 2 days a week.

Moderate exercise yielded slightly different results. Approximately one-third (26%) reported doing no moderate exercise. However, approximately 46% reported

doing moderate exercise 1 to 2 days a week. The remainder was a small number who reported doing moderate exercise more than 2 days a week.

Strength training was also quite different. Approximately 77% reported no strength training at all. Approximately 13% of respondents reported doing strength training 1 to 3 days a week. A very small number reported doing strength training more than 3 days a week. The frequencies of exercise are presented in Table 4.

Table 4

Frequency of Physical Activity by Level

#Days	Vigorous	Moderate	Strength training
	%	%	%
0	54.7	25.5	76.4
1	15.1	23.6	4.7
2	10.4	22.6	3.8
3	7.5	6.6	4.7
4	5.7	3.8	1.9
5	2.8	5.7	3.8
6	1.9	.9	.9
7	0	7.5	1.9
Total	*98.1*	96.2	98.1

The next variable examined was how often truckers exercised (on the road, at home, or not at all). More than one-third (38.7%) reported not exercising at all. Exercising at home was slightly more prevalent than exercising on the road (28.3% versus 16%). Exercising the same amount in either setting was reported by 15% of respondents. Table 5 summarizes my finding on exercise.

Table 5

Exercise Locations

Place	Frequency
	%
More at home	28.3
More on the road	16
Same	15.1
None	38.7

Time in the driver's seat was measured using a range of hours up to the max of 11 hours, which is the maximum legal hours driving. Out of 105 responses, the majority (72.6%) reported driving between 9 and 11 hours a day while on the road. The next time period driving reported was 7 to 9 hours reported by 21.7%. The remainder reported driving mostly 3 to 5 hours or less. Figure 1 demonstrates these results.

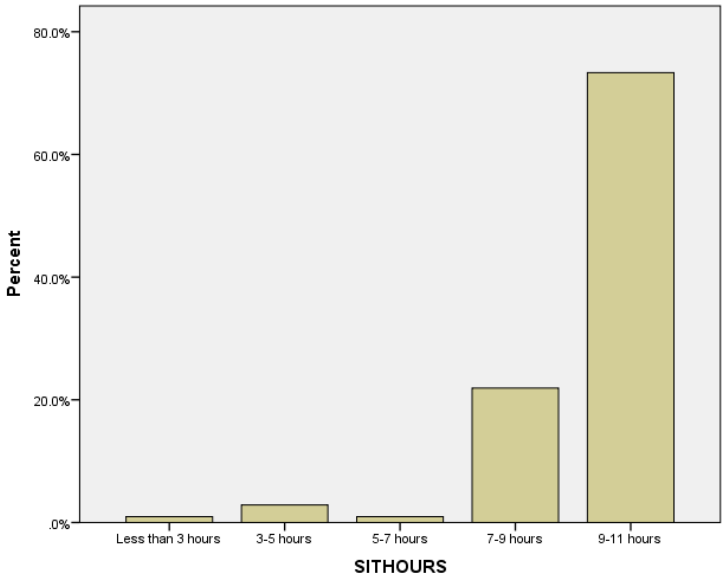

Figure 1. Number of hours in driver's seat.

Examining the variable of sleep, I examined sleep patterns on the road versus at home. Figure 2 demonstrates that almost half the drivers (46.2%) reported sleeping 7 to 8 hours a night on the road. The remainder (37.7%) reported sleeping 5 to 6 hours a night on the road. Very few reported sleeping 9 or more hours or 4 or less hours on the road.

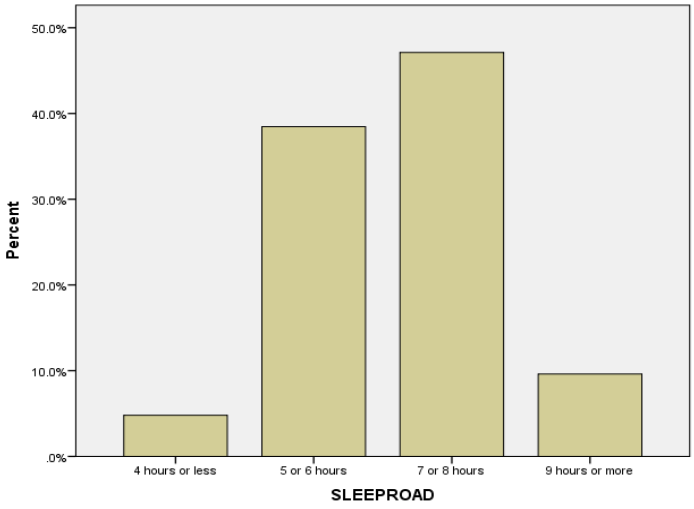

Figure 2. Hours of sleep on the road.

The results for sleeping at home was slightly different with more drivers (52.8%) reporting sleeping 7 to 8 hours a night at home, and about a third (26.4%) reporting sleeping 5 to 6 hours a night at home. The majority of the remainder (16%) reported sleeping at 9 or more hours at home. Figure 3 represents the findings for sleep at home.

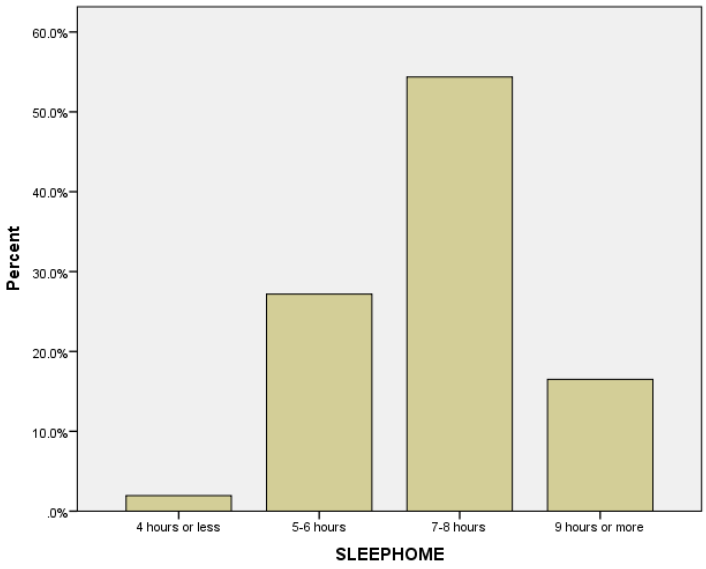

Figure 3. Hours of sleep at home.

Drivers were asked how many days in the last week did they feel they slept enough on the road. The largest part of the sample (26.2%) reported feeling as if they slept enough for 2 days of the last 7. A little less than one-third (21.7%) felt they had not slept enough at all. The majority of the sample did not report feeling as if they slept enough more than 2 out of the last 7 days. Table 6 shows the full distribution of the variable.

Table 6

Number of Days Drivers Felt They Slept Enough

Time	*N*	%
0 Days	23	21.7
1 Day	15	14.2
2 Days	25	23.6
3 Days	13	12.3
4 Days	4	3.8
5 Days	5	4.7
6 Days	8	7.5
7 Days	12	11.3

Respondents were asked about the way they ate through the week. Approximately 32.2% reported that they ate either 2-3 times per day or 5-6 times per day, which is a healthier way to eat. However, as Table 7 demonstrates, the largest response (40.6%) reported that the number of times food was eaten varied from day to day.

Table 7

Frequency of Meals/Snacks Eaten

Type of meal	Frequency %
5-6 small meals	6.6
3 meals a day/no snack	5.7
3 meals a day/ snacks	12.3
2 meals a day/snacks	14.2
1 meal a day/snacks	19.8
Varies	40.6

Next, I examined where OTRs got their food from. Over half (52.8%) reported getting food from Truck Stops and stores. Home and store bought were the next choice for the drivers sampled. The rest obtained food from either stores or Truck Stops, as demonstrated in Table 8.

Table 8

Sources of Food

Location	N	%
Truck Stops and Store	56	52.8
Home and Store Bought	25	23.6
Store Bought only	12	11.3
Truck Stop only	11	10.4

Respondents were asked how many meals a day were consumed on the road. Almost half (49.1%) reported at least one meal a day eaten on the road. About 20.8% reported not consuming any meals on the road, and 14.2% reported either at least two meals a day or all meals being consumed on the road. Table 12 shows the range of responses for this variable.

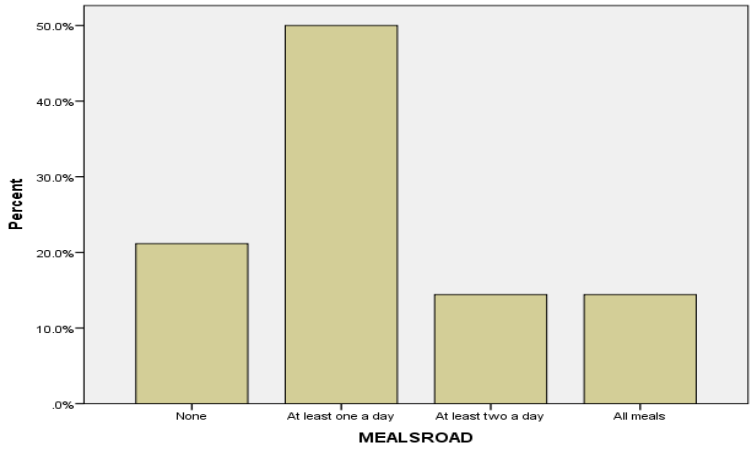

Figure 4. Meals on the Road

Finally, respondents were asked if they thought they had a healthy or unhealthy diet, and to what degree. The majority (63.3%) reported they thought they had some degree of an unhealthy diet. A little over one-third (35.9%) reported they thought they had some degree of a healthy diet. Table 9 represents the summary of the distribution of this variable.

Table 9

Healthy or Unhealthy Diet

Unhealthy	67	63.3
Healthy	38	35.9

Research Questions and Hypotheses

Research Questions

1. Are gender, nutrition, physical activity, and sleep the contributing factors of obesity among over-the-road truckers (OTRs)?

$H_0$1: Gender, nutrition, physical activity, and sleep have no impact on obesity among over-the-road truckers (OTRs).

H_a1: Gender, nutrition, physical activity, and sleep have a significant impact on obesity among over-the-road truckers (OTRs).

Statistical Plan: Independent variables= gender, nutrition, sleep, physical activity; Dependent variable= obesity; Statistical test was logistic regression to express findings in Odds Ratios and Confidence Intervals at the significance level (*Figure* 1).

Linear regression was used to analyze the relationship between the predictor variable of obesity and the independent variables. The only variable that proved to be statistically significant, however, was how many meals or snacks were consumed on the road (p=.004). This demonstrated that nutrition was a factor for obesity in this study, but the other hypothesized factors were not able to be proven. Therefore, for all other factors, the null hypothesis was proven.

2. Does the trucking environment, specifically truck stops and the hours of service, have an impact on the rates of obesity among OTRs?

$H_0$2: The trucking environment, specifically hours of service and truck stops, have no significant impact on obesity among OTRs

H_a2: The trucking environment, specifically hours of service and truck stops, have a significant impact on obesity among OTRs.

Statistical Plan: Independent variables = truck stops, hours of service; Statistical test was logistic regression to express findings in Odds Ratios and Confidence Intervals at the significance level (Table 14).

Linear regression was used to analyze the relationship between the predictor variable and the independent variables. The only variable that proved to be statistically significant was the environmental factor of where truckers got their food (truck stops) with a p-value of .008. Hours of service were not proven to be statistically significant, and the null hypothesis was proven. The variables of moderate physical activity, strength training, and sleep may have an impact on obesity, but this study was unable to establish statistical significance for that part of my research questions. Statistical Assumptions

In order to determine if my data for the independent variables is normally distributed, I conducted a Shapiro-Wilk Test of Normality. The results of this test indicated that my data was not normally distributed (p=.000). However, it is quite possible that the lack of normality was due to missing data and a small sample size (Field, 2009). I also ran a Q-Q plot to further explore normality. The Q-Q plot indicated that the variable for where truckers get their food and how much they eat on the road was fairly normally distributed. The variable BMI was not normally distributed, according to the Q-Q plot, and this may again be due to a small sample size.

Odds Ratios and Confidence Intervals

I examined the regression coefficient in the analysis to determine the Odds ratio for each independent variable (Szumilas, 2010). Table 10 is the output for the coefficients.

Table 10. Coefficients for Odds Ratios

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.790	.187		4.215	.000	.417	1.163
	GENDER	.008	.101	.009	.083	.934	-.192	.209
	VIGPHYS	-.018	.035	-.056	-.505	.615	-.087	.052
	MODPHYS	.027	.025	.116	1.061	.292	-.023	.077
	STRPHYS	-.051	.031	-.172	-1.658	.101	-.112	.010
	SLEEPROAD	-.108	.067	-.161	-1.601	.113	-.241	.026
	FOODSOURCE	-.079	.040	-.220	-1.961	.053	-.159	.001
	MEALSROAD	-.089	.056	-.175	-1.600	.113	-.199	.022

The Odds ratios for each of the independent variables were all less than 1, which would indicate a lower-odds for the outcome of Obesity, however there were two issues with the results (Szumilas, 2010). Only the variable FOODSOURCE was approaching

statistical significance, and the 95% confidence intervals were very wide. The large width of the CI would indicate low precision for the OR, most likely due to the sample size being fairly small in representativeness (Szumilas, 2010).

Chi-Square and ANOVA

The variable of Gender was examined to see if it cross-tabulated with the variable BMI. The data analysis output is represented in Table 11.

Table 11. Gender and BMI association

GENDER * BMI Crosstabulation

			BMI		
			Obese	Not Obese	Total
GENDER	Male	Count	25	10	35
		% within GENDER	71.4%	28.6%	100.0%
		% within BMI	36.2%	33.3%	35.4%
		% of Total	25.3%	10.1%	35.4%
	Female	Count	44	20	64
		% within GENDER	68.8%	31.3%	100.0%
		% within BMI	63.8%	66.7%	64.6%
		% of Total	44.4%	20.2%	64.6%
Total		Count	69	30	99
		% within GENDER	69.7%	30.3%	100.0%
		% within BMI	100.0%	100.0%	100.0%
		% of Total	69.7%	30.3%	100.0%

This output demonstrates that in this study, women were twice as likely as men to be obese. The Pearson's Chi Square result indicated that the association between BMI and Gender were approaching statistical significance (.077) as seen in Table 12, but did not obtain full statistical significance as defined in this study (.05).

Table 12. Chi Square Gender and BMI

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.077[a]	1	.782		
Continuity Correction[b]	.002	1	.961		
Likelihood Ratio	.077	1	.781		
Fisher's Exact Test				.823	.484
Linear-by-Linear Association	.076	1	.783		
N of Valid Cases	99				

All other variables (physical activity, nutrition, and sleep) were cross tabulated with gender, but none proved to be statistically significant.

Next, Gender was cross tabulated using the Pearson's Chi Square result with the environmental variables of hours driving and how many times a day food was consumed to see if there was an association between these variables. None of these variables proved to be statistically significant.

Finally, a one-way ANOVA was conducted to compare means between groups and determine if the null hypotheses were correct. The one-way ANOVA was conducted between BMI and each of the following groups: Gender, vigorous physical activity, moderate physical activity, strength training, hours of sleep on the road, sources of food, and meals eaten on the road. Only two variables had statistically significant results. Sources of food proved statistically significant with an outcome of .016. Meals eaten on the road proved to be statistically significant with an outcome of .011. This coincides

with the logistic analysis of both of these variables. The alternative hypotheses are only correct for these two variables. Table 13 shows the full ANOVA results.

Table 13. ANOVA.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
GENDER	Between Groups	.018	1	.018	.075	.784
	Within Groups	22.609	97	.233		
	Total	22.626	98			
VIGPHYS	Between Groups	.151	1	.151	.067	.796
	Within Groups	215.685	96	2.247		
	Total	215.837	97			
MODPHYS	Between Groups	8.512	1	8.512	2.066	.154
	Within Groups	387.321	94	4.120		
	Total	395.833	95			
STRPHYS	Between Groups	3.998	1	3.998	1.666	.200
	Within Groups	230.421	96	2.400		
	Total	234.418	97			
SLEEPROAD	Between Groups	.916	1	.916	1.898	.172
	Within Groups	46.349	96	.483		
	Total	47.265	97			
FOODSOURCE	Between Groups	9.776	1	9.776	6.024	.016
	Within Groups	155.785	96	1.623		
	Total	165.561	97			
MEALSROAD	Between Groups	5.620	1	5.620	6.770	.011
	Within Groups	79.696	96	.830		
	Total	85.316	97			

Summary and Transition

The population of Over the Road Truckers (OTRs) was represented in this chapter through the use of descriptive statistics. The research questions, including the null and alternative hypotheses, were reviewed and tested using linear regression analyses, Chi-Square and ANOVA. The first research question examined the dependent variable of Obesity and which of the independent variables (gender, nutrition, physical activity, and sleep) might be a contributing factor of obesity among this population. The results indicated that the only nutrition proved to be statistically significant, with all other variables supporting the null hypothesis. The second question examined if the trucking environment, specifically truck stops and hours of service where contributing factors to obesity among this population. The results indicated that truck stops, the source of food for the majority of those sampled, were statistically significant. However, the hours of service supported the null hypothesis. Chapter 5 discusses the interpretation of my findings, the limitations of my study, recommendations for future study, and implications for social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to examine the impact of gender, physical activity, diet, and sleep on obesity among OTRs. Obesity is an epidemic that is proving to be a considerable burden on the trucking industry because of the physical consequences and health issues that it impacts. These issues create a problem for OTRs because they must remain medically certified to drive. The sections in this chapter include Characteristics of the Sample, Interpretation of the Findings, Limitations of the Study, Recommendations for Future Study, and Implications for Social Change.

Characteristics of Sample

The characteristics of my sample were somewhat different than I had expected. Far more women than men participated in the study (67 women, 38 men). This was unexpected given that the data regarding the gender distribution of this population indicate a significantly higher number of men than women. For example, Layne and Randolph (2009) cited that women make up approximately 12 to 15% of the overall trucking workforce. If this is correct, then I had expected that my sample would follow similar patterns. However, this was not the case. My sample consisted of almost twice as many women as men. What contributes to this variance is still in question and would require more in depth analysis or a larger sample with more power.

In the sample, women were almost twice as likely to be identified as obese, which was also not expected, 65.1% versus 28.3%, as data related to obesity among genders shows only a slightly higher prevalence. Ogden et al. (2014) discussed rates of

obesity between genders, with females having slightly higher rates than males. The CDC (2014) concluded that women have higher rates of obesity than men, but not to the extent found in my sample. This is most likely because the sample itself had almost twice as many females as males, which is not a characteristic sample. The sample size and genders associated with it are most likely why the rate of obesity within the sample was unexpected.

The sample consisted of more company drivers than owner/operators (66 company, 38 owner/operator), which is consistent with my expectations given the data regarding this population. According to the OOIDA Foundation (2012), there are approximately 350,000 to 400,000 owner operators and approximately 2.6 million company drivers. There are, however, contrasting data from the same year by the Bureau of Labor and Statistics who stated there are approximately 1.7 million drivers on the road. Taking either source into account, I expected to have a sample with a much larger representation of company drivers than owner operators. The rest of the data analyses regarding the independent variables that represent the characteristics of my sample were mostly unexpected , which I discuss in the next section.

Interpretation of the Findings

This study adds to the body of knowledge regarding obesity and the population known as OTRs by examining two research questions and hypotheses:

1. Are gender, nutrition, physical activity, and sleep the contributing factors of obesity among over-the-road truckers (OTRs)?

$H_0$1: Gender, nutrition, physical activity, and sleep have no impact on obesity among over-the-road truckers (OTRs).

H_a1: Gender, nutrition, physical activity, and sleep have a significant impact on obesity among over-the-road truckers (OTRs).

Based on the hypotheses testing of this question, the majority of the null hypothesis was proven. The alternative hypothesis regarding the variable of nutrition was the only one to be proven. Therefore, it can be concluded that nutrition has a significant impact on obesity among OTRs.

2. Does the trucking environment, including both truck stops and the hours of service, have an impact on the rates of obesity among OTRs?

My hypothesis was that the trucking environment, particularly hours of service and obesity, has a significant impact on obesity among OTRs.

$H_0$2: The trucking environment, specifically hours of service and truck stops, has no significant impact on obesity among OTRs.

H_a2: The trucking environment, specifically hours of service and truck stops, have a significant impact on obesity among OTRs.

Based on the hypothesis testing of this question, one part of the null hypothesis was proven. The alternative hypothesis regarding truck stops was proven. Therefore, it can be concluded that the trucking environment, specifically truck stops, has a significant impact among OTRs.

Logistic regression demonstrated that the relationship between obesity and moderate physical exercise, strength training, and sleep on the road approached statistical

significance. Those who did not exercise at least moderately, did not do strength training, or did not sleep enough were potentially more likely to be obese. These outcomes are similar to the study completed by King et al. (2001), which demonstrated the prevalence of obesity among sedentary workers. A more recent study completed by Sieber et al. (2014) had similar findings to my study when they examined the health implications for truck drivers in the United States. As with the findings of my study, which found that many of the participants who were obese were also not physically active or sleeping 7 hours or more a night, the authors found that truckers who were identified as obese reported engaging in no physical activity and having 6 or less hours of sleep a day on the road (Sieber et al., 2014). Linear regression demonstrated statistically significant relationships between obesity and environment, specifically where truckers got their food and how many meals they consumed on the road. The study conducted by Apostolopoulos et al. (2011) had similar results. Apostolopoulos et al. also found that truckers who ate mostly at truck stops or restaurants often made unhealthy food choices and that these truckers were classified as overweight or obese. The results of my study indicate that those who obtain their food at truck stops and stores and who consume at least one meal on the road are more likely to be obese.

Cross tabulation to examine the relationship between gender and obesity approached statistical significance, demonstrating that female truckers were more likely to be obese than male truckers. This is fairly similar to CDC (2014) data regarding obesity among genders. Finally, the ANOVA results demonstrated a statistically significant result for where truckers got their food from and how many meals consumed

on the road. This hypothesis test confirmed the alternative hypotheses regarding obesity and nutrition as well as obesity and the environment. The impact of this variable on obesity among this population is further evidenced and supported by the research Prawitz and Lukazuk (2007) who found truckers are not necessarily concerned about where they get their food from, and though there are more healthy choices available today than when they completed their study, the results of this study indicate that they are still choosing to consume food from less healthy environments.

Limitations

There were many limitations with this study. The first limitation was the small sample size. The number of OTRs employed in the United States is over 1.7 million (Bureau of Labor and Statistics, 2012). A representative sample with enough power would have been approximately 383 or higher. A much larger sample would have yielded much more powerful results. Recruitment was extremely challenging. There were a large number of sources recruiting for the survey, including a major truck stop company, Pilot/Flying J. However, the survey was not able to be featured other than as a mention on a Facebook page. If one of the companies had been willing to highlight the study, it may have resulted in a larger sample. I had very limited resources and was not able to offer any incentives that would be approved by IRB. An incentive of a gift card or even cash would most likely have inspired more participation.

The small sample size yielded several other limitations. There is a much smaller population of female OTRs compared to male OTRs (Layne & Randolph, 2009). However, this study had a gender breakdown of 67 females and 38 males. Such a

disproportionate gender breakdown presents a limitation to the study. The sample is not representative of the OTR population as it is currently understood. Another limitation is in reference to the logistic regression analysis. The odds ratios were not reliable because the confidence intervals were too wide. This is also most likely due to the small sample size. It is also most likely that the small sample size impacted all of the logistic regression, cross tabulation, and ANOVA analyses. The inability to prove the alternative hypothesis may be limited by the sample size, especially since the descriptive analysis demonstrates outcomes of variables that would under normal circumstances have an association or relationship with obesity. The analyses that produced outcomes that approached statistical significance were also most likely limited by sample size.

Recommendations for Future Study

Despite the limitations, this study is compelling. Many of the independent variables suggest an impact on the dependent variable of obesity, as the results of the analysis where observed approaching statistical significance for these variables (sleep, gender, nutrition) but did not meet the standard of $p < .05$. Based on the findings of my study, a larger, more comprehensive study is warranted because further study will provide more information about the specific variables that contribute to obesity among this population. The issue of obesity among OTRs is a significant public health issue and one that warrants more research because of how negatively obesity is impacting the trucking population. This in turn impacts the industry by the loss of available drivers due to denied medical certifications or health complications tied to obesity.

The limitation of no incentives definitely impacted this study. Offering an incentive will more than likely increase participation of the target population. An incentive such as a gift card to a popular website or shop would more than likely generate more participation. Most drivers are very busy and require something to incentivize them to participate.

Offering a gift card from a popular truck stop would motivate this population to participate. If a relationship with one of the major trucking companies or major truck stop companies could be established and the study promoted by one or more of these companies, a gift card from the same would enhance participation.

Gender was a limitation due to the representativeness of the sample. Diversifying the sources for participants more intentionally may alter the gender of participants. Future researchers should make every effort to recruit participants from sources that cater to the trucking population that were not used in this study.

This study was limited by unreliable odds ratios. Obtaining sufficient resources to motivate a sufficient sample size will reduce confidence intervals and create more reliable odds ratios. Incentivizing participants and expanding sources for the sample should result in a larger more sufficiently representative sample and thus create more reliable outcomes.

Implications for Social Change

The trucking population known as OTRs are a small but vital population to both our way of life and our economy. Trucks move every type of item consumed or used by the general population. OTRs also represent one of the unhealthiest populations in the

country, with estimates as high as 85% of OTRs being overweight or obese (Apostolopoulos et al., 2011). From a public health perspective, this population is challenging. They must balance the demands of their job with the need to remain healthy enough to pass a required medical certification and comply with federal regulations. Obesity is the greatest health issue for this population and is linked to most of the other health issues that impact this population. Studies like this can inform policy makers and the trucking industry culture through a better understanding of what impacts obesity among OTRs, which has the potential for positive social change. A healthier OTR population with lower levels of obesity equals a more qualified workforce and a healthier trucking environment. Health policy makers can research and develop programs that create a culture of health and wellness among this population. The trucking industry can then adopt these policies and programs, which will also work toward creating a culture of health and wellness that results in positive social change. The positive social change comes from transforming an industry and policy framework that contributes to obesity into one that supports a healthy work environment and healthier lifestyles through applying research like this study into program and policy development.

Conclusion

This study is one of the first to address the OTR population and obesity examining the specific independent variables of nutrition, sleep, physical activity, and gender as potential contributing factors of obesity. Most studies have addressed one or two factors related to obesity. I attempted to look at all the factors that have been implicated in obesity among this population based on a variety of sources. My findings

are compelling, but my small sample size impacts generalizability. It is clear that nutrition and truck stop environments are contributing factors of obesity, even with a small sample. However, with several variables approaching statistical significance, and the various limitations of my study, more opportunities to research the independent variables are needed. The health and wellness of this population is important because of the serious health issues that are currently affecting this population and because of the role truckers play in our economy. A healthier trucking environment and trucking population will ensure stability in the workforce and positive social change resulting in better public health outcomes.

References

Anonymous, (2006). Truckers break the waist barrier. *Nursing Standard, 20*(38), 9. Retrieved from Academic Search Complete database.

Anonymous, (2007). Trucking magazine helps drivers' battle obesity; five long-haul truckers participate in year-long fit for the road program. *Truckers Magazine.* 06 Mar 2007. Retrieved from http://search.proquest.com.ezp.waldenulibrary.org/docview/447530655?accountid=14872

Anonymous, (2009). OSA in truck drivers may require federally-mandated screening. *Journal of Environmental and Occupational Medicine. 14*(4), 22. Retrieved from journals.lww.com/joem

Apostolopoulos, Y., Sonmez, S., Shattell, M., Belzer, M. (2010). Worksite-induced morbidities among truck drivers in the United States. American Association of Occupational Health Nurses Journal. Retrieved from: http://www.uncg.edu/phe/Apostolopoulos-AAOHN-Worksite%20Induced%20Morbidities.pdf

Apostolopoulos, Y., Sonmez, S., Shattell, M., Haldeman, L., Strack, R., & Jones, V. (2011). Barriers to truck drivers' healthy eating: Environmental influences and health promotion strategies. *Journal of Workplace Behavioral Health, 26*(2), 122-143.

Baskin, M. L., Ard, J., Franklin, F., & Allison, D. B., (2005). Prevalence of obesity in the United States. *Obesity Reviews,* 6(1), 5-7. doi: 10.1111/j.1467-789X.2005.00165.x

Caban, A., Lee, D., Fleming, L., Gómez-Marín, O., et al. (2005). Obesity in US workers: The national health interview survey, 1986 to 2002. *American Journal of Public Health, 95* (9), 1614-22.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Reports (Washington, D.C.: 1974), 100(2), 126-131.

Centers for Disease Control and Prevention (CDC), (2010). Vital signs: Adult obesity. Retrieved from http://www.cdc.gov/vitalsigns/AdultObesity/index.html

Centers for Disease Control and Prevention (CDC), (2011). Body mass index. Retrieved from: http://www.cdc.gov/healthyweight/assessing/bmi/index.html

Centers for Disease Control and Prevention (CDC), (2011). Translating practice based evidence and research. Retrieved from http://www.cdc.gov/chronicdisease/resources/publications/AAG/obesity.htm

Centers for Disease Control and Prevention (CDC), (2013). Healthy weight-it's not a diet it's a lifestyle! Retrieved fromhttp://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/english_bmi_calculator/bmi_calculator.html

Centers for Disease Control and Prevention (CDC), (2013). Healthy weight-it's not a diet it's a lifestyle! About BMI for adults. Retrieved fromhttp://www.cdc.gov/healthyweight/assessing/bmi/adult_BMI/index.html

Centers for Disease Control and Prevention (CDC). (2013). Overweight and obesity: Adult obesity facts. Retrieved fromhttp://www.cdc.gov/obesity/data/adult.html

Centers for Disease Control and Prevention (CDC), (2014). Adult obesity facts. Socioeconomic status and obesity. Retrieved from http://www.cdc.gov/obesity/data/adult.html#Groups

Centers for Disease Control and Prevention (CDC), (2014). The 2013-2014 national health and nutrition examination survey (NHANES): Questionnaires. Retrieved from http://www.cdc.gov/nchs/nhanes/nhanes2013-2014/questionnaires13_14.htm

Centers for Disease Control and Prevention, (2014). The social-ecological model: a framework for prevention. Retrieved fromhttp://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html

Centers for Disease Control and Prevention (CDC), (2015). About adult BMI. How is BMI calculated? Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/

Centers for Disease Control and Prevention (CDC), (2015). 2013-2014 National health and nutritional examination survey (NHANES). Dietary behavior. Retrieved from http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/DBQ_H.pdf

Daddario, D. K. (2007). A review of the use of the health belief model for weight management. *MEDSURG Nursing*, *16*(6), 363-366.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Federal Motor Carrier Safety Administration, (2013). Part 395 hours of service for drivers: § 395.3: Maximum driving time for property-carrying vehicles. Retrieved from http://www.fmcsa.dot.gov/regulations/title49/section/395.3

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Los Angeles, CA:SAGE Publications.

Gates, D., Brehm, B., Hutton, S., Singler, M., & Poeppelman, A. (2006). Changing the work environment to promote wellness: a focus group study. *AAOHN Journal, 54*(12), 515-520.

King, G. A., Fitzugh, E. C., Bassett Jr., D. R., McLaughlin, J. E., Strath, S.J., Swartz, A.M., & Thompson, D. L., (2001). Relationship of leisure-time physical activity and occupational activity to the prevalence of obesity. *International Journal of Obesity, 25*(2001), 606-612.

Layne, D., Rogers, B., & Randolph, S. (2009). Health and gender comparisons in the long-haul trucking industry. *Journal of American Association of Occupational Health Nurses, 57*(10), 405-413. doi: 10.3928/08910162-20090916-01

Marqueze, E., Ulhôa, M., & Moreno, C. (2012). Irregular working times and metabolic disorders among truck drivers: a review. *Work (Reading, Mass.), 41*,3718-3725. doi:10.3233/WOR-2012-0085-3718

Moreno, C. R. C., Louzada, F. M., Teixiera, L. R., Borges, F., & Lorenzi-Filho, G. (2006). Short sleep is associated with obesity among truckers. *Chronobiology International, 23*(6). 1295-1303. doi: 10.1080/07420520601089521

Muennig, P., Lubetkin, E., , Jia, H., & Franks, P. (2006). Gender and the burden of disease attributable to obesity. *American Journal of Public Health*, *96*(9), 1662–1668. doi: 10.2105/AJPH.2005.068874

Norusis, M., J. (2010). *PASW statistics 18: Guide to data analysis*. Upper Saddle River, NJ: Prentice Hall.

National Center for Health Statistics (NCHS). (2010). NCHS data brief, no. 50. Obesity and socioeconomic status in adults: United states, 2005-2008. Retrieved from http://www.cdc.gov/nchs/data/databriefs/db50.pdf

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *JAMA: Journal Of The American Medical Association*, 311(8), 806-814. doi:10.1001/jama.2014.732

OOIDA Foundation, (2012) Industry Facts. Retrieved fromhttp://www.ooida.com/OOIDA%20Foundation/Tools/industry-facts.asp

Roberts, S., York, J. (2000). Design, development, and evaluation of driver wellness programs: Final report. Retrieved from http://www.fmcsa.dot.gov/facts-research/research-technology/report/driver-wellness.htm

Rosenstock, I.M., Stretcher, V.J., & Becker, M.H. (1988). Social Learning Theory and the Health Belief Model. *Health Education Quarterly,* 15(2), 175-183.

Sieber, W. K., Robinson, C. F., Birdsey, J., Chen, G. X., Hitchcock, E. M., Lincoln, J. E., … Sweeney, M. H. (2014). Obesity and Other Risk Factors: The National Survey of U.S. Long-Haul Truck Driver Health and Injury. *American Journal of Industrial Medicine*, 57(6), 615–626. Retrieved from http://doi.org/10.1002/ajim.22293

Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion*, 10(4), 282-298.

Szumilas, M. (2010). Explaining Odds Ratios. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 19(3), 227–229.

Smith, B., Phillips, B.A., (2011). Truckers drive their own assessment for sleep apnea: A collaborative approach to online self-assessment for obstructive sleep apnea. Retrieved from http://bensmith.zapto.org/papers/jcsm2011.pdf

Trone, Daniel, W. (2007). Factors associated with discharge during marine corps basic training. *Military Medicine*, 172, 9(936), 936-941.

Trucking. Net website U.S Statistics. (2009) http://www.truckinfo.net/trucking/stats.htm

United States Department of Agriculture (USDA), (2014). ChooseMyPlate.gov: Daily food plans and worksheets. Retrieved from http://www.choosemyplate.gov/supertracker-tools/daily-food-plans.html

U.S. Bureau of Labor and Statistics. (2012) Occupational outlook handbook: Heavy and tractor trailer drivers. Retrieved from http://www.bls.gov/ooh/transportation-and-material-moving/heavy-and-tractor-trailer-truck-drivers.htm

U.S. Department of Health and Human Services, (2010). Dietary guidelines for americans. Retrieved from http://www.hhs.gov/news/press/2011pres/01/20110131a.html

U.S. Department of Transportation; Federal Motor Carrier Safety Administration, (n.d.). Qualifications of drivers or operators (**§ 398.3)**. Retrieved from http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.aspx?reg=398.3&keyword=age

U.S. Department of Transportation, Federal Motor Carrier Safety Administration, (n.d.). Medical programs. Retrieved from http://www.fmcsa.dot.gov/rules-regulations/topics/medical/medical.htm

Whitfield, P., Prawitz, P., Lukaszuk, A. (2007). Long-Haul truck drivers want healthful meal options at truck-stop restaurants. *Journal of the American Dietetic Association*. 107(12), 2125-2129. doi:10.1016/j.jada.2007.09.003

Yun. S., Zhu, B-P, Black, W., Brownson, R.C. (2006). A comparison of national estimates of obesity prevalence from the behavioral risk factor surveillance system and the national health and nutrition examination survey. *International Journal of Obesity*, 30 (2006). 164-170.

Weiss, S. (2013). 10-4 for life! A public health promotion for truckers using intervention mapping. PUBH 8220. Spring, 2013. Walden University.

Wiegand, D. M., Hanowski, R. J., & McDonald, S. E. (2009). Commercial drivers' health: a naturalistic study of body mass index, fatigue, and involvement in

safety-critical events. *Traffic Injury Prevention*, 10(6), 573-579. doi:10.1080/15389580903295277

Appendix A: Survey Instrument

Contributing Factors of Obesity among OTRs Survey

This survey is designed to collect information about individual behaviors in the areas of health and wellness, nutrition, physical activity, sleep, and gender for Over the Road Truckers (OTRs). This information will be used to examine what, if any of these things, may impact the rates of obesity among OTRs. All information will be treated as confidential and no identifying data will be collected. Please answer all the questions as accurately and honestly as possible.

Descriptive Data

1. Do you identify as male or female?
    a. Male
    b. Female
2. Are you at least 21 years of age?
    a. Yes
    b. No
3. How old are you?
4. How many years have you been driving a truck?
5. Are you an owner/operator or company driver?
    a. Owner/Operator
    b. Company Driver
    c. Other: _____

Biometric Data (some questions adapted from BLU HLC Survey 2013)

1. How much do you weigh (in pounds)?
2. What is your height? (answer will be divided by 12 to get exact inches)
3. BMI calculation will be done using the CDC (2013) standardized calculation of: weight (lbs.)/ [height (inches)] ^{2} x 703. This will be put in a separate column in the data analysis
    a. Yes
    b. No
    c. Don't know/Unsure

Physical Activity (adapted from BLU HLC Survey 2013)

4. On how many of the past 7 days did you exercise or take part in vigorous physical activity that made your heart beat fast and made you breathe hard for at least 20 minutes? (For example: basketball, soccer, running or jogging, fast dancing, swimming laps, tennis, fast bicycling, or similar aerobic activities)
    a. 0 days
    b. 1 day
    c. 2 days

   d. 3 days
   e. 4 days
   f. 5 days
   g. 6 days
   h. 7 days
5. On how many of the past 7 days did you take part in moderate physical activity or exercise for at least 30 minutes where you had only small increases in your breathing or heart rate, such as fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors?
   a. 0 days
   b. 1 day
   c. 2 days
   d. 3 days
   e. 4 days
   f. 5 days
   g. 6 days
   h. 7 days
6. On how many of the past 7 days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?
   a. 0 days
   b. 1 day
   c. 2 days
   d. 3 days
   e. 4 days
   f. 5 days
   g. 6 days
   h. 7 days
7. Do you exercise more on the road or at home?
   a. I exercise the same amount no matter where I am
   b. I exercise more on the road
   c. I exercise more at home
   d. I don't exercise in either place
8. How many hours a day, on average do you spend in the driver's seat (sitting or driving)?
   a. 9-11 hours
   b. 7-9 hours
   c. 5-7 hours
   d. 3-5 hours
   e. Less than 3 hours

Sleep Activity (adapted from BLU HLC Survey 2013)

9. During time on the road, how many hours per night do you usually sleep?
    a. 4 hours or less
    b. 5 or 6 hours
    c. 7 or 8 hours
    d. 9 hours or more
10. During time at home and not on the road, how many hours per night do you usually sleep?
    a. 4 hours or less
    b. 5 or 6 hours
    c. 7 or 8 hours
    d. 9 hours or more

11. During the past week, how many days did you feel that you did not get enough rest or sleep?
    a. 0 days
    b. 1 day
    c. 2 days
    d. 3 days
    e. 4 days
    f. 5 days
    g. 6 days
    h. 7 days

Nutrition (some questions adapted from NHANES 2013)

1. How many times do you eat during the day?
    a. I eat 3 meals a day and no snacking
    b. I eat 3 meals and day and some snacks
    c. I eat one big meal a day and eat snacks the rest of the time
    d. I eat two meals a day and snack the rest of the time
    e. I eat 5 or 6 small meals a day
    f. I eat when I can, it varies from day to day

2. Where do you get your food from?
    a. Truck Stops only
    b. Truck Stops and some store bought food (Walmart, supermarket, etc.)
    c. Store bought food only (Walmart, supermarket, etc.).
    d. Home only
    e. Home and Store bought (Walmart, supermarket, etc.)
3. How healthy do you consider your overall diet to be?
    a. Extremely healthy
    b. Very Healthy
    c. Healthy

   d. Somewhat Unhealthy
   e. Unhealthy
   f. Very Unhealthy
4. On average, how many meals per week do you eat that are not prepared at a home or in your truck? Please include meals from both dine-in and carry out restaurants, cafeterias, fast-food places, food courts, food stands, meals prepared at a grocery store, and meals from vending machines.
   a. None
   b. At least one a day
   c. At least two a day
   d. All meals

References:

I do not have the direct citation for the BLU HLC Survey2013 but I have written the author for permission and proper citation information.

Centers for Disease Control and Prevention (CDC). 2013-2014 National health and nutritional examination survey (NHANES). Dietary behavior. Retrieved from http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/DBQ_H.pdf (public domain)