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Association between Obesity, Socioeconomics, Mental Illness, and Education in Native American Communities

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Walden University
2020

Abstract

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by

Darrell D. Wright

MS, Columbia Southern University, 2012

BS, Columbia Southern University 2011

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

Obesity is a profound health epidemic that adversely affects the health of all ethnicities. This growing health crisis has been found to be linked to several chronic diseases such as stroke, diabetes, and several forms of cancer. As in Native American populations, increased morbidity and mortality rates associated with obesity prevalence in minority populations has been linked to variables such as income, education, mental illness, and age. The purpose of this research was to examine the association of obesity with socioeconomic status, education, mental illness, and age in Native American populations. The theoretical framework used in this study was based on the socioecological model. The rationale for selection of the socioecological model was that it would increase opportunities to achieve positive social change by educating and encouraging healthy behaviors for Native American youths and young adults so that learned behaviors would transcend to the interpersonal, community, and organizational levels of the model. A quantitative research approach was applied using secondary data from the 2017 Behavioral Risk Factor Surveillance System. Descriptive, bivariate, and correlation analyses were used to examine the associations between variables believed to predict obesity in Native American populations. Results revealed that obesity was significantly associated with income level, education level and age level, but all relationships were noted as weak. Social change can be achieved by implementing new and improved policies to address the needs of Native American communities, as described in this study.

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Dedication

This research study is dedicated to my God, who strengthens me and instills the undying dedication and perseverance to complete what He has ordained, so it be written in His words by my hand. This research is dedicated to my father, the late Willie L. Wright Sr., and my mother, Elizabeth J. Wright, educator, and mentor to thousands of children and young adults who embraced education with a passion for excellence. This study is also dedicated to my wife, Pamela G. Wright, who has embraced and endured the challenges of what it has taken to complete my research.

Acknowledgments

I am thankful to God, who has strengthened and empowered me, in good health, and a positive spirit, to complete my research. I am thankful for my children, Darrell and Keylan, who has always been sincere, supportive, and unselfish throughout the time taken to complete my research.

I am grateful for my home church, Mount Olive Baptist, who provided me a spiritual foundation, rich with educators and professionals alike, who continues to lead by example with pride, commitment, and dedication to spiritual and community health. I am also grateful for my place of worship, New Birth Missionary Baptist, who leads with excellence, provides care to many around the world, and continues to be a positive spiritual influence to millions.

I am thankful for my Walden University Health Science Committee members: Dr. Vibha Kumar (Chairperson), Dr. Vasileios Margaritas (Member), and Dr. Namgyal L. Kyulo (University Research Reviewer); all of which were always professional, patient, and unselfish in sharing their wisdom, experience, for recommendations for the betterment of my research.

To the many health care workers around the world, especially those in Public Health, who at this time are embattled with research, treating patients, and tirelessly fighting coronavirus, it is an honor for me to join the fight in protecting the health of veterans who have been subjected to this world pandemic known as COVID-19. As I have for more than a decade, it my pledge to continue dedicating my time, my work, and my abilities to helping and protecting those like myself, who have burdened the fight of

honorably protecting these United States. It is with this pledge that many fallen veterans entrust advocates like me, to account for the health, protection, and wellbeing of their widow and orphans that I be deemed worthy to accept.

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Section 1: Foundation of the Study and Literature Review

Introduction

This study is focused on the growing obesity problem and minority populations. Although the relationship between obesity and socioeconomic status is not limited to minority populations, the ongoing trends in research illustrate that several minority populations may be vulnerable to social determinants of health that predict increases in obesity statistics and chronic diseases (Gustafson, 2013). This holds true for Native Americans who may be one of the most underserved populations in the United States. According to Norris, Vines, and Hoeffel (2012), the United States Census Bureau defines an American Indian or Alaskan Native as a person having origins in any of the original peoples of North America, South America, or Central America who maintain tribal affiliation or community attachment. Additionally, Norris, Vines, and Hoeffel reported that in 2010 more than 5 million American Indians and Alaskan Natives registered for the 2010 Census with most being of Cherokee tribal affiliation residing in the Western region of the United States.

Similar to many other populations, American Indian populations experience sociodemographic factors such as poverty, unemployment, domestic violence, sexual assault, alcoholism, and drug addiction has manifested to a lifestyle of hopelessness that has been adopted by many in the 566 Native American tribes (Horwitz, 2014). This decline in quality of sociodemographic issues substantiates the need for additional research in determining how adverse impacts of substandard education statistics increases obesity, how stress related to declining economics increases obesity, and how mental

illnesses such as depression may have significant influences on health and mortality statistics in Native American communities. Unfortunately, population-based research on Native American communities seems to be limited thus resulting in limited interventions designed to reduce prevalence of disease as well as the social ills that lead to increased obesity and health risks. According to Schell and Gallo (2012), overweight and obesity rates for Native American children, adolescents, and adults tend to be notably higher than corresponding rates for the general U.S. population. For obesity studies conducted in Native American communities, one of the primary objectives is to design interventions that produce positive effects on a generational scale, thus improving generalizability to future generations (Schell & Gallo, 2012).Therefore, my study focused on income, education, mental illness, and age, all of which are social determinants of health that relate to increased incidence and prevalence of obesity in Native American communities. The relevance of this research was to illustrate the profound need for improved policies that address the ills of Native American communities. Statements by researchers of limited population-based research in Native American communities that sample sizes were too small to produce significant findings and generalizations is problematic and limits the ability for change. There is significant need for increases in government programs and policies that may afford Native American communities the same rights and benefits as other recognized races and ethnic populations (Hodge, Cantrell, & Kim, 2011).

Problem Statement

While obesity is known as a growing epidemic in the United States, it is highly disconcerting that obesity rates among American Indians exceed those of the general population (Hodge et al., 2011). Studies assessing the ethnic and racial susceptibility to metabolic dysfunction and obesity in the United States have identified that African Americans, Hispanics, and people of Native American ancestry are more prone to obesity, cardiovascular disease, and diabetes than Whites of European ancestry and people of East Asian ancestry such as Chinese, Japanese, and Koreans (Sellayah, Cagampang, & Cox, 2014). The prevalence of American adults who are at least 100 pounds overweight has risen dramatically in the past decade (Hodge et al., 2011). For instance, 31% of those aged 20–74 years in the general population were categorized as obese in 1999–2004, as compared to just 14% in 1976–1980 (Hodge et al., 2011). According to Hodge et al. (2011), rates of obesity have been steadily increasing over the past 30 years; a trend largely attributed to Americans consuming diets high in fat and calories and living sedentary lifestyles. According to Sequist, Cullen, and Acton (2011), American Indians and Alaska Natives, represented 1.7% of the U.S. population in 2010; and further concluded that obesity affects one out of every three Native Americans.

According to research conducted by Hodge et al. (2011) the age-adjusted percentage of obese American Indian adults was 34%, which was almost 60% higher than that reported for non-Hispanic Whites. It is further emphasized by Hodge et al. that American Indian obesity rates are not only higher than those for the general U.S. population, they are also now higher than any other ethnic group except for Black

females whose obesity rates are similarly in the 30–37% range. At one time, morbid obesity was thought to be an uncommon and rare condition found only among a few individuals. However, research is showing an increased trend towards morbid obesity across all sectors of the American public (Hodge et al. 2011). Factors associated with morbid obesity include genetics, as well as metabolic, environmental, behavioral and socioeconomic influences, yet there may be other complex factors attributed to the increased prevalence of morbid obesity, particularly among minority groups (Hodge et al., 2011). Hodge et al. concluded that exploration into areas of culture, socio-demographic characteristics and health status need to be examined to identify potential contributors to morbid obesity.

Morbid obesity is particularly troubling to communities because individuals with massive weight gain face a greater probability of disability, associated healthcare costs, and lost productivity (Hodge et al., 2011). The negative consequences of obesity are said to potentially exceed those of smoking and alcohol consumption (Hodge et al., 2011). Even more, the challenges of quantifying the health issues by using national health surveys illustrate the difficulty of measuring obesity rates in American Indians communities. Several hindering factors such as remote reservation environments and mistrust towards outside researchers make it difficult to ascertain true estimates of the prevalence and temporal trends of morbid obesity among rural American Indians (Hodge et al., 2011).

The magnitude of the obesity problem is not limited to the issue itself but exacerbates the origin of multiple chronic diseases. Ogden, Carroll, Kit, and Flegal

(2014) concluded that Americans whose body mass index (BMI) is greater than 30% are clinically considered obese; and non-Hispanic blacks age 40 to 59 have the highest age-adjusted rates of obesity (Centers for Disease Control and Prevention, 2015). The Centers for Disease Control and Prevention (CDC; 2015) concluded that more than one-third (34.9%) of U.S. adults (78.6 million) are obese, and that obesity related conditions include heart disease, stroke, Type 2 diabetes, and certain types of cancers. This is consistent with the 2013 *State of Health in the U.S.*, report written by the United States Department of Health and Human Services (HHS; 2014) which illustrated the link between obesity and poverty that further exemplified the need for policy intervention to address declining socioeconomic status in African-American and other minority communities. In addition, HHS (2010) concluded that income and education may be the defining factors in obesity trends, and that African-American women obesity trends illustrate increase with wealth while African-American male obesity statistics illustrated consistency.

Native Americans, like African American populations, also experience significant obesity trends that originate from similar social determinants of health. For example, Peralta (2014) reported that Native Americans continue to grapple with unemployment levels nearly double that of the overall population, have higher poverty rates, and are behind in education attainment. The 5.2 million Native Americans in the United States represent a small fraction of the U.S. work force but have significantly higher unemployment rates than many other racial and ethnic groups. Peralta further reported that one in four native people live in poverty and share a labor force participation rate of

61.6% which is the lowest of all race and ethnicity groups. Krogstad (2016) concluded that Native Americans have a higher poverty rate when compared with the national average but there appears to be a parallel in employment statistics with both African American populations and Hispanics. The 29.1% unemployment rate is significant to small tribal regions where employment is predominantly U.S. and tribal government agencies. Employment statistics for Native Americans can vary by state. Wherein one state could represent a substantive employment statistic, others may illustrate significant declines in employment at U.S. government and tribal government agencies.

Native American education statistics are significantly compromised and have been on the decline for many years. In a 2015, Camera noted that native youth post the worst achievement scores and the lowest graduation rates of any student group. Camera (2015) posted that the in 2014 American Indian students yielded a 67% graduation rate compared to the national average of 80%. Further, Camera identified potential barriers to education such as the U.S. governments' bureaucratic approach to inconsistencies brought on by multiple federal agencies, and lack of leadership in the Bureau of Indian Education. To substantiate these findings, the *U.S. Department of Educations' Bureau of Indian Education Report on Achievement and Growth 2009-10 to 2012-13* illustrated that the Bureau of Indian student achievement was below average across all grade and subject areas (Northwest Evaluation Association, 2014). The finding reflects that improvement has not been significant enough to levy the standards across all age groups, classes, and grades (Northwest Evaluation Association, 2014). Whereas fewer students were tested than in previous years, it could be misleading to assume that test taken at all grade levels

showed improvement because the overall population of Native American students' educations may be worse than what was measured simply because sample size illustrated that fewer testers may have yielded positive yet skewed results (Northwest Evaluation Association, 2014).

Undiagnosed mental illness is likely significant to all races and ethnicities. In a survey study conducted by Luciano and Meara (2014), it was found that employment rates decreased with increasing mental illness severity, and more severe mental illness was associated with lower employment rates and longer working years than people with no, mild, or moderate mental illness. These findings are exacerbated in Native American populations where mental health and substance abuse often lead to increased domestic abuse, drug use, suicide and homicide rates, and alcohol abuse (McDonald & Pritchard, 2010). One factor pointed out by McDonald and Pritchard (2010) is that because rural and frontier regions make up 75% of the land mass of the United States, many on reservations often fail to receive adequate and timely quality medical and mental health care. The need for early diagnoses and adequate access to healthcare in rural regions occupied by Native Americans not only negatively influences mental health related statistics, but it metastasizes through Native American youth a culture of reinforced lifestyles of violence and drug use as a normalcy for coping with the necessities that are apparently absent.

Because my study focused on social determinants of health that may influence increased obesity statistics, it is believed that there is significance in quantifying variables that may yield new interventions and improved policies that may be designed to improve

healthy living, reduce the footprint of inadequate health services, and illustrate the need for improving education statistics. Therefore, recommendations developed from this research may prove significant to those that are responsible for protecting and advocating for equitable legislation that prioritizes Native Americans as a viable stakeholder in American culture and decisions at all levels of government.

While focusing on the problem statement as a substantiated and well documented means of justifying continued research, the multipart goal of crafting research questions, developing hypotheses, and conducting literature reviews was to identify methodologies and proven research approaches to conducting research that quantifies predictor variables that adversely impact the health and obesity rates in Native American communities.

Purpose of the Study

The purpose of this study was to explore the impact of social determinants of health such as economic instability, education level, mental health, and age level as they relate to the increased prevalence of obesity in American Indian communities. The significance of this study was to illustrate the profound need for improved policies and treatment programs that will address the plethora of problems that continue to plague the American Indian and Alaska Native communities.

Research Questions and Hypotheses

RQ1: Based on limited research that identifies absence of policy-driven objectives to address obesity in Native-American communities, is there an association between obesity and the following: income level, education level, mental illness, and age levels in Native American communities?

$H_0$1: There is an association between obesity and the income level in Native American communities.

H_a1: There is no association between obesity and the income level in Native American communities.

$H_0$2: There is an association between obesity and education level in Native American communities.

H_a2: There is no association between obesity and education level in Native American communities.

$H_0$3: There is an association between obesity and mental illness in Native American communities.

H_a3: There is no association between obesity and mental illness in Native American communities.

$H_0$4: There is an association between obesity and age level in Native American communities.

H_a4: There is no association between obesity and age level in Native American communities.

Theoretical Foundation

Stokols (1996) concluded that the socioecological perspective on health promotion is not based on a single theory or discipline, but on a broader paradigm that bridges several different fields of research. In other words, the socioecological model (SEM) illustrates a range of behaviors that are culturally driven, environmentally influenced, and institutionally relative to the outcome of health. This concept is inclusive to environmental conditions and policies that influence behaviors, but not to the degree that they supersede the influence of common practices that do not support improving health (Stokols, 1996). Subsequently, the SEM is grounded in themes and core principles that are designed to promote and improve the balance between the interrelations of human behavior and environmental conditions (Stokols, 1996). Given the density of populations and the interrelations of communities and their perspective environment, the healthfulness of these interrelations and exchanges depend highly on community behavior patterns and environmental susceptibility. The positive influence of interventions across the five themes of the SEM should be designed to improve behaviors, improve environmental standards, and promote health outcomes that yield overall improved individual and community health.

Coreil (2009) concluded that community-based interventions are guided principals such as socioecological framework, respect for community values and needs, and community participation and control. To provide consistency in those principals, an effective intervention to reduce prevalence of obesity in Native American communities of low-income status should first began with focusing on the innermost framework of the

SEM at the individual level, which involves improving socioeconomics through education, employment, and training opportunities. It is believed that through public private partnerships with city and county governments, education, job training, and employment programs would increase employment opportunities for many Native Americans (Coreil, 2009). For example, training programs to learn trades such as plumbing, carpentry, and electrical maintenance should lead to opportunities such as apprenticeships and fulltime employment. It is believed that if the job training and certification programs had a curriculum that encompassed health education, improvements in healthy food choices would be significant to the future of healthy employees (Coreil, 2009). In addition, it is believed that learning a skill would promote inclusiveness, self-efficacy, and positively impact relationships with family, peers, and neighbors (Coreil, 2009).

Some of the most significant factors that shape behaviors and dictate cultures are common to the interpersonal level of the SEM. Family, peers, and neighbors comprise communities, and develop and sustain cultures that can sometimes lead to unhealthy habits and lifestyles (Coreil, 2009). Robinson (2008) asserted that multiple factors such as taste preferences, habits, nutritional knowledge, in addition to social environments, social traditions, and poor dieting, adversely impact obesity statistics.

The third level of the SEM framework is organizational (Stokols, 1996). Organizations such as community groups, employers, and schools are all influential to how obesity impacts Native American communities. Because these organizations are commonly visited, they shape outlooks and behaviors that are either acceptable or out of

character for cultural norms within Native American communities (Hodge et al., 2011). The diet of American Indians is often poorer in quality than that of other ethnic groups (Hodge et al., 2011). Many American Indian communities eat foods high in fat, and high in sugar, while failing to consume sufficient fruits and vegetables (Hodge et al., 2011).

Community environment, the fourth element of the SEM framework, is influenced by multiple factors that are indirectly related to responsibilities of those that live in Native American communities plagued with high prevalence of obesity. For example, Booth, Pinkston, Walker, and Poston (2005) concluded that poorer neighborhoods have three times fewer supermarkets than wealthier neighborhoods and also contain more fast-food restaurants and convenience stores than wealthier neighborhoods. The inability of access to healthier foods to achieve sustainable healthy diets, compounded by densely populated environments that share declining socioeconomic status, is a barrier to intake of foods high in nutritional value; and is directly linked to decisions that are often made by those who do not live in densely populated low-income neighborhoods (Booth et al., 2005).

Public policy, the fifth element of the SEM framework, is the most critical aspect of the SEM framework because it encompasses all preceding levels of the SEM (Stokols, 1996). Effective policy could not only alleviate many factors that negatively influence obesity statistics in Native American communities, but it could also improve morbidity and mortality statistics by improving community health in ways such as adding walkways, bike paths, increased lighting, and recreational facilities for adults and children. Because these health promoting necessities are absent from many Native

American communities, effective policies to bring about positive change in areas of health and wellness would be significant to reducing prevalence of obesity in Native American communities (Nestle & Jacobson, 2000). Nestle and Jacobson (2000) asserted that policies designed to improve physical fitness by adding parks and recreation would be successful in reducing obesity statistics.

When applied to the obesity epidemic affecting Native American populations, the SEM provides an effective means as a tool for improving the following: individual behaviors and education, defining and addressing social determinants of health, improving socioeconomic status and wealth, improving community and family relations, establishing partnerships with schools and community organizations, improving environmental conditions, and developing policies that address economic development, community partnership and culturally appropriate programs, and health care needs. In doing so, the five focuses of the model help to illustrate how barriers such as economics, policy, and environmental factors influence the health of populations. For purposes of discussion, this study illustrates how each level of the SEM impacts the prevalence of obesity in Native American communities.

Nature of the Study

The nature of this cross-sectional research study was to examine data collected from Native American populations who participated in the 2017 Behavioral Risk Factor Surveillance System (BRFSS) survey to assess prevalence of Native American obesity. To accomplish this, it was necessary to identify common variables shared within other ethnic populations such as African Americans of similar age ranges who share similar

obesity rates. The effort to identify social determinants of health within the population in question was accomplished to conduct statistical analysis, and to better understand the strength of variable relationships as predictors of obesity.

By identifying key variables such as income, education, mental illness, and age, future researchers would be afforded increased opportunities of designing and recommending effective, health improvement interventions that address the Native American obesity epidemic. In addition, the aim of this research was to promote new policies that focus on sustainability of improved behaviors, the importance of early screenings, improved physical fitness and education, improved socioeconomic status, and increase access to health care and healthy food choices (Nestle & Jacobson, 2000).

Data derived front the National Health and Nutrition Examination Survey (NHANES) conducted from 1988-1994, and from 2007 to 2008, indicated that socioeconomics plays a vital role in obesity statistics by race, ethnicity, and income levels (Ogden, Lamb, Carroll, & Flegal, 2010). Amora (2010) concluded that the benefit of using quantitative research is that it is conclusive and its purpose is to quantify the identified research problem, understand prevalence of the researched problem, and determine if projectable results can be applied to larger populations. Additionally, Creswell (2009) concluded that one of the most significant benefits of conducting quantitative research is that it is affordable, in that the data is available to the researcher without conducting interviews required for qualitative research.

Literature Search Strategy

The following library databases and search engines were accessed for this study: PubMed Health, Google Scholar, Science Direct, PsycInfo, Google, Walden University Library, and Walden Library Books. The key search terms and combinations of search terms used in this study were as follows: *Native Americans, Alaska Natives, American Indians, Native Americans and Alaska Natives, Native American obesity, Native American income, Native American poverty, Native American mental illness, Native American diabetes, Native American education, obesity and mental illness,* and *correlating obesity and education.* The scope of literature reviewed for this study spanned a period of five years, 2011 to 2016. For the period under review, emphasis was placed on peer-reviewed literature.

Literature Review Related to Key Variables and/or Concepts

Education

In U.S. public schools, possessing a social identity that is commonly underrepresented in the classroom (e.g., racial-ethnic identity, working-class identity) is a strong indicator of disparities in academic achievement (Fryberg, Covarrubias, & Burack, 2013). For example, in 12 states with the largest populations of Native American students, graduation rates revealed that while 71.4% of all students graduate from high school, fewer than 50% of Native American students graduate from high school (Fryberg et al., 2013). There are plenty of studies that have shown associations between education level and obesity. However, there are limited studies that focus on education and Native American obesity. According to Devaux, Sassi, Church, Cecchini, & Borgonovi (2011),

most research conducted on Native American populations focused on associations between socioeconomics and health status; and very little research was conducted on lifestyles and obesity prevalence.

According to Devaux et al. (2011), those with more years of schooling are less likely to smoke, drink excessive alcohol, be overweight or obese, or use illegal drugs; the better educated are more likely to exercise and to obtain preventive care. Although true for many populations, Fryberg et al. (2013) revealed that there is insufficient obesity prevalence research conducted in Native American communities for generalizations. Devaux et al. (2011) determined that there are three possibilities for correlations between education and health: (a) increased education that leads to improved health, (b) healthy people having more education, and (c) relationships between education and health are affected by unobserved factors, without cause, and affect health and education in the same direction. The three pathways for correlations are not mutually exclusive, but some combination of the three are likely to provide the most plausible explanation for the strong correlations consistently found between education and health or obesity (Devaux et al., 2011). More often in population-based research, educated individuals make better use of health-related information than those who are less educated, and education provides individuals with better access to information and improved critical thinking skills (Devaux et al., 2011). In contrast, successful education statistics may be applicable to most populations but Native Americans have unique challenges such as higher rates of poverty, inadequate access to healthy foods, declining infrastructures, homelessness,

higher morbidity rates, and many other social determinants of health that supersede those of many other populations studied (Council, 2012).

Income and Poverty

The issue of poverty is quite complex, but it is much more than an abstract condition for the over 40 million Americans who face daily struggles with food security, access to health care, and the search for basic shelter (Council, 2012). Poverty rates are on the rise, and more Americans are living in poverty than at any other time since the Census Bureau began measuring its occurrence (Council, 2012). According to 2006-2010 American Community Survey (ACS) figures, 40.7 million people have incomes below the poverty line, constituting a national poverty rate of 13.8% (Council, 2012). The incidence of poverty is greatest in America's rural areas and central cities (Council, 2012). Approximately 10 million persons, or 16.3% of the rural and small-town population, live in poverty (Council, 2012). Nearly one-quarter of people in poverty live in rural areas (Council, 2012). Poverty rates are generally lower in suburban and urban communities, plus or minus 10.5%, and highest in large cities where 17.3% of the urban population has below poverty level incomes (Council, 2012). According to Council (2012), the poverty rate for rural Native Americans is above 30% and more than half of all Native Americans in poverty live in rural and small town areas. This substantiates declining socioeconomics and illustrates how large numbers of poor, rural Native Americans are concentrated on or near reservations, where the overall poverty rates can exceed half of the community population (Council, 2012). This significantly differs from current poverty statistics reported by Semega, Fontenot, and Kollar (2017), who

illustrated how 2016 declines in poverty rates for non-Hispanic Whites was 8.8%, 22% for Blacks, 10.1% for Asians, and 19.4% for Hispanics. An increasing number of rural communities are experiencing persistently high poverty rates (Council, 2012). These areas are often isolated geographically, lack resources and economic opportunities, and suffer from decades of disinvestment and double-digit poverty rates (Council, 2012). Often forgotten or hidden from mainstream America, these areas and populations have had high poverty rates for decades (Council, 2012).

Research has revealed that the association between income level and obesity is strong (Hodge et al., 2011). In developed countries like the United States, obesity is most common among those with low socioeconomic status (Hodge et al., 2011). According to Akil and Ahmad (2011), body mass index has been found to be higher in some groups of people receiving food stamps benefits. Weight differences were especially high for women. More than 42% of women who participated in the food stamps programs were obese (Akil & Ahmad, 2011). Although food stamps increase the availability of food energy, protein, and some micronutrients such as vitamins and iron, persons receiving food stamps consume more meat, added sugars, and total fats rather than fruits, vegetables, grains, and dairy products (Akil & Ahmad, 2011).Beyond having access to fewer healthier food markets, minority population groups have also had less access to physical activity facilities as a result of lower incomes and declining education statistics; both of which have been associated with increased BMI and poorer health (Akil & Ahmad, 2011). Higher rates of obesity are likely to be found among the lowest income and the least educated groups, particularly among women and certain ethnic groups (Akil

& Ahmad, 2011). An association between hunger and obesity may be explained by the relatively low cost of energy-dense foods, the high palatability of sweets and fats associated with higher energy intakes, and the association of lower income and food insecurity with lower intakes of fruit and vegetables (Akil & Ahmad, 2011). Studies reveal that healthier foods, generally, are more expensive and less readily available in poorer communities (Akil & Ahmad, 2011).

American Indian adults who are single with low educational levels and low incomes appear to be more susceptible to weight gain and severe obesity (Hodge et al., 2011). In comparison, 29% of this cohort of morbidly obese American Indians had less that a high school education compared to 25.2% of Black adults, 15.8%of White adults, and 13.9%of Asian adults (Hodge et al., 2011). According to Hodge et al. (2011), the household annual income of single American Indians was reported to be the lowest of all weight categories; $17,500 (median annual income); which is strikingly lower than the 2003 national median income for Whites ($48,000), Blacks ($30,000), Hispanics ($33,000) and Asians ($55,500).

Mental Illness

Reeves et al. (2011) defined mental illness as a diagnosable mental disorder that is characterized by continued abnormalities in thinking, mood, and behaviors that are associated with suffering and weakened or damaged functioning. The association between mental illness and other chronic diseases has become a public health problem that often results in increased morbidity and mortality rates (Reeves et al, 2011). The World Health Organization (WHO) noted that in developed countries, mental illnesses

accounts for more disabilities than cancer, heart disease, or any other groups of illnesses (Reeves et al., 2011). Approximately 25% of the adults in the United States have mental illnesses, and approximately 12.5 % will develop some form of mental illness during their lifetime (Reeves et al., 2011). According to Reeves et al., anxiety and mood disorders are the most common forms of mental illness in adults and the effects of mental illness can range from daily functions with minor disruptions to personal, social, and occupational incapacitations that precede death. Morbidity of chronic diseases can be reduced by treatment and health care compliance, but chronic diseases such as cardiovascular disease, obesity, asthma, diabetes, epilepsy, and cancer can be exacerbated by mental illness and result in increased mortality (Reeves et al., 2011)

The prevalence of obesity and its associated hazards has provided the basis for prioritizing both treatment and prevention efforts both in developed and in developing countries (Taylor et al., 2012). Results from epidemiologic and clinical studies reporting prevalence rates of 25% to 60% for BD, 3-6, 30% to 70% for schizophrenia, 7, 8, and 20% to 55% for depression have slowed efforts to sub-phenotype groups at risk for obesity, and has implicated people with severe and persistent mental illness as being highly susceptible to early onset and sustained excess weight (Taylor, et al., 2012). According to Taylor et al., an undisputable association between weight and chronic mental illness is the iatrogenic effect of treatment and the complex interplay between psychiatric illness and weight involves neurobiology, psychology, and sociological factors.

Lifestyle factors such as low exercise rates and elevated obesity rates adversely affect the physical health of people with mental illness (Thornicroft, 2011). These, combined with relatively high rates of smoking and poor diets, contribute further to increased prevalence of hypertension, high plasma cholesterol and triglycerides, and diabetes and obesity (Thornicroft, 2011). The consumption of sweetened beverages, refined foods, and pastries has been shown to be associated with an increased risk of depression in longitudinal studies (Gangwisch et al., 2015).

Native Americans disproportionately experience adverse childhood experiences (ACEs) as well as health disparities, including high rates of posttraumatic stress, depression, and substance abuse (Brockie, Heinzelmann, & Gill, 2013). Due to poor health outcomes, American Indian and Alaska Native populations have a life expectancy that is more than five years on average shorter than that of the overall U.S. population (Sequist et al., 2011). The causes of this disparity span the life spectrum, beginning with high infant mortality rates, and include a high prevalence of chronic disease, mental health disorders, and substance abuse (Sequist et al., 2011). According to Sequist et al. (2011), the rate of alcohol abuse among American Indian and Alaska Native people is more than six times higher than the United States population; and hospitalization rates for alcohol-related conditions are approximately 78% higher among American Indian and Alaska Native people than the overall United States population.

Compared to the overall U.S. population, American Indian and Alaska Native people are twice as likely to have incomes below the federal poverty level, have nearly three times the national unemployment rate, and are less than half as likely to graduate

from college (Sequist et al., 2011). These disadvantages contribute to the higher incidence of chronic and communicable diseases, as well as to higher rates of depression, substance abuse, and violence, seen in this population (Sequist et al., 2011).

Definitions

Income: Income is defined based on U.S. standards of the 2010 median income of U.S. households of $50,046.00, compared to the median household income of Native American and Alaska Native families of $35,062.00 (U.S. Department of Commerce, 2016).

Mental illness: Mental illness is a diagnosable mental disorder that is characterized by persistent abnormalities in thinking, mood, or behavior associated with distress and impaired functioning (Reeves, 2011).

Poverty: The U.S. Department of Commerce (2016) defined poverty by a means of measuring in percentile a population's median income to be either above or below the national average.

Socioeconomic status: The American Psychological Association (2017) defined *socioeconomic status* as a conceptualization of social standing or class of an individual or group with emphasis on privilege, power, and control commonly related to inequities and access to distribution of resources.

Assumptions

There were several assumptions that were considered in this study. The first assumption was sample size would be representative of the population in question. The second assumption was that bias was reduced because random sampling was used for the

selection of participants. Additionally, assumptions of participants answering survey questions honestly, limited errors made during data collection, cultural sensitivity and community participation considered and applied to the research, and that variables used in my research would be available in the secondary data set.

The aforementioned assumptions considered in this research were significant to the integrity and credibility of the research, to the participants whose identities and responses were coded for confidentiality, and to address the research problem of having limited research that focused on common variables experienced in Native American communities. As reported by Schell and Gallo (2012), obesity in Native American communities has been observed to be much higher than other populations. Subsequently, it may be of benefit to Native American communities and populations that share similar sociodemographics, that behavioral interventions and community programs designed to reduce obesity are applicable to all age levels, are designed to improve behaviors, and are structured with proven policy-driven strategies designed to reduce obesity (Schell & Gallo, 2012).

Scope and Delimitations

The following limitations were applicable to this research:

- Because limited research has been conducted on the population in question, common variables that were applicable to other minority populations with a high prevalence of obesity were used in this study.
- Understanding the socioecological framework of the participants in question was considered significant in understanding culturally-based decisions in order to develop appropriate interventions.
- The study to obtain the data was more than 5 years old and variables of interest may have had greater internal validity had the data been collected in a more recent study.
- Because limited obesity research is available for Native Americans, missing data may not be uncommon to this research and may reduce reliability of results and skew inference.
- There are other variables of interest not used in this research that may have illustrated increased internal validity to illustrate cause and effect.
- Because of the broad number of Native American tribes, generalizability is questionable across tribal regions because of cultures, environmental factors, and economic factors.
- Children and adolescents present a multitude of the obesity statistics for Native American populations but were not studied in this research due to limitations of the study and decreased respondents.

Significance

Although several data for this study did not shed light on new causal social determinants of health, the variables examined are relative to populations who share high prevalence of obesity, lower education statistics, high crime rates, low employment rates, and high rates of undiagnosed mental illness. Therefore, the study results and findings are significant to evidence-based research in that they provide statistical population measure to the obesity epidemic for Native Americans. If used properly, data from this research can be applied to establishment of new policies that address having access to healthy foods, health literacy, mental health counseling, the importance of early health screening, and environmental factors that have been found to increase physical fitness and reduce sedentary lifestyles. Similarly, results from this research can be used to develop education and training programs designed to increase jobs and trade organizations within Native American communities. Beyond economics, poverty, and health, the SEM and its different levels of themes often illustrates a need for increased self-efficacy and empowerment (Stokols, 1996). This focus may not only improve health and occupational statistics, but it may also reveal how engaging in community development can empower populations to succeed.

Summary and Conclusions

My study revealed a gap in population health research as well as how government oversight of education and health programs in indigenous populations has produced limited results due to ineffective or outdated policies developed by bureaucratic structures. This comprehensive approach to research conducted has focused on multiple areas that addressed the need for future research, literature that addressed the variables of interest, limitations of the study, delimitations and assumptions of the research conducted, and how generalizable results can improve social change.

Section 2: Research Design and Data Collection

Introduction

The purpose of this study was to explore the adverse impact of social determinants of health such as economics, education, and mental illness as they relate to prevalence of obesity in American Indian and Alaska Native communities. To illustrate the significance of the of the need for improved health protection policies and treatment programs directly related to the obesity epidemic in American Indian and Alaska Native communities, this section of my research focuses on the nature of this study, the study design, variables used in conducting this research, ethical considerations applied to this research, and data used to conduct statistical analysis.

Research Design and Rationale

To quantify my research, I conducted a cross-sectional study using quantitative research analysis of an existing secondary data set. The data was obtained from the CDC's 2017 BRFSS. Amora (2010) concluded that the benefit of quantitative research is that it is conclusive, in that its purpose is to quantify a research problem, understand its prevalence, and look for results that are generalizable to larger populations. Additionally, Creswell (2009) asserted that some of the benefits of using survey data are that surveys generally follow a standard format that illustrates purpose and rationale; surveys identify the population to be measured and the instrument used to measure data; and surveys are significant to time restraints, cost effective, and ethically sound.

Methodology

This segment of my research focused on the selected target population and study area, management and analysis of secondary data, ethical considerations, and techniques applied to sampling, and threats to validity.

Target Population and Study Area

According to CDC (2017a), the target population for the BRFSS telephone survey consisted of people residing in 54 states and territories, held a private residence or lived in college housing, had a working cellular phone, and were aged 18 years and older. Of the 486,303 participants surveyed, 1.96%, or 9,539 Native American and Alaskan Native participants were sampled. The sample data were collected by both state health departments and from contractors such as the Marketing Systems Group (MSG), which provided data for all 54 states and territories, aided in reducing costs, and improved consistency of protocol for conducting interviews and collecting data.

Secondary Data Management

To conduct my research, I used a nationally recognized, randomized, population-based telephone survey that is inclusive to all U.S. states and territories to achieve the largest sample size of participating American Indians and Alaskan Natives. On August 14, 2019, I received approval number 08-14-19-0394090 from the Walden Institutional Review Board (IRB) to conduct my research using data from the 2017 BRFSS.

There were several notable benefits to using the 2017 data from the BRFSS. The first was that all variables applied to my research had been identified in the data dictionary, the second benefit was that it was cost effective to use data that had already

been collected, and the third benefit was that ethical considerations were properly addressed. Creswell (2009) concluded that the sole unconditionally binding moral imperative, described as the categorical imperative, associates conduct as universally acceptable; meaning how one behaves and what measures one takes should be interpreted as within the laws of humanity, professional, and ethically sound.

Sampling

The data collected during the 2017 BRFSS were obtained from two samples: landline telephones and cellular phones. To maintain consistency with CDC's defined methodology of sampling, the cellular telephone sampled group was accounted for as a household and was randomly selected from each state in a list established by the CDC. The household sampled group required the following: count of the number of adults living within a residence, random selection of eligible adults, classification of telephones into strata, applied disproportionate stratified sampling based on density of households, and use of the disproportionate stratified sampling to establish a sampling ratio between high and low density groups in order to gain efficiency of sampling, and to establish a sampling rate (CDC, 2017a). To obtain informed consent, CDC decided that it would have state public health offices and contractors to collect data and conduct interviews with adults aged 18 years and older who had landlines; and adults 18 years and older who owned a cellular phones.

Data Collection

CDC protocol enabled state public health offices, and contractors used in the data collection process to conduct interviews with adults aged 18 years and older who had landlines, and adults 18 years and older who owned a cellular phone. Once permission was received from Walden University, data were obtained from the 2017 BRFSS health survey, which is a publicly available dataset.

The dependent variable of interest was BMI, which has been used to define obesity; and independent variables used to predict obesity were *income level*, *education level*, *mental illness*, and *age level*.

Data Availability and Tools

The hyperlink to the BRFSS study was initially located under Walden University's list of secondary data sources. After entry into the CDC's website, the BRFSS data dictionary, overview, summary, and different formats for processing the data for statistical analyses was readily accessible.

The 2017 BRFSS questionnaires were developed by CDC but could be modified by each state with CDC's approval. According to CDC (2017a), states that modified their questionnaires added about 5 to 10 minutes to the predefined 18-minute interview. Some questionnaires included questions that were specific to individual states. The data were publicly available, so no permissions were needed to gain access to the data.

Sample Size

To conduct my research, I analyzed the entire sample of 9,539 American Indians and Alaskan Natives participating in the research. To obtain informed consent, CDC decided that it would have state public health offices and contractors used in the data collection process conduct interviews with adults aged 18 years and older who had landlines and adults 18 years and older who owned a cellular phone.

Justification for Effect Size, Alpha Level, and Power Level

Sullivan and Fein (2012) concluded that effect size is the main finding of a quantitative study that illustrates the magnitude of the difference between groups. With the goal of achieving generalization based on a very small sample, a minimum effect size yielded a broader understanding in reporting the differences between groups based on the variables analyzed (Sullivan & Fein, 2012). Therefore, it was believed that several factors were significant to the success of conducting and publishing my research. First, because Native Americans and Alaska Natives represented 1.96% of the 2017 BRFSS sample, and 1.3% of the U.S. population, a minimum effect size was applied in order to illustrate significances in the differences between groups that would identify minor, cost effective changes that could yield improvements in the obesity rates for future interventions for the populations in question (Coe, 2002). Second, a standard alpha level of .05 was applied to reduce the probability of Type 1 error, and to test for statistical significance. Finally, a power level of 0.8 was applied to reduce risks of a Type 2 error, and to conclude if there was an 80% chance of a real effect.

Instrumentation and Operationalization of Constructs

The 2017 BRFSS is a nationally recognized state-based telephone, behavioral, health survey conducted by the CDC in all 50 states, the District of Columbia, Guam, and Puerto Rico. The instruments used were not without influence from the states that they were applied. As with some states, questions were added that were significant to individual states. Similarly, modules were optional, but well-defined core questions were consistent throughout the survey. The CDC (2017a) concluded that many of the questions in the 2017 BRFSS survey were obtained from other national surveys such as the National Health and Nutrition Examination Survey, and the National Health Interview Survey.

Operationalization of Constructs

The dependent variable obesity, defined by Ogden et al. (2014), as BMI that is greater than 30%, was analyzed for adults between the age of 18 and 64 years. For study purposes, BMI was categorized into four categories: underweight, overweight, normal weight and obese (CDC, 2017a). Underweight respondents based on BMI were coded (BMI5<18.50); normal weight respondents based on BMI were coded (18.50<=_BMI<25.00); overweight respondents based on BMI were coded (25.00<=_BMI5<30.00); and obese respondents based on BMI were coded (30.00<=_BMI599.99).

Independent variables, income, education, mental illness, and age in 5-year categories were chosen for this research study. These variables, identified in the 2017

BRFSS research study, have been identified as some of the most common variables for analyses, but offer insight to the limited research conducted on the population of interest.

Income was reported as _INCOMG, and five levels of reporting were identified for this variable: less than $15,000 (INCOME2=1, 2); $15,000 to less than $25,000 (Income2=3, 4); $25,000 to less than $35,000(INCOME2=5); $35,000 to less than $50,000 (INCOME2=6); and $50,000 or more (INOCME2=7, 8). Respondents who did not know, refused to answer, or had missing values were reported as (INCOME2=77, 99, or missing).

Education was coded as EDUCAG, and five levels of reporting were identified for education: did not graduate from high school (EDUCA=1, 2, and 3); graduated high school (EDUCA=4); attended college or technical school (EDUCA=5); and graduated from college or technical school (EDUCA=6). The options of *Don't Know/ Not Sure/ Missing* was reported as (EDUCA=9, missing).

The operationalization of the independent variables included three distinct reporting levels for mental health. Mental health, coded as MENT14D, was identified as zero days when mental health was not good (MENTHLTH=88); 1-13 days when mental health was not good (M<=MENTHLTH<=30); and 14+ days when mental health was not good (14<=MENTHLTH<=30). The mental health response for *Don't Know/ Refused/ Missing* was reported as (MENTHLTH=77, 99, or missing).

Age was coded as AGEG5YR. The 5-year categories were listed in increments ranging from 18 years of age to 24 years of age. The 5-year sequence was repeated up to

age 80 or older. The option of *Don't Know/ Refused/ Missing* was reported as 7 <= AGE <= 9.

Variables reported as *Don't Know/ Not Sure/ Missing/ or Refused to Answer* were dichotomized in SPSS to rule out incomplete responses and refusals to answer. Although dichotomizing may ultimately reduce effect size, it proved as a valuable method for establishing consistency of analyses across all variables analyzed. Additionally, it enabled me to split the data into categories of completed surveys and incomplete surveys.

Data Collection and Data Analysis Plan

Data derived from the 2017 BRFSS was collected in each month during the course of the calendar year 2016. The software used to process analyses of the data was IBM SPSS Statistics Version 25. To describe the data set, descriptive statistics analysis was conducted to produce illustrations of measures and central tendency in the form of graphs and charts. Univariate analysis was used to illustrate frequency in the form of bar charts and histograms. Assuming all variables were normally distributed, relationships between variables are linear, and the random population sampled scores were independent of scores for other cases, univariate analyses was conducted to illustrate descriptive statistics in the form of bar charts, histograms, and frequency tables. Bivariate analyses included a Chi-square test to answer rather there was a relationship between obesity and education, obesity and income, obesity and mental illness, and obesity and age. Correlation analysis was used to measure the association and degree of linear relationships between variables.

Research Questions and Hypotheses

RQ1: Based on limited research that identifies absence of policy-driven objectives to address obesity in Native-American communities, is there an association between obesity and the following: income level, education level, mental illness, and age levels in Native American communities?

$H_0$1: There is an association between obesity and the income level in Native American communities.

H_a1: There is no association between obesity and the income level in Native American communities.

$H_0$2: There is an association between obesity and education level in Native American communities.

H_a2: There is no association between obesity and education level in Native American communities.

$H_0$3: There is an association between obesity and mental illness in Native American communities.

H_a3: There is no association between obesity and mental illness in Native American communities.

$H_0$4: There is an association between obesity and age level in Native American communities.

H_a4: There is no association between obesity and age level in Native American communities.

Threats to Validity

Creswell (2009) concluded that *internal validity threats* are the inability of the researcher to draw correct inferences from data derived from the population in the experiment due to the experimental procedures conducted during the research, treatment of participants in the research, and experiences of the participants in the research. Additionally, Creswell concluded that *external validity threats* can occur when researchers draw incorrect inferences from the samples that are not generalizable to other persons or settings in future situations or past situations. Potential internal validity threats can include resentment, instrumentation, testing, mortality, and selection (p. 163). Potential external validity threats that inhibit generalization are participants with fewer characteristics that cannot be generalized to broader populations; settings and locations that prevent generalization to different settings, and locations; and time restraints that inhibit researchers from generalizing the results to past or future experiments (p. 165).

To address validity, CDC (2017a) concluded that using a dual-frame survey including landline and cellular telephones improved validity, data quality, and representativeness of BRFSS data. Additionally, using questions from other national surveys that have been statistically tested and approved for use in the BRFSS helped to improve internal validity of the tool used. To improve validity, CDC officials met with state testing coordinators to develop a consensus on the content of the questionnaire; allowing states to compare their data with data from other surveys; requiring that all new questions proposed be field tested and cognitive tested before the question could be

adopted; random monitoring administers of the questionnaire; and requiring a majority vote from state representatives before adopting a new question (CDC, 2017a).

Additional threats to validity included confirming the latest software updates to SPSS to assure changes in rules and calculations were accounted for; accounting for interviewer bias; and taking into consideration missing data such as when calls to cellular phones were dropped or inadvertently disconnected.

Ethical Considerations

The proposed secondary data analyzed and tested were coded to protect the identities of the 2017 BRFSS survey participants. Therefore, anonymity of participants was ethically considered to protect the right of privacy for each participant. Approval by Walden University IRB was formally requested and received before any data processing or uploading into statistical processing software was conducted.

Data Treatment

Once approval was received from Walden IRB, data were downloaded from the Center's of Disease Control and Preventions' website, stored on an external hard drive, and will be maintained for five years after completion of this research study.

Summary

Section 2 of my research focused on quantitative research design, methodology and the population of interest, secondary data, secondary data management, ethical considerations, study area, sampling methods, operationalization, and threats to validity. A thorough explanation was provided illustrating the definition, the coding, and the constructs of the dependent variable as well as independent variables. A data analysis

plan was provided to illustrate how data was processed using statistical software, descriptions of the data processed, and how illustrations of the strength of relationships between variables were presented. Section 3 of my research built on what has been stated in Section 2 by presenting the findings of the research and analysis conducted. Additionally, Section 3 delved into evaluation of statistical assumptions and summarization of answers to research questions.

Section 3: Presentation of Results and Findings

Introduction

The purpose of conducting this research was to examine how common social determinants of health adversely impact obesity statistics in Native American populations in the United States. With the objective of justifying the need for new and improved policy-driven objectives to reduce obesity prevalence in Native-American populations and communities, several hypotheses were developed and posed in research questions to determine if there were relationships between obesity and income level, education level, mental illness and age level. In contrast, null hypotheses were developed to determine if there were no relationships between obesity and income levels, education levels, mental illness, and age levels.

This section of my research illustrates the results of processed secondary data analyses from the 2017 BRFSS using the 25th version of IBM SPSS Statistics software. Illustrations include the results of descriptive statistics, univariate analysis, bivariate analyses, Chi-square test, and correlation analyses.

Data Collection of Secondary Data Set

Data collected for the 2017 BRFSS took place in each month of 2016. Landline data were collected by using Computer-Assisted Telephone Interview (CATI) software to conduct interviews and cell phone data were collected by using a vendor to oversee the use of a Telecordia database that randomly selects cell phone numbers based on area codes. The state-based, behavioral health survey was issued in all 50 states, the District of Columbia, the U.S. Virgin Islands, Guam, and Puerto Rico. Although states were given

the opportunity to input several questions and modules that were common to the state issued, most questions were consistent with well recognized national nutrition health surveys issued by CDC. The CDC partnered with state public health offices, who in turn hired and trained contractors to conduct the roughly 20-minute phone interviews with adults aged 18 years and older.

There were 54 states and territories sampled. A disproportionate stratified sample design was divided into high and medium density groups, and applied to the continental U.S. for landlines while a simple random sample design was used for the U.S. Virgin Islands, Puerto Rico, and Guam (CDC, 2017a).

Of the 486,303 landlines and cell phones sampled, 252,265 were landlines and the remaining 234,038 were either cell phones or the answer to the question determining if they were speaking on a cell phone was not asked or missing. Of the 486,303 interviews conducted, 421, 192, or 86.61%, were completed. Approximately 65,111, or 13.39%, of the interviews conducted were partially completed. Of the 486,303 landlines and cell phones sampled, 210,606, or 43.31%, were males; and 275,631, or 56.68%, were females. The remaining 0.01%, or 66 respondents, refused to answer the demographic question. There were 9,539 Native Americans participants who represented 1.96% of the total 486,303 participants surveyed.

Of the research questions posed, questions about mental illness yield the least number of responses from Native American participants. Fifteen Native American participants, or less than 1%, identified if he or she had a mental illness of any type. The significance of such few responses to questions related to mental illness identified a

discrepancy in this research, and a conceivable reluctance to answer questions related to mental illness. Henderson, Evans-Lacko, and Thornicroft (2013) concluded that lack of identifying mental illness behaviors, ignorance of access to mental health treatment, reflects a prejudice against those who have mental illnesses and fear of discrimination for admitting diagnosis of mental illness are all potential contributors to low participation in survey questions related to mental illness.

Univariate Analysis

2017 BRFSS Descriptive Characteristics for Native American Participants

There were a total of 9,539 Native American men and women who participated in the 2017 BRFSS. There were 8,464 Native American respondents that identified themselves by their sex (Figure 1). The majority of those who responded were 55 to 59 years of age.

Descriptive Analyses

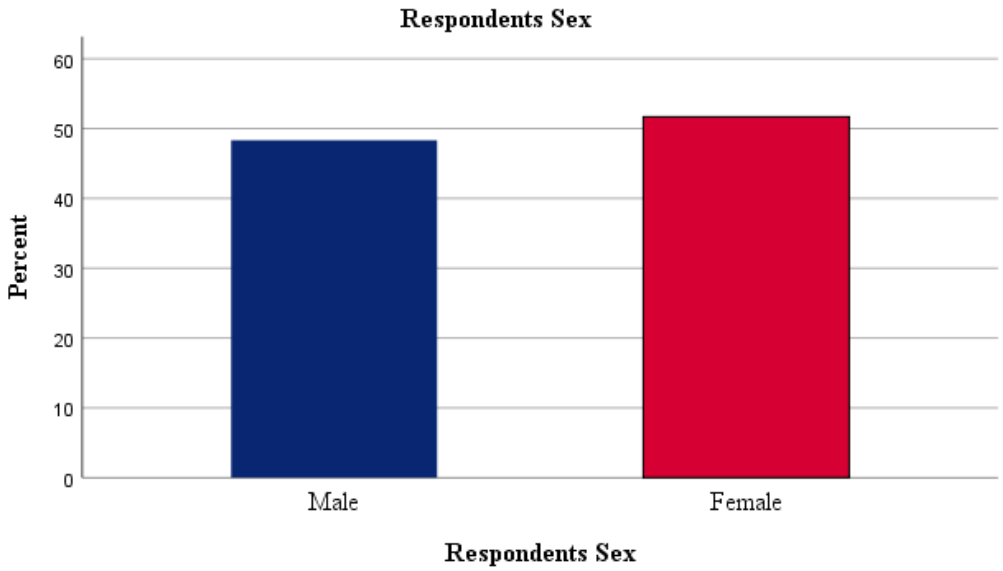

Figure 1. Percentage of males and females who identified themselves by their sex

Table 1

Distribution of the Sample by Sex

		Frequency	Percent
	Men	4089	48.3
	Women	4375	51.7
	Total	8464	100.0

Table 1 displays 9,539 Native American participants who took part in the 2017 BRFSS survey, *n*=8464 that identified themselves by their sex. While 8,464 responded, 4,089 (48.3%) were men, and 4375 (51.7%) were women.

The highest percentages of Native American participants' ages ranged from 45 to 69 years of age, as illustrated in (Figure 2).

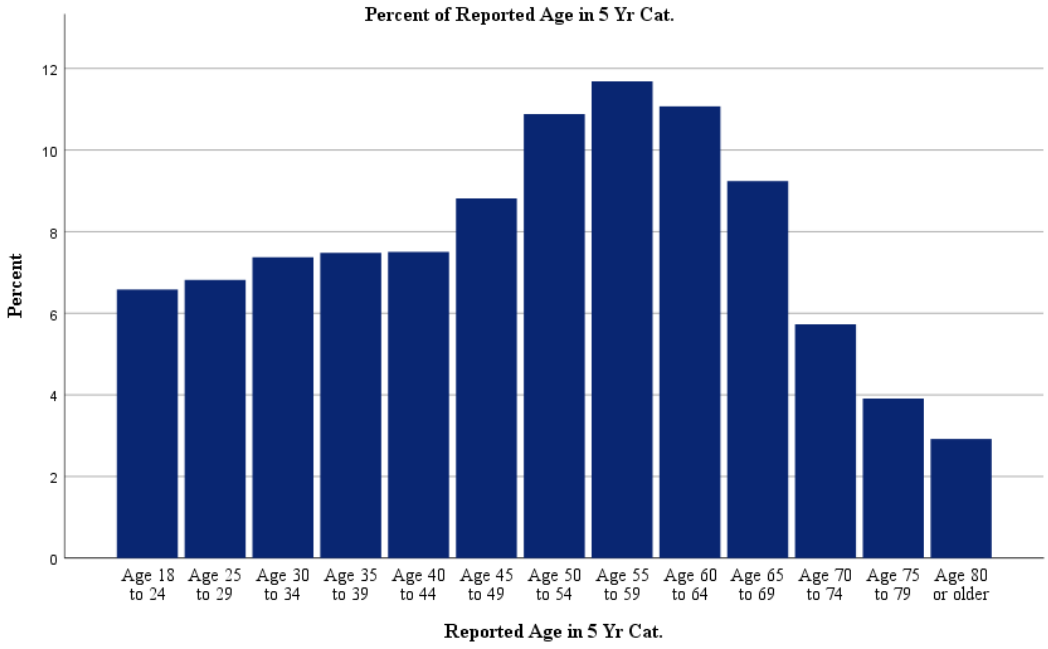

Figure 2. Age reported in 5-year increments

Table 2

Distribution of Sample by Age

	Frequency	Percent
Age 18 to 24	557	6.6
Age 25 to 29	577	6.8
Age 30 to 34	624	7.4
Age 35 to 39	633	7.5
Age 40 to 44	635	7.5
Age 45 to 49	746	8.8
Age 50 to 54	921	10.9
Age 55 to 59	989	11.7
Age 60 to 64	937	11.1
Age 65 to 69	782	9.2
Age 70 to 74	485	5.7
Age 75 to 79	331	3.9
Age 80 or older	247	2.9
Total	8464	100.0

Table 2 illustrates how questions of age were recorded in 13 categories with 5-year increments that started at age 18 and ended at age 80 or older. The majority, 989(11.7%) of those who responded were between 55 and 59 years of age. The age category with the least number of responders were age 80 or older 247 (2.9%).

Very few Native American participants had a BMI of less than 18.5, while most Native American participants were considered overweight or obese (Figure 3).

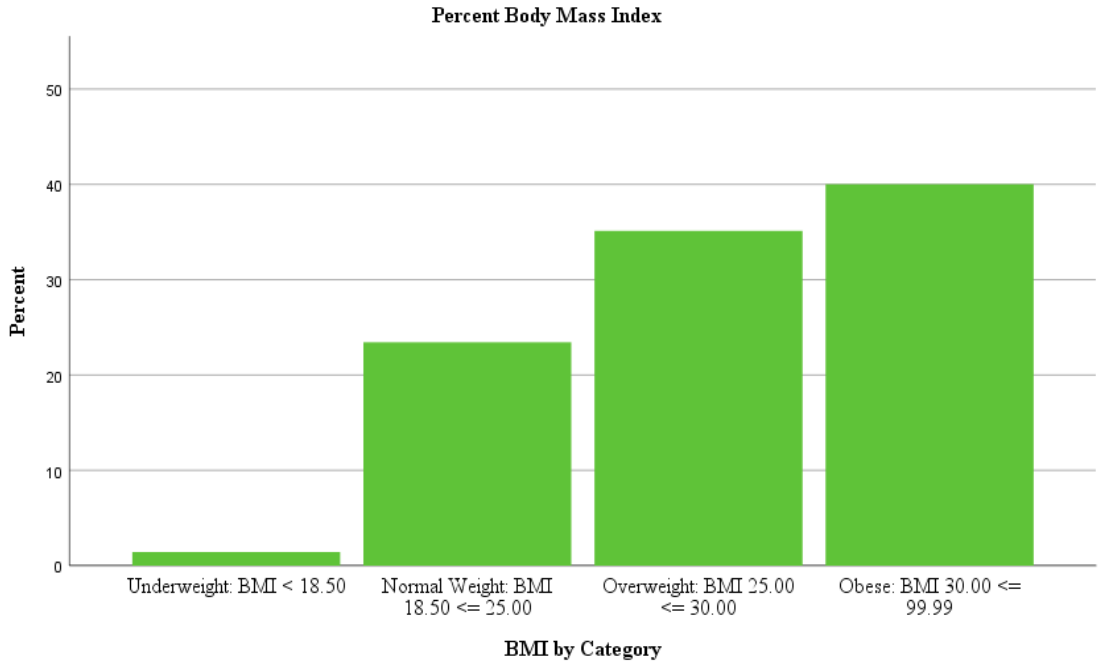

Figure 3. Histogram of computed BMI

Table 3

Distribution of Sample by BMI

	Frequency	Percent
Underweight: BMI5 < 18.50	121	1.4
Normal Weight: BMI 18.50 <= 25.00	1983	23.4
Overweight: BMI 25.00 <= 30.00	2973	35.1
Obese: BMI 30.00 <= 9999	3387	40.0
Total	8464	100.0

Table 3 displays four categories of BMI: Underweight, Normal Weight, Overweight, and Obese. 121 (1.4%) of the respondents were underweight, while 1983 (23.4%) were of normal weight. 2973 (35.1%) were overweight; and 3387 (40.0%) of Native American respondents were obese.

As shown in (Figure 4), almost all Native American participants were educated.

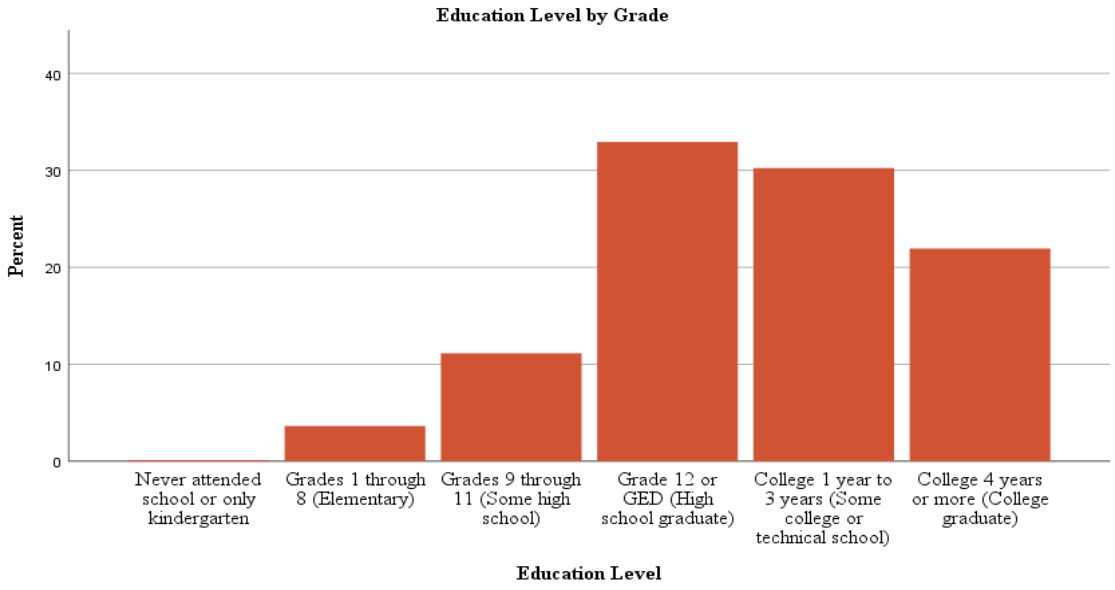

Figure 4. Education level completed

Table 4

Distribution of Sample by Education

	Frequency	Percent
Never attended school or only kindergarten	11	.1
Grades 1 through 8 (Elementary)	309	3.7
Grades 9 through 11 (Some high school)	943	11.1
Grade 12 or GED (High school graduate)	2786	32.9
College 1 year to 3 years (Some college or technical school)	2559	30.2
College 4 years or more (College graduate)	1856	21.9
Total	8464	100.0

There are six categories of education levels presented in Table 4. Eleven (0.1%) never attended school or only went to kindergarten. The majority of Native American respondents, 2,786 (32.9%), had a GED or graduated from high school. Two-thousand, five hundred and fifty-nine (30.2%) had 1 to 3 years of college or went to technical school, and 1,856 (21.9%) of the Native American respondents had 4 years or more of college or were college graduates.

There were many Native American participants who had incomes of less than $10,000 (Figure 5).

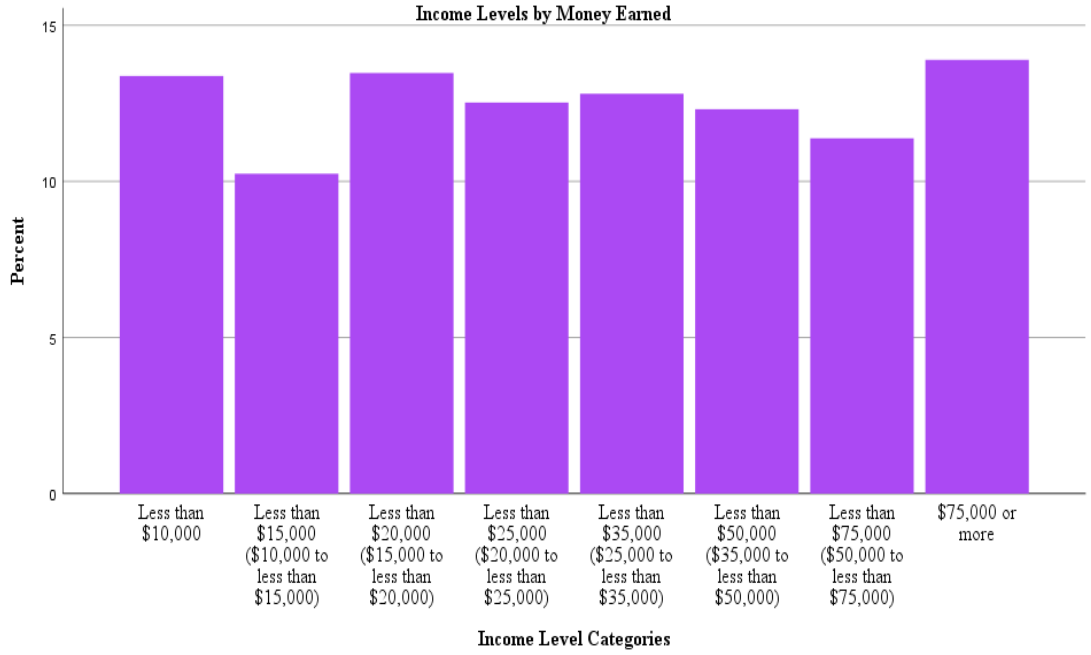

Figure 5. Income levels by percentage

Table 5

Distribution of Sample by Income

	Frequency	Percent
Less than $10,000	1132	13.4
Less than $15,000 ($10,000 to less than $15,000)	867	10.2
Less than $20,000 ($15,000 to less than $20,000)	1140	13.5
Less than $25,000 ($20,000 to less than $25,000)	1060	12.5
Less than $35,000 ($25,000 to less than $35,000)	1084	12.8
Less than $50,000 ($35,000 to less than $50,000)	1042	12.3
Less than $75,000 ($50,000 to less than $75,000)	963	11.4
$75,000 or more	1176	13.9
Total	8464	100.0

As illustrated in Table 5, the greatest number of Native American participants had incomes of $75,000 or more, while almost the same percentage of Native American participants had incomes of less than $10,000.

Table 6

What is the Major Health Problem, Illness or Disease?

Illness/Disease	Frequency	Percent
Arthritis / Rheumatism	18	8.9
Asthma	2	1
Cancer	11	5.4
Chronic respiratory conditions such as Emphysema or COPD	6	3
Dementia or other Cognitive Impairment Disorders	20	9.9
Developmental Disabilities such as Autism, Down's Syndrome, and Spina Bifida	13	6.4
Diabetes	19	9.4
Heart Disease, Hypertension, Stroke	19	9.4
Mental Illnesses, such as Anxiety, Depression, or Schizophrenia	15	7.4
Other organ failure or diseases such as kidney or liver problems	12	5.9
Substance Abuse or Addiction Disorders	1	0.5
Injuries, including broken bones	20	9.9
Old age / infirmity / frailty	46	22.8
Total	202	100

Native Americans who responded to questions concerning mental illnesses, *n*=15 (7.4%) responded to questions identifying rather they had suffered from mental illnesses such as anxiety, depression, or schizophrenia. Only one (0.5%) out of 202 Native American respondents identified substance abuse as a primary health problem, and 46 (22.8%) of Native American respondents identified old age, infirmity, and frailty as their major health problem or illness.

Bivariate Analysis

A total of 9539 Native Americans participated in the 2017 BRFSS. Of the 9539 participants, 8464 responded to questions concerning their age, income, level of education, and estimated body mass index (BMI).

Analyses conducted in this section are in two parts. The first part is bivariate analyses of categorical variables to answer if there is a relationship between obesity (BMI) and age level, BMI and education level, and BMI and income level. Chi-square test was conducted to determine if there is a relationship between categorical variables that can be associated with the Native American participants of the 2017 BRFSS.

The second part of this section includes bivariate analyses of continuous variables to better understand if changes in independent variables affect BMI and obesity rates in Native American respondents.

Chi-Square Analysis

As can be seen in Table 7, the age category with BMI's greater than 30 had the highest number of Native Americans respondents who were age 55 to 59. There were 423 (42.8%) out 989 Native American respondents who had BMI's greater than 30. The second highest number of responses in the obesity by age category was age 50 to 54; of which 401 (43.5%) out of 921 Native American respondents had BMI's greater than 30. The third highest number of responses in the obesity by age category was age 60 to 64; of which 396 (42.3%) out of 937 Native American respondents had BMI’s greater than 30.

The lowest BMI by age category were BMI's of 18.5 or less. The age group with the least number of respondents was age group 35 to 39. Only 3(0.5%) out of 633 Native

American respondents had BMI's of 18.5 or less. The second lowest number of respondents with BMI's of 18.5 or less was age 30 to 34. Only 5 (0.8%) out of the 624 Native American respondents, age 30 to 34, had a BMI of 18.5 or less. There were two age groups with the third lowest number of respondents. Age group 65 to 69 had 7 (0.9%) Native American respondents out of 782; and age group 75 to 79 had 7 (2.1%) out of 331 Native American respondents with a BMI of 18.5 or less.

According to Green & Salkind (2014), a Cramer's *V* (effect size) is measured in values from 0 to +1. The Cramer's *V* value for age was .107, thus closer to 0 and greater than .05. Therefore, the magnitude of the effect size is small, and the relationship between age and BMI is weak. Although the Chi-square test was found significant, the null hypothesis that there is no association between age level and obesity in Native American communities was rejected.

Regarding education (Table 7), the three education categories with highest number of Native American respondents with a BMI greater than 30 were first, high school graduates. There were 1112 (39.9%) out of 2786 responses from high school graduates who had a BMI greater than 30. The second highest number responses by education category with BMI's greater than 30 were those with 1 to 3 years of college. There were 1078 (42.1%) out of 2559 responses from those who had a BMI greater than 30, and 1 to 3 years of college. The third highest number of respondents with a BMI greater than 30 was those who graduated college. There were 704 (37.9%) out of 1856 responses from Native Americans who had a BMI's greater than 30, and graduated from college.

There were 0 out of 11 responses in the category representing no education or kindergarten with a BMI of 18.5 or less. The education category with the most responses to having a BMI of 18.5 or less was high school graduates. There were 44 (1.6%) out of 2786 Native Americans who were high school graduates and had a BMI of 18.5 or less. The second highest number of responses with a BMI of 18.5 or less was those with 1 to 3 years of college. There were 26 (1.0%) out of 2559 Native Americans who had a BMI 18.5 or less, and 1 to 3 years of college. The third highest number of responses from Native Americans who had a BMI of 18.5 or less was those with a college degree. There were 23 (1.2%) out of 1856 Native Americans who were college graduates, and had a BMI of 18.5 or less.

The Cramer's *V* value for education was .034, thus closer to 0 and lower than .05. Therefore, the magnitude of the effect size is very small, and the relationship between education and BMI is very weak. Since the Chi-square test was found significant, the null hypothesis that there is no association between education and obesity in Native American communities was rejected.

As far as the income variable is concerned (Table 7), the greatest number of Native American respondents who reported income levels and BMI's greater than 30 had incomes of $15,000.00 to less than $20,000.00. There were 472 (41.4%) out of 1140 Native American respondents who had a BMI greater than 30, and an income of $15,000.00 to less than $20,000.00. The second highest number of Native American respondents who reported income levels and BMI's greater than 30 had incomes of less than $10,000.00. There were 461 (40.7%) out of 1132 Native American respondents who

had BMI's greater than 30, and an income of less than $10,000.00. The third highest number of respondents with a BMI greater 30 had incomes of $75,000.00 or more. There were 436 (37.1%) out of 1176 Native American respondents who had BMI's greater than 30, and an income of $75,000.00 or more.

The greatest number of Native American respondents who reported income levels and BMI's of 18.5 or less had incomes of less than $10,000.00. There were 25 (2.2%) out of 1132 Native American respondents who had a BMI greater than 30, and an income of less than $10,000. The second highest number of respondents with BMI's 18.5 or less had incomes of $15,000.00 to less than $20,000.00. There were 22 (1.9%) of Native American respondents who had a BMI of 18.5 or less, and had incomes of $15,000.00 to less than $20,000.00. The third highest number of respondents that had a BMI of 18.5 or less had incomes of $25,000.00 to less than $35,000.00. There were 16 (1.5%) out of 1084 Native American respondents who had a BMI of 18.5 or less, and an income of $25,000.00 to less than $35,000.00.

The Cramer's *V* value for income was .047, thus closer to 0 and lower than .05. Therefore, the magnitude of the effect size is very small, and the relationship between income and BMI is very weak. Since the Chi-square test was found significant, the null hypothesis that there is no association between income and obesity in Native American communities was rejected.

Mental illness data from Table 7 revealed 15 total responses. There were 4 (26.7%) Native American respondents who had a BMI of 30 or more. There were 7 (46.7%) Native American respondents who had BMI's between 25 and 30; and there were

4 (26.7%) of Native American respondents to the BMI category of 18.5 to 25. A total of 8449 Native Americans did not answer questions about BMI and mental illness. Of the 8449 negative responses, 121 (1.4%) did not answer rather they had mental illness and a BMI of 18.5 or less. Of the 8449 negative responses to having a mental illness and a BMI of 18.5 to 25, 1979 (23.4%) had a negative response or did not answer. Of the 8449 negative responses to having a mental illness and a BMI of 25 to less than 30, 2966 (35.1%) had a negative response or did not answer; and of the 8449 negative responses to having a mental illness and a BMI of 30 or more, 3383 (40.0%) had a negative response or did not answer.

The Cramer's *V* value for mental illness was .013, thus closer to 0 and higher than .05. Therefore, the magnitude of the effect size was very small, and the relationship between mental illness and BMI is weak. Since the Chi-square test was not found significant, the null hypothesis that there is no association between mental illness and obesity in Native American communities was retained.

Table 7

Chi-square Test for 2017 BRFSS Native American Independent Variables and Obesity

	Body Mass Index (BMI) Categories					Chi-square Test		
Independent Variables	Underweight: BMI < 18.50 N%	Normal Weight: BMI 18.50 <= 25.00 N%	Overweight: BMI 25.00 <= 30.00 N%	Obese: BMI 30.00 <= 99.99 N%	Total	X^2	*V*	*P*
Income Level	121(1.4)	1983(23.4)	2973(35.1)	3387(40.0)	8464	56.429	.047	.000
Less than $10,000	25(2.2)	288(25.4)	358(31.6)	461(40.7)	1132			
Less than $15,000 ($10,000 to less than $15,000)	15(1.7)	198(22.8)	296(34.1)	358(41.3)	867			
Less than $20,000 ($15,000 to less than $20,000)	22(1.9)	280(24.5)	366(33.8)	472(41.4)	1140			
Less than $25,000 ($20,000 to less than $25,000)	13(1.2)	265(25.0)	352(33.2)	430(40.6)	1060			
Less than $35,000 ($25,000 to less than $35,000)	16(1.5)	273(25.2)	366(33.8)	429(39.6)	1084			
Less than $50,000 ($35,000 to less than $50,000)	12(1.2)	241(23.1)	379((36.4)	410(39.3)	1042			
Less than $75000 ($50,000 to Less than $75000)	7(0.7)	198(20.6)	367(38.1)	391(40.6)	963			
$75000 or more	11(0.9)	240(20.4)	489(41.6)	436(37.1)	1176			

Education Level	121(1.4)	1983(23.4)	2973(35.1)	3387(40.0)	8464	29.803	.034	.013
No school or only kindergarten	0(0.00)	1(9.1)	5(45.5)	5(45.5)	11			
Grades 1-8 (Elementary)	6(1.9)	72(23.3)	120(38.8)	111(35.9)	309			
Grades 9-11 (Some High School)	22(2.3)	220(23.3)	324(34.4)	377(40.7)	943			
Grade 12 or GED (HS Graduate)	44(1.6)	697(25.0)	933((33.5)	1112(39.9)	2786			
College 1- 3 years (Some college or technical school)	26(1.0)	562(22.0)	893(34.9)	1078(42.1)	2559			
College 4 years (College graduate)	23(1.2)	431(23.2)	698(37.6)	704(37.9)	1856			
Mental Illness	121(1.4)	1983(23.4)	2973(35.1)	3387(40.0)	8464	0.521	0.137	0.677
Yes	0.(0)	4(26.7)	7(46.7)	4(26.7)	15			
No	121.(4)	1979(23.4)	2966(35.1)	3383(40)	8449			
Age in 5 Yr Categories	121(1.4)	1983(23.4)	2973(35.1)	3387(40.0)	8464	279.407	105	.000
Age 18 to 24	15(2.7)	227(40.8)	162 (29.1)	153(27.5)	557			
Age 25 to 29	11(1.9)	191(33.1)	177(30.7)	198(34.3)	577			
Age 30 to 34	5(0.8)	131(21.0)	224(35.9)	264(42.3)	624			
Age 35 to 39	3(0.5)	122(19.3)	211(3.3)	297(46.9)	633			
Age 40 to 44	8(1.3)	131(20.6)	210(33.1)	286(45.0)	635			
Age 45 to 49	9(1.2)	147(19.7)	258(34.6)	332(44.5)	746			
Age 50 to 54	13(1.4)	185(20.1)	322(35.0)	401(43.5)	921			
Age 55 to 59	11(1.1)	189(19.1)	366(37.0)	423(42.8)	989			
Age 60 to 64	9(1.0)	198(21.1)	334(35.6)	396(42.3)	937			
Age 65 to 69	7(0.9)	182(23.3)	287(36.7)	306(39.1)	782			
Age 70 to 74	12(2.5)	105(21.6)	178(36.7)	190(39.2)	485			
Age 75 to 79	7(2.1)	93(28.1)	141(42.6)	90(27.2)	331			
Age 80 or older	11(4.5)	82(33.2)	103(41.7)	51(20.6)	247			

Correlation Analysis

In contrast to part one of the bivariate analyses where categorical variables were analyzed, the second part of the analyses focused on analysis of continuous variables. Initially, Pearson product-moment correlation coefficient analyses was conducted to measure the strength of the linear relationship between independent and dependent variables; assuming that all cases were independent of each other; were random samples from the Native American population who participated in the 2017 BRFSS; and were bivariate and normally distributed (Green & Salkind, 2014). To confirm the assumptions, normality analysis was conducted to test skewness and kurtosis. Interpretations of the normality analyses illustrated that variables considered were not normally distributed. Because the assumption of normal distribution was violated, Spearman's rho correlation coefficient analyses were conducted to illustrate strength of relationship, and significance of relationships between obesity and continuous variables researched.

Table 8

Nonparametric Correlation for Age in Five Year Categories and Body Mass Index

Correlations

			AGE IN FIVE-YEAR AGE CATEGORIES	BODY MASS INDEX CATEGORIES
Spearman's rho	REPORTED AGE IN FIVE-YEAR CATEGORIES	Correlation Coefficient	1.000	.008
		P	.	.456
		N	8464	8464
	COMPUTED BODY MASS INDEX CATEGORIES	Correlation Coefficient	.008	1.000
		P	.456	
		N	8464	8464

The results of the Spearman's rho correlation coefficient illustrate that there is a positive but weak relationship between age level and body mass index (obesity). Because the *p* value of .456 is greater than *p*-value (alpha value) of .05, the positive but weak relationship observed between age level and obesity is not significant.

Table 9
Nonparametric Correlation for Education Level and Body Mass Index

Correlations

			EDUCATION LEVEL	BODY MASS INDEX CATEGORIES
Spearman's rho	EDUCATION LEVEL	Correlation Coefficient	1.000	.010
		P	.	.351
		N	8464	8464
	COMPUTED BODY MASS INDEX CATEGORIES	Correlation Coefficient	.010	1.000
		P	.351	
		N	8464	8464

The results of the Spearman's rho correlation coefficient illustrate that there is a positive but weak relationship between education level and body mass index (obesity). Because the *p* value of .351 is greater than the *p*-value (alpha value) of .05, it was determined that the positive but weak relationship observed between education level and obesity is not significant.

Table 10
Nonparametric Correlation for Income Level and Body Mass Index

Correlations

			INCOME LEVEL	BODY MASS INDEX CATEGORIES
Spearman's rho	INCOME LEVEL	Correlation Coefficient	1.000	.008
		P	.	.463
		N	8464	8464
	COMPUTED BODY MASS INDEX CATEGORIES	Correlation Coefficient	.008*	1.000
		P	.463	
		N	8464	8464

The results of the Spearman's rho correlation coefficient illustrate that there is a positive but weak relationship between income level and body mass index (obesity). Because the *p* value of .463 is greater than the *p*-value (alpha value) of .05, the positive but weak relationship observed between income level and obesity is not significant.

Summary

In Section 3 of this research, analysis of variables that were identified in the 2017 BRFSS, and previously associated with obesity research conducted in other minority populations with similar age groups, revealed weak relationships of predictor variables that were significant. The research was conducted in order to assess factors that influence prevalence of obesity in Native Americans who participated in the survey. Of 486,303 interviews conducted, 1.96 percent, or 9539 were conducted with Native Americans who were 18 years of age and older. Univariate, bivariate, and correlation analyses were

conducted to identify significance, strength of variable relationships, and predictability of obesity. Although relationships identified were weak with small effect sizes, bivariate analyses to include: income level, education level, and age level were found be significantly related to obesity increases in Native Americans who participated in the 2017 BRFSS. Mental illness was not found to be significantly associated with obesity, probably due to the very few cases of mental illness (15).

In the final section of my research, I illustrated how findings from Section 3 will be applied to a theoretical concept that is designed to reduce prevalence of Native American obesity, and improve the health of Native American communities.

Section 4: Application to Professional Practice and Implications to Social Change

Introduction

Obesity is an illness that has adversely impacted minority populations at greater levels than other populations (Gustafson, 2013). Therefore, the purpose of this research was to examine how income, education, mental illness, and age adversely impact obesity statistics in Native American populations in the United States. This study was designed to identify and analyze variables that have been linked to increased obesity prevalence in minority populations. It was through this objective that evidence-based research could be provided to justify new and improved policy-driven objectives that focus on reducing prevalence of obesity in Native-American populations and communities. To accomplish this, variables identified in the 2017 BRFSS dataset were chosen for secondary data analyses and processed using the 25th version of IBM SPSS Statistics software.

Concise Summary of Key Findings

There were 8,464 Native Americans who responded to questions about their BMI in the 2017 BRFSS dataset. Participants identified themselves in one of four BMI categories as underweight (BMI, 18.5), normal weight (BMI 18.5 <= 25.00), overweight (BMI 25.00<=30.00), and obese (BMI 30.00<=99.99). There were 121(1.4%) underweight Native American participants, 1,983(23.45%) participants who were categorized as normal weight, 2,973(35.1%) who were identified themselves as overweight, and 3,387(40.0%) who identified themselves as obese.

For questions involving education and BMI, the most obese education category was 1,112(39.9%) of Native American participants had 12 years of high school, a GED,

or were high school graduates. For questions involving incomes and BMI, the most obese income category was 472 (41.4%) of Native American participants who earned $15,000.00 to less than $20,000.00.

Most of the Native American participants did not answer to questions about mental illness. For the 15 that answered whether they had a mental illness or not, the greatest amount in any category of BMI was seven. There were 7 (46.7%) that were overweight. There were no positive mental illness responses to the underweight category; and there were four (26.7%) responses to category of normal weight, and four (26.7%) responses to the obese category. There were no Native American participants who had negative answers to mental illness in any category of BMI.

Bivariate analysis revealed that, except for obesity and mental illness, there were significant but weak associations ($p < 0.05$) between obesity and age level, obesity and education level, and obesity and income level.

Interpretation of Findings

Native American BMI

The results of this study provided a formative insight to how Native American incomes, educations, and ages are important predictors of Native American obesity. As discovered, almost half of the middle-aged Native American respondents had BMI's greater than 30. Only a few Native Americans reported mental illness. Most Native Americans earned $20,000.00 or less, and had at minimum, a high school education. Additionally, a large percentage of obese Native American respondents in this study had

1 to 3 years of college and several who graduated from college and earned $75,000.00 or more.

Native American Income Challenges

As previously reported, most Native Americans who may or may not live on reservations had incomes of $20,000.00 or less. This research substantiated findings by researchers such as Hodge et al. (2011) who identified that in developed countries such as the United States obesity is most common among those with low socioeconomic status. In a article written by A Program of Partnership by Native Americans (2015), it was concluded that the largest reservation employers are Tribal and Federal governments, but factors such as overcrowded housing, minimal incomes from social security, and veteran disability programs are not enough to reduce unemployment numbers on reservations that range from four out of eight to sometimes 10 out of eight unemployed Native American adults. Council (2012) concluded that Native American poverty rates that exceed half of the overall community population are caused by Native Americans who live in high density, rural, or small town areas on or near reservations. The National Congress of American Indians (2020) reported that 38.3% of Native Americans that live on reservations live in poverty compared to 13% of the national average who live in poverty. These statistics and research parallel with this study's crosstab analysis which revealed that of n = 8464 Native Americans, 41.4% of obese Native Americans, earned incomes between $15,000 to less than $20,000.

In contrast, Native Americans may ultimately follow inverse obesity trends within the United States as a developed country. Bentley, Ormerod, and Ruck (2018) concluded

that obesity in developed economies and countries may be a result of overabundance of inexpensive foods and reduced daily physical activity. Wherein this may not be anything new to the U.S. obesity crisis, Bentley et al. revealed that this is in contrast to developing countries wherein the poor are subjected to increased prevalence of obesity. This phenomenon, reverse gradient, does not fully explain why developed countries with higher income environments have increased prevalence of obesity, but it does provide question as to why are those with moderate incomes in developing countries have increased prevalence of obesity. If this model is consistent with indigenous, poor populations, it may be applicable to Native American populations in that the solution to reducing Native American obesity may not be in increasing incomes, but more so in increasing physical fitness, and applying greater discretion to food choices.

Native American Education and BMI

Devaux et al. (2011) surmised that educated individuals make better use of health-related information than those who are less educated. This overall assumption may be true statistically for the United States as a whole but may not apply to indigenous populations in the United States and its territories. For example, surveys conducted by the U.S. Department of Education (2019) revealed that in the 2016-2017 school year, the national average for public school graduation rates was 85%, which Pacific Islander (91%) and White (80%) students were above the national average, while Hispanic (80%), Black (78%), and Native American (72%) students were below the national average. These trends are consistent throughout the 2019 report but they are also generational in that the same survey taken in 2017 revealed that for households with at least one parent

who completed a bachelor's degree or higher, Asian (68%), and White (52%) families had the highest percentages, while Black (26%), Pacific Islander (21%), Native American (21%), and Hispanic (20%) families had the lowest percentages of families (U.S. Department of Education, 2019). These trends align with this survey in that *n* = 8464 of Native Americans (40%) were obese who had educations that range from no schooling at all to those who had completed 4 years of college. Again, these may be national averages, but survey numbers for obesity on Native American reservations are likely to be higher (U.S. Department of Education, 2019).

For a different perspective on how education and obesity differ by sex, the CDC (2017b) explained that obesity rates are lower among college graduates who are non-Hispanic Whites, Blacks, and Hispanic women, but higher for non-Hispanic Asian men and women, and non-Hispanic Blacks and Hispanic men. This may be consistent among established U.S. populations but as noted in this study, obesity prevalence increased from Native Americans with no education to Native Americans who were high school graduates. According to this research, declines in obesity were noted for Native Americans with 1 to 3 years of college' and even lower for Native Americans who graduated from college, which is consistent with studies conducted by CDC. Based on this comparison, prevalence of obesity in Native American communities peaked at the high school level for Native Americans, and declines for Native Americans with 1 to 3 years of college, and Native American's who are college graduates. What this identifies is that the target population for interventions designed to reduce obesity may be more appropriate at the adolescent and teenage Native American populations.

Native American Age and Obesity

According to HHS (2020), Native American adolescents are 30% more likely to be obese than non-Hispanics Whites, and Native American adults are 50% more likely to be obese than non-Hispanic Whites. Further, 41% of Native Americans did not meet federal physical activity guidelines compared to 38.9%of non-Hispanic Whites HHS (2020). These obesity statistics are significant to leading a healthy lifestyle in that they often lead to increased risks of serious diseases including death (CDC, 2020). Previously mentioned, *n* = 8464 of the Native Americans surveyed in this study, 40% of age groups from age 18 to greater than 80 years of age. and 75.1% were either overweight or obese.

Mental Health and Native American Communities

CDC (2020) concluded that mental illness such as clinical depression and anxiety are common mental disorders as a result of obesity. Although responses were less than 1% of the entire sampled population, for those who indicated that they have a mental illness, *n* = 15 of Native Americans, 73.4% were either overweight or obese. Although the number of responses for the mental illness category was minimal, the percentages illustrate consistency with categories of income, education, and age that were observed.

Interpretation of Findings in the Context of Theoretical and/or Conceptual Framework

As previously discussed, the socioecological perspective on health promotion is not based on a single theory or discipline, but on a broader paradigm that bridges several different fields of research (see Stokols. 1996). Because the SEM is characterized by themes and core principles designed to promote and improve interrelations of human

behavior and environmental conditions, it was not beyond the scope of this research to define and substantiate social determinants of health in Native American communities that can be addressed at multiple levels of the SEM.

The SEM illustrates a range of behaviors that are culturally driven, environmentally influenced, and institutionally relative to the outcome of health (Stokols, 1996). It was identified in this study that age, education, and income were associated with obesity. Subsequently, it may be advantageous to address reducing obesity in the earliest stages of life by introducing healthy foods to form healthy diets and by encouraging physical activity to improve strength and reduce prevalence of chronic diseases. It is at the Individual level of SEM that education, developing interest, hobbies, and occupations can be influenced (Stokols, 1996). This study revealed that most of the sampled population had a high school diploma but yet were obese. Therefore, positive influences at the individual level of the SEM, if achieved, would directly influence improvements at the intrapersonal level of the SEM.

The interpersonal level, where families, neighbors, and peers create cultures and lifestyles, would likely be influenced by mentors, leadership programs, and cultural programs (Stokols, 1996). Generally found in organizations such as Boys and Girls clubs, promotion of healthy lifestyles through education and fitness are common goals. It is plausible at this stage, that it is important to hear about, or know of someone who used their education as a tool for success. It was previously noted in this study that even with a high school diploma, obesity rates were extremely high. For those who did use their educations as a tool to improve socioeconomic status, the obesity rates were still very

high. This research revealed that 78.7% of Native American respondents, who had incomes of $75000.00 or more, were overweight or obese.

The third level of the SEM is the organizational level (Stokols, 1996). It was previously noted that diets of many Native Americans were often poor in quality, high in fat and sugar, and included minimal fruits and vegetables (Hodge et al., 2011). If true, there is dire need for places that are commonly visited such as community organizations, schools, and places of employment to revisit policies and programs that shape cultural norms of obesity as an acceptable way of life.

The forth element of the SEM, community, identifies the cultural values and norms of the community environment (Stokols, 1996). HHS (2019) concluded that Native Americans have a life expectancy 5.5 times less than other races in the U.S., and that higher rates of chronic liver disease and cirrhosis, diabetes mellitus, chronic respiratory diseases, assaults, suicides, homicides, and other unintentional injuries are significant to Native American communities. The aforementioned health disparities indicate that there is a significant opportunity for health interventions in Native American communities. Nestle and Jacobson (2000) concluded that community health disparities can be reduced by empowering and educating those within the community on the need for healthy diets, improved physical fitness, and the importance of education. My research has shown that obesity rates can increase regardless of age, education, and income. The same holds true for the few Native Americans who identified themselves as having a mental illness. Although more research on this topic is required, it is fair to

mention that there is a correlation to obesity and increased prevalence of mental illnesses in Native American communities (CDC, 2020).

As previously discussed, public policy, the fifth element of the SEM framework addresses each level of the SEM through policy (Stokols, 1996). HHS (2014) concluded that effective policies can reduce obesity prevalence in Native American communities. A few examples of policy driven objectives that have a positive benefit to any community are recreation facilities, bike paths, well lit walking paths and trails, healthy foods in schools, access to healthy foods, and many other cultural and community outreach programs (HHS, 2014).

Limitations of the Study

Although sample size was small in comparison to other races and ethnicities, one primary reason for lack of representation is that many Native Americans living on reservations, and in rural communities have been deemed hard-to-count for purposes of appropriations based on Census enumerations (National Congress of American Indians, 2020). Therefore, with exception of mental illness cases, it is believed that this study is representative by sample and size to the Native American population.

My research study was based on CDC data collected in 2016 and published in 2017. The 2017 BRFSS data collected by CDC were a valid source of secondary data that were derived from questions used in previous nutritional studies, and tailored by each state and territory to address cultural norms and commonalities.

Although valid by source, there are likely many other health, and domestic factors that are influencing increased obesity prevalence in Native American communities.

Therefore, to generalize this study, those factors must be identified and researched. In addition, given the nature of the cross-sectional research design used in this study, more would probably be learned if this research was longitudinal so that trends could be observed, and interventions could be developed at different levels of the SEM. As previously noted, sample size was a limitation to this study. Green and Salkind (2014) conclude that larger sample sizes, and reducing standard error and may increase prediction of dependent variables.

Weak associations were found between predictor variables and the outcome variable Aschengrau and Seage (2008) concluded that adding variables (confounders) or using effect modification is applicable to improving predictability of outcome variables. Additionally, Aschengrau and Seage (2008) determined that confounding addresses two analogies: whether the crude measure of association is distorted, and whether the stratum-specific and adjusted summary adjustments are different from the crude estimate; and whether effect modification answers whether the association differs according to the level of a third variable, or whether the stratum-specific estimates are different from each other. Either way, adding a third variable is a common practice used by researchers to improve a regression model (Aschengrau & Seage, 2008).

Recommendations

To better understand the nature and culture of Native American communities, it is conceivable that a randomized, quantitative telephone survey may not reveal the necessary cultures and lifestyles that would shed light on the obesity epidemic in Native American communities. Although not as cost effective, a qualitative survey based on

input from community stakeholders and community focus groups may yield additional predictors and confounders of obesity in Native American communities (Creswell, 2009).

My research provides a less formal but broader look at how obesity prevalence is highest in Native American populations when compared to other minority populations. If considered, factors such as Native American incarcerations, drug addiction, domestic violence, health literacy, homelessness, healthy food choices, and questions related to pharmacotherapy compliance may yield additional opportunities for discovery of obesity predictors. Studies that account for the aforementioned variables may also help to provide a more comprehensive intervention that not only addresses the more common causes of obesity, but also those that may provide insight to underlying causes of obesity in Native American communities. One can surmise if the aforementioned variables were included in this research, observations may have provided greater insight to how policies could be developed to reduce Native American social determinants of health.

Another recommendation is to find a way through education and improved awareness to obtain valid responses related to questions about mental illness. As previously noted, Henderson et al., (2013) identified barriers such as fear of stigmas and prejudices related to admission of mental illness diagnosis; and ignorance surrounding mental illness and the availability of organizations and programs designed to provide therapeutic measures to help respondents cope with their mental illnesses are common barriers that yield reluctance to seeking mental health treatment. Henderson et al., (2013) concluded that improving education and awareness about mental illnesses would likely

yield valid responses to survey questions, and would provide substantiation of programs and policies designed to address mental health and adverse behaviors.

Implications for Professional Practice and Social Change

My study revealed that although there are relationships between obesity and income, obesity and education, and obesity and age, more has to be done to reduce prevalence of obesity in Native American communities. Because many researchers have identified the lack of research conducted in Native American populations, part of the relevance of my study was to improve awareness of the health and socioeconomic disparities in Native American communities in order to substantiate the need for productive interventions.

Professional Practice

There is much to be learned from data collected and analyzed in the 2017 BRFSS. On all accounts, affordability is paramount for many researchers. Therefore, using secondary data provided by a valid source such as CDC is significant to learning more about the population in question at an affordable cost. Beyond costs, the diversity of data collected substantiates additional opportunities for researchers to develop an array of research questions that are applicable to many other populations. This level of diversity in usage of data creates ample opportunities for researchers to work closely with Native American focus groups, community stakeholders, and medical and mental health professionals to create surveys that address barriers that reduce success in sustainable treatment. Finally, because the BRFSS is conducted annually, researchers are provided an

opportunity to catalogue statistical information to determine if interventions are required, and if interventions have been effective.

Positive Social Change

The SEM was chosen as the theoretical premise of this research in order to illustrate the benefits of a comprehensive approach to addressing the health and socio-economic disparities of a community at multiple levels. As a researcher, creating positive change in the health and norms of a community must start with the youth. Therefore, the rationale of the theory selection will hopefully present those who review this research with a new focus that involves educating and encouraging Native American youths and young adults at the individual level of the SEM. It is my hope that what has learned at the individual level will improve healthy behaviors at the interpersonal, community, and organizational levels of the SEM. It will be through those levels that the voice of change will be heard so that new and improved policies to address the needs of Native American communities can be legislated.

Conclusion

My research validated that it takes more than graduating from high school or college to reduce obesity prevalence in Native American communities. Additionally, my research revealed that it takes more than earning a substantial income, or living a longer life to reduce prevalence of obesity in Native American populations and communities. The findings of my research may not have provided the complete answer to the obesity crisis in Native American communities, but the significance of my research was to educate and provide a heightened sense of awareness of the need for social and

behavioral changes that may be required to reduce prevalence of obesity. With the needs for social and behavioral changes in mind, my study serves as substantiation for creation or improvement of policy driven objectives that address health literacy, the importance of physical fitness, and the importance of maintaining a healthy diet.

It is plausible that social change and healthy behaviors can be achieved through education improved socioeconomics, and implementation of healthier lifestyles. Subsequently, it is vital that youths and young adults understand that they are future community leaders, and before they embrace the responsibility of the health of their communities, taking personal responsibility for their actions and behaviors must be considered first.

My hope is that my research provides the motivation and substantiation needed for Native American communities and local governments to reinvest in the health and future of their communities. Positive change and reduced prevalence of obesity can be achieved, but it will take setting personal and realistic community goals that include consistency in predefined, policy driven objectives to make obesity a chronic illness of the past.

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Appendix: Socioecological Model