8-1-2013

# Co-Morbidities Associated With Adult Obesity In Mississippi

Richmond Lachney

# Co-morbidities Associated With Adult Obesity in Mississippi

By

Richmond Lachney, Daniel Walker, Tonda Wells

Clinical Research Project

Submitted in Partial Fulfillment of the Requirements for the

Degree of Master of Science in Nursing, College of Nursing

and Speech Language Pathology

Mississippi University for Women

Graduate Committee Approval

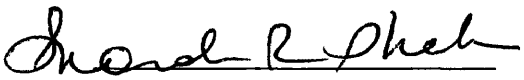


ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

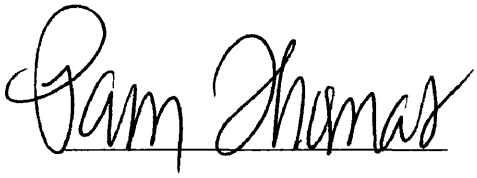
The Graduate Committee of Richmond Lachney, Daniel Walker, and Tonda Wells hereby approve this research project as meeting partial fulfillment of the requirements for the Degree of Master of Science in Nursing

**APPROVED:**

Chair of Research Project



Member of Research Committee



Member of Research Committee

Approved:

Director of Graduate School

## DEDICATION

We would like to thank God, for the strength, guidance, patience, and endurance necessary to complete this project. We would like to dedicate this project to our families who supported and encouraged us throughout this past year. Thank you for believing in us and supporting us during this endeavor.

## ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to the following for guiding and mentoring us throughout our research project: Dr Patsy Smyth, Mrs Shonda Phelon, and Mrs Pam Thomas. Special thanks to each of you for your guidance and encouragement in making this research project a success. Your commitment to our success is greatly appreciated.

## Abstract

Obesity rates are rapidly increasing in Mississippi and the entire United States. It is estimated that 34.9% of Mississippi residents and 75 million Americans over the age of 20 are considered obese. Numerous studies have shown the high risk of developing co-morbidities once a person develops obesity. The number of adult Americans living with obesity and its associated co-morbidities is alarming. The purpose of this study was to determine which co-morbidities are most prevalent among obese residents of rural Mississippi and whether they can be reduced or reversed with significant weight reduction. Nola Pender's Health Promotion Model was utilized to guide the methods of this study. This study posed two separate questions. What percent of obese adult patients of rural health clinics in Mississippi have a co-morbidity associated with their obesity? What are the most common co-morbidities associated with obesity among patients of rural health clinics in Mississippi? This study examined the medical charts of non-pregnant, adult patients of three rural Mississippi health clinics who are 20 years of age or older, of any race, ethnicity, or gender, with a BMI >30. The data was gathered from 300 charts of patients who met the inclusion criteria and statistically analyzed to determine which obesity-associated co-morbidities are most prevalent among this population.

## TABLE OF CONTENTS

COPYRIGHT PAGE.....iii

DEDICATION PAGE.....iv

ACKNOWLEDGEMENTS.....v

ABSTRACT.....vi

TABLE OF CONTENTS.....vii

LIST OF TABLES.....x

LIST OF FIGURES.....xi

LIST OF APPENDICES.....xii

CHAPTER I:

Background Information and Statement of the Problem.....1

Purpose of the Research Project.....1

Significance of the Research Project.....2

Limitations of the Research Project.....3

Definition of Terms.....3

Research Questions.....4

Conceptual Framework.....4

Assumptions.....6

Summary.....6

CHAPTER II:

Conceptual Framework.....8

Review of Related Research.....13

CHAPTER III:

Design and Methodology.....41

Setting.....41

Population and Sample.....41

Implementation of the Project.....41

Protection of Human Subjects and Data Collection.....41

Summary of Methods.....41

Data Analysis.....42

CHAPTER IV:

Participant Characteristics.....44

Research Question One.....46

Research Question Two.....46

Conclusion.....50

CHAPTER V:

Summary and Conclusions.....51

Interpretations of Findings and Conclusions.....51

Outcomes Related to Research Questions.....52

Literature Applications to the Outcomes.....52

Limitations.....53

Implications and Recommendations.....54

Nursing Theory.....54

Nursing Research.....54

Advanced Nursing Practice.....55

Nursing Practitioner Education.....55

Summary.....56

REFERENCES.....57

## LIST OF TABLES

Table 1. Demographics.....45

Table 2. BMI by gender, age, and ethnicity.....48

## LIST OF FIGURES

Figure 1. Number of total co-morbidities per patient.....46

Figure 2. Incidence of co-morbidity amongst the sample of patient charts.....47

Figure 3. BMI by gender.....49

Figure 4. BMI by age classification.....49

Figure 5. BMI by ethnicity.....49

## LIST OF APPENDICES

A. IRB Approval Letter.....58

B. Letter of Consent for Rural Health Clinic.....59

C. Data Collection Instrument.....61

# Chapter I

## Background Information and Statement of the Problem

The number of adult Americans living with obesity and its associated co-morbidities is alarming. Numerous studies have shown the high risk of developing co-morbidities once a person develops obesity. The American Heart Association's Overweight and Obesity-2012 Statistical Fact Sheet states that 75 million Americans over the age of 20 are considered obese. The latest CDC findings on adult obesity reveal that 34.9% of adult Mississippi residents are obese. A study performed by Guh et al in 2009 revealed a direct association between obesity and an increased incidence of numerous medical conditions including: type II diabetes mellitus, all cancers except esophageal and prostate cancer, all cardiovascular diseases, asthma, gallbladder disease, osteoarthritis and chronic back pain.

Because of the prevalence of obesity and its association with numerous co-morbidities, bariatric surgery is now recognized as a viable treatment option for those with morbid obesity. Substantial weight loss from bariatric surgical procedures is associated with either reversal or significant improvement in several co-morbid conditions (Burke & Wang, 2011). Morbidly obese patients who underwent bariatric surgery and were followed post-surgically were found to have resolution or significant improvements of type II diabetes mellitus, hypertension, dyslipidemia, metabolic syndrome, non-alcoholic fatty liver disease, chronic kidney disease, left ventricular hypertrophy and obstructive sleep apnea (Athyros, Tziomalos, Karagiannis, & Mikhailidis, 2011).

## Purpose of the Research Project

The purpose of this study was to determine which co-morbidities are most prevalent among obese residents of rural Mississippi and how they can be reduced or reversed through significant weight reduction such as that with bariatric surgery. Additionally, the researchers attempted to illustrate the benefits of weight loss and the reduction or reversal of the co-morbidities associated with obesity.

**Significance of the Research Project**

The findings of this study are significant to all healthcare providers who care for obese patients. Over 1 billion adults are obese worldwide and obesity results in over 2.8 million deaths each year ("10 facts on obesity," 2012). The CDC reports that as weight increases, the risk for coronary heart disease, cancer, hypertension, dyslipidemia, stroke, liver disease, gallbladder disease, sleep apnea, respiratory problems, osteoarthritis, and gynecological problems increase. Another statement by the CDC reveals that about 147 billion dollars were spent treating obesity in the United States alone in 2008. Less than 50% of adults in America get the recommended amount of daily exercise ("Adult obesity facts," 2011). Obesity has become a global epidemic and Mississippi is the most obese state in the union. Steps must be taken by all people in the United States to reduce excess body weight, improve levels of physical fitness, and reduce co-morbidities associated with obesity. Health care spending on obesity and obesity related co-morbidities cannot continue at this rate. Healthcare providers must become more proactive in finding ways to treat and counsel obese individuals. Treatment plans and counseling must be initiated as soon as obesity is identified to prevent or reverse the onset of countless co-morbidity. This study serves as an informative reminder of the high rates of obesity and the associated co-morbidities to healthcare providers.

## Limitations of the Research Project

The research project was limited because data was only gathered from three rural health clinics in Mississippi. According to 2011 census data, the population of Mississippi is comprised of 60% Caucasians and 37.3% African Americans. Different results may be present if clinical sites included areas with a broader range of ethnic groups. This study utilized a retrospective chart review and only data that was documented in the charts was used. Results may differ or other data may be apparent if examinations or interviews with human participants were carried out. A total of 300 charts were reviewed to determine which co-morbidities are most prevalent among adult residents of Mississippi who are obese. Findings may have been skewed due to the small sample size utilized for this study.

## Definition of Terms

### Body Mass Index (BMI)

*Conceptual*: "A tool used to screen for overweight and obesity. In adults, BMI is defined as weight in kilograms divided by the square of the height in meters. A BMI of 25-29.9 indicates overweight and a BMI of 30 or greater indicates obesity." (R. Porter & J. Kaplan (Eds.), 2011, pg 58).

*Operational:* A tool used to screen for overweight and obesity. Only data from patients with a BMI of 30 or greater will be utilized in this study.

### Obesity

*Conceptual:* "An unhealthy accumulation of body fat. Obesity is defined as having a body mass index of 30kg/m squared or greater. Obesity is the most common metabolic/nutritional disease in the U.S. Obesity is more common in women, minorities,

and the poor. Obesity is the end result of an imbalance between food eaten and energy expended, but the underlying causes are more complex. Genetic, hormonal, and neurological influences all contribute to weight gain and loss." (D. Venes (Ed.), 2009, pg 1614)

*Operational:* Obesity will be defined as having a BMI of 30 or greater and Morbid Obesity shall be defined as a BMI greater than 40.

**Co-Morbidity**

*Conceptual:* A concomitant but unrelated pathologic disease process, the coexistence of two or more disease processes. (Lexicomp, 2012)

*Operational:* Co-morbidities of obesity include but are not limited to, type II diabetes mellitus, all cancers except esophageal, pancreatic, and prostate cancer, all cardiovascular diseases except CHF, gallbladder disease, osteoarthritis, chronic back pain, dyslipidemia, liver disease, respiratory problems, and gynecological problems.

**Research Questions**

The following research questions were created to guide the focus of this study:

1. What percent of obese adult patients of rural health clinics in Mississippi have co- morbidity associated with their obesity?

2. What are the most common co-morbidities associated with obesity among patients of rural health clinics in Mississippi?

**Conceptual Framework**

Nola Pender's Health Promotional Model (HPM) describes the multi-dimensional nature of persons as they interact within their environment to pursue health. The model focuses mainly on the three following areas: individual characteristics and experiences,

behavior specific cognitions and affect, and behavioral outcomes. Nola Pender's HPM was designed to complement models of health protection and defines health as "a positive dynamic state, not merely the absence of disease" ("Nursing theories," 2012, pg. 1). The HPM describes the nature of people as they interact within the environment around them to pursue health. The main goal of Pender's theory and our current study is to promote healthy behaviors that improve health, enhance functional ability, and improve quality of life in all stages.

Pender's HPM theoretical framework establishes several points that solidify the idea that decisions regarding living a lifestyle that promotes health are acquired from lived experiences and decisions regarding lifestyle changes are made based on the perception of which ones produce a more desirable result. Perceived barriers can prevent one from selecting resolutions that would be beneficial in the promotion of a healthy lifestyle. Individuals must be encouraged and educated on the proper decisions to make regarding their lifestyle choices. Greater perceived self-efficacy tends to result in fewer perceived barriers to a specific health behavior. When positive emotions are associated with a certain behavior, individuals are more likely to make decisions that promote health. We, as nurses and future nurse practitioners, constitute part of the interpersonal environment that exerts influence on persons throughout their lifespan.

We used Pender's Health Promotional Model (HPM) in our study because it is an empowering, holistic, competence based model that does not use fear or threat as motivation. The HPM has demonstrated fruitfulness as it describes new phenomenon and reveals relationships between existing phenomena that were previously unknown. We used the model as a basis for our theoretical framework throughout our study. The model

provided guidance as we strived to show how obesity placed individuals at a higher incidence of obtaining certain chronic diseases. It also provided direction as we disclosed the idea that certain lifestyle changes or interventions, such as bariatric surgery, can have a profound effect on removing those same chronic diseases. The variables mentioned in the above paragraphs were indicative throughout the research as we uncovered the many co-morbidities associated with obesity and how they can be reversed with loss of excess body weight.

**Assumptions**

It is well known and documented that more than 1 billion people worldwide are obese. It is also well documented that people with obesity are at an extremely high risk of developing numerous co-morbidities. With this information, assumptions regarding the proposed study were made. First, it was assumed that primary care providers had documented heights and weights of all patients who have been seen in their clinic. Second, it was assumed that any co-morbidity associated with obesity was documented in the charts. Finally, it was assumed that the documentation in the charts was complete and accurate.

**Summary**

Obesity has become the most prevalent metabolic or nutritional disease in the United States. With over two-thirds of the population being obese, Mississippi has the highest obesity rate in the United States. The development of numerous co-morbidities has been linked to obesity. This study reviewed charts of obese patients in three rural Mississippi health clinics in order to determine the percentage of obese patients with one or more co-morbidities, and the most frequently occurring co-morbidities. This study also

utilized prior studies on the results of bariatric surgery to illustrate how significant weight loss can reduce or reverse the co-morbidities associated with obesity.

# Chapter II

## Literature Review

### Introduction

The purpose of this study was to determine which co-morbidities were most prevalent among obese residents of rural Mississippi and how they can be reduced or reversed through significant weight reduction such as that with bariatric surgery. The treatment of obesity in the primary care clinic should be addressed with the client to properly deal with the many co-morbidities of the disease. Addressing obesity and stressing weight reduction should be the primary goal of all healthcare providers.

The objective of this chapter was to present literature reviews that demonstrated the relationship between weight loss and the significant reduction in the co-morbidities associated with obesity. This chapter illustrated that reduction in weight contributed to the decreased incidence of the co-morbidities of obesity.

### Conceptual Framework

Nola Pender's Health Promotional Model (HPM) was chosen as a framework for the current research. The review of literature, along with Pender's theory, provided a background and framework for the importance of this study. The literature review provided the results of other studies that strongly related to the current study including theorist Nola Pender and nine literature reviews. Nola Pender's HPM described the multi-dimensional nature of persons as they interact within their environment to pursue health ("Nursing Theories," 2012). Several articles related to Nola Pender's HPM were reviewed to establish points that solidified the idea that decisions surrounding lifestyle

changes that promote health are acquired from lived experiences. This section of chapter two describes how the authors utilized Pender's HPM in their studies.

The research article "Girls on the move program to increase physical activity participation" objective was to evaluate the effectiveness of combining nurse counseling with a program to increase physical activity participation on the reversal of the sedentary lifestyles of adolescent girls (Smith, Gretebeck, Kazanis, & Pender, 2006). The study took place over a 12-week period and utilized girls in sixth, seventh, or eighth grade from two Midwestern junior high schools in a low socioeconomic area. The study included 45 girls in the intervention group and 32 girls in the control group. At baseline, each girl answered a questionnaire regarding their current level of physical activity, and had their height, weight, and BMI recorded. The researchers provided age specific recommendations on physical activity for each girl in both the control group and intervention group. The girls in the control group were then asked to return at 12 weeks to answer a follow up questionnaire regarding physical activity levels and to have height, weight, and BMI measured again. The girls in the intervention group received tailored feedback and counseling from a nurse with special training in the area of health promotion at three distinct periods during the 12 week study.

At the conclusion of the study, the researchers discovered that no differences in self-reported physical activity between the intervention or control group existed. The study also found that no change was noted from pre-intervention to post-intervention BMI for either group. The authors recommended that because no significant difference emerged between the groups despite nurse counseling and individually tailored physical activity feedback, a more robust intervention has to be developed (Smith et al., 2006).

Increasing youth physical activity is a promising approach to decreasing the escalating national overweight and obesity epidemic. The ultimate goal was to develop an effective patient counseling intervention for diverse groups of children and adolescents (Smith et al., 2006). The authors utilized Pender's HPM in the study by attempting to modify the subjects perceived benefits of action, perceived barriers to action, and varying levels of self-efficacy through counseling and feedback from healthcare professionals. This concept was useful in our research as we took into account that the aforementioned perceived barriers, benefits, and varying levels of self-efficacy, often stand between obese patients and the attainment of healthy diets and lifestyles.

A 2006 article by Padula and Sullivan utilized a correlational study to identify determinants of health promotion activities among older adults who were in long-term marriages. Selection of study variables was aided by Nola Pender's Health Promotion Model and a proposed re-conceptualization of interpersonal influences. They examined the association between relationship quality and the dependent variable of health promotion behaviors and the independent variables of perceived barriers to health promotion, perceived self-efficacy, and social support. The study sample was comprised of 80 individuals from suburban and rural communities who spoke English and were able to complete the pencil-and-paper measures independent from each other. Their data was collected over a 9-month period in the participants' homes. The data showed that the majority of participants were over 70 years of age, identified their health as very good, ranked their marriages as very happy, stated that they had four or fewer individuals in their overall support network, identified their spouse as the their primary network source, and identified their spouse as being very helpful in health related support.

The study findings suggested that assessment and planning interventions should focus on older married adults as individuals as well as members of a couple. The relationship between older, married adults is a vital component of the plan of care (Padula & Sullivan, 2006). The findings of this study speak to the concepts of Pender's HPM that family is a primary source of interpersonal influence and perceived self-efficacy influences perceived barriers to action. The authors' use of the HPM in this study was beneficial to our study, as we understood that familial influences and low levels of self-efficacy could also pose as barriers to action in achieving weight loss among obese patients.

Kelly, Sherrod, and Smyth also used Nola Pender's revised Health Promotion Model as a conceptual framework in a 2009 study. This study was conducted utilizing a descriptive retrospective chart audit in a small rural family clinic in a southern state. The purpose of the study was to determine whether or not primary care providers (PCPs) were conducting smoking cessation therapy, whether a physician or nurse practitioner conducted the smoking cessation therapy, and at what time frame smoking cessation therapy was initiated in relation to diagnosis of CAD. The study sample consisted of 150 patients who had a history of smoking and CAD. Over two-thirds of the sample charts contained documented smoking cessation therapy from a PCP at this clinic. Of the 150 patient charts in the sample, 103 of them had documented smoking cessation therapy prior to, or within one year of being diagnosed with CAD. The two full time physicians at the clinic were responsible for initiating 50% of the therapy and the part time nurse practitioner initiated 18.7% of the smoking cessation therapy (Kelley, Sherrod & Smyth, 2009).

The authors utilized a portion of Pender's Health Promotion Model Construct, interpersonal influences, as it was the most relevant to this study. The data revealed that the PCPs at this clinic recognized the importance of interpersonal influences on smoking cessation as evidenced by the level of smoking cessation therapy that was initiated. This speaks to the theory that healthcare providers are primary sources of interpersonal influence. This application of Pender's HPM was useful in our study as we took into account that healthcare providers must realize the importance of their interpersonal influence and act upon it to elicit positive change among obese patients.

Another study was conducted by Murphey and Rew (2009) to identify the scope of oral health problems and describe three models to guide pediatric nursing research and interventions related to oral health in pregnant minority adolescents. One of the models utilized was Nola Pender's Health Promotion Model. The study utilized a meta-analysis format. The article focused on dental caries, periodontal disease, pregnancy outcomes, and potential consequences of oral disease to young mothers and their offspring. The study used Pender's theory as a model to direct methods of assessing perceived self-efficacy, barriers, beliefs, interpersonal influences, and situational influences that could be utilized by nurses when dealing with this population. The authors explain that Pender's model is useful for assessing other characteristics such as previous experiences and behaviors, demographic characteristics, and perceived health status.

The study revealed that the Health Promotion Model could be used as a way to construct nursing interventions that could change the client's perceptions in some of the areas mentioned above. This influenced our study by helping to grasp the understanding that perceived self-efficacy, barriers, beliefs, interpersonal influences, and situational

influences could all play a role in a patient's willingness and ability to participate in a plan to achieve any goal. Our research has benefitted from the knowledge that these factors should be assessed by healthcare providers and taken into consideration when formulating a plan of care for weight reduction.

**Review of Related Research**

Related research was reviewed to reveal a relationship between weight reduction and the improvement of the co-morbidities associated with obesity. Other studies pertain were reviewed pertaining to the effects of obesity on lifelong morbidity and mortality. Several studies revealed an improvement or resolution of type II diabetes mellitus, hypertension, dyslipidemia, metabolic syndrome, non-alcoholic fatty liver disease, chronic kidney disease, left ventricular hypertrophy and obstructive sleep apnea after weight reduction (Athyros, Tziomalos, Karagiannis, & Mikhailidis, 2011).

In 2009, a literature search was performed in pursuit of the top 20 co-morbidities associated with overweight and obesity. In an effort to help us better understand the correlation between overweight/obese individuals and their increased probability of developing other co-morbid diseases, the authors in this particular study performed a systematic review and meta-analysis of 89 prospective cohort studies. Quantitative information was collected and compiled into charts displaying the co-morbidities and their associated relative risks and incidence rate ratios. Medline, Embase, ISI Web of Science, and Google Scholar databases were explored and preliminary data dating up to January 2007 was extracted according to the inclusion criteria. Previous articles obtained the following inclusion criteria: prospective cohort study of the general population of a Western country, relevant outcomes, a sample size of at least 200 subjects, and a risk

estimate based on the incidence of disease instead of the mortality rate of the disease. Studies that were lacking in sufficient data to provide an unadjusted relative risks with 95% confidence intervals for the overweight and obese groups compared to the normal group were eliminated. The original literature review began with more than 29,000 articles prior to the purging of irrelevant articles.

The primary objective of this study was to provide a comprehensive review of the incidence of co-morbidities related to obesity and overweight (Guh et al., 2009). After data was collected, relative ratios were measured by incidence rate ratios and by the ratios of proportion. Study specific unadjusted relative ratios on the log scale comparing overweight with normal and obese with normal were weighted by the inverse of their corresponding variances to obtain a pooled relative ratio with a 95% confidence interval (Guh et al., 2009). The random effects model was used to estimate the pooled RR using the maximum likelihood estimation model.

The results of the study varied depending on whether waist circumference (WC) or BMI was used to determine obesity. The meta-analysis determined statistically significant associations for overweight with incidence of type II diabetes, all cancers except esophageal (female), pancreatic and prostate cancer, all cardiovascular diseases (except congestive heart failure), asthma, gallbladder disease osteoarthritis and chronic back pain (Guh et al., 2009). Relative risks and incidence ratios were calculated and the results confirmed that overweight and obesity carry a profound health burden and place individual's at a higher risk of developing one of the listed 18 chronic health diseases. WC was shown to be a superior predictor for type II diabetes, hypertension, coronary artery disease, congestive heart failure, stroke, and gall bladder disease. The

researchers recommended a few variables that would have strengthened the study as a whole. The exclusion of the lack of physical inactivity limited the study according to the authors. Also, the lack of studies linking waist circumference and certain co-morbidities limited the ability to estimate the risk for certain co-morbidities. The literature research was mainly performed through Medline and Embase, therefore bias may have occurred secondary to the search strategy.

The study broadened our knowledge of the profound effect that obesity has on the body and its systems. An analysis was provided that showed the incidence of occurrence of each of the chronic co-morbidities. The article illustrated once again the importance of health promotion and dietary education. Maintenance of a healthy weight is imperative in the prevention of an even larger disease burden in the future.

To help us better understand the correlation between obesity and the incidence of hypertension, diabetes and certain metabolic syndromes, Drs. Hwang, Bai, Sun, and Chen released the results of their nation-wide population cohort study in 2011. Their analysis of both male and female participants gave a fairly broad spectrum view of the general population. The study employed data from the Taiwanese Survey on Prevalences of Hypertension, Hyperglycemia, and Hyperlipidemia (TwSHHH). The original TwSHHH was a nationwide epidemiological analysis of 3,629 men and women ages 18-59. The survey began in 2002 and follow-up examination and data collection was performed in 2007 (TwSHHH II). The mean length of follow-up was 5.4 years. Individuals were excluded from this current study if they had hypertension, Type II diabetes mellitus, history of a stroke, or had any components of the metabolic syndrome. Inclusion criteria narrowed the count to 1,547 subjects consisting of both men and women that were further

subdivided into normal-weight, overweight, and obese BMI categories. The main goal of the study was to describe the community incidences of Type II diabetes mellitus, hypertension and the metabolic syndrome and to investigate the impact of obesity and weight changes on these cardiometabolic diseases. (Hwang, Bai, Sun, & Chen, 2011, p. 228)

The data that was used in the study was collected by trained public health care nurses via questionnaires during home visits. Baseline socio-demographic data was collected at each visit such as: sex, age, exercise habit, alcohol drinking habit, smoking habit, family history of cardiovascular-related diseases and physician diagnosed diseases. Blood pressure measurements were performed and most importantly BMI statistics were gathered. The standard protocol for collection was performed identical at both collection points. Written informed consents were obtained prior to initial data collection and before follow-up data accumulation.

After the data was collected it was analyzed using SAS software. The demographic characteristics of subjects were compared between BMI categories via ANCOVA test for continuous variables for age adjustment, and differences in proportion data were assessed using the Cochrane-Amritage trend test (Hwang, Bai, Sun, & Chen, 2011, p. 228). Incidence rates of hypertension, DM Type II, and metabolic diseases were calculated by dividing the new cases by the number of years after follow-up. Hazard ratios (HR) with 95% confidence intervals were derived by using the Cox's proportional hazards model to determine the 5.4 year risk of overweight and obesity for developing hypertension, Type II DM, and the metabolic syndrome. The criteria for statistical significance were $p < 0.05$ and a 95% CI of HR.

The results of the study showed that obesity and weight gain are associated with an increased risk for incidences of hypertension, Type II DM, and metabolic disease. The greatest significance was seen with increased incidences of hypertension in those with higher BMI's. The study showed that a normal body weight person had a 4.7 % increase in hypertension over the 5.4 years while individuals with a BMI >27 had a dramatic increase of 20.9%. Metabolic syndrome also began to have significant increases in incidences at BMI levels >23. The prevalence of Type II DM also began to increase after BMI levels reached 25. Each kg/ meter squared of BMI gained was associated with an 18% increase in the risk of developing hypertension and a 26% increase in the risk for metabolic syndrome. The researchers brought to light the strong correlation between overweight/obesity and the prevalence of cardiometabolic diseases.

The researchers stated a few weaknesses and limitations of the study mainly regarding the classification of a metabolically normal individual. During initial inclusion participants were excluded if they had any components of metabolic syndrome, however, no data of serum insulin or C-reactive protein were used for exclusion. Therefore, data results could have been altered secondary to slightly limited exclusion/inclusion criteria.

The recommendations of the researchers were mainly focused on the prevention of obesity and the implementation of a weight management program in order to reduce cardiometabolic diseases. This study was important to the current research project in that it showed how imperative it is for individuals to maintain a healthy weight. The study showed that incidences of developing hypertension, diabetes, and metabolic disease are increased even more with continued weight gain. This study further broadened the

knowledge regarding the profound correlation between overweight and obesity and the prevalence of certain cardiometabolic diseases.

In 2008, Burke and other researchers released the results of their multi-ethnic observational cohort study to demonstrate the impact of obesity on cardiovascular disease risk factors and subclinical valvular disease. Their analysis provided a superb opportunity to evaluate the prevalence of cardiovascular disease risk factors in a large number of overweight and obese individuals from different ethnic backgrounds. The study employed data from the Multi-Ethnic Study of Atherosclerosis (MESA). The MESA was a nationwide diverse cohort study that gathered data from both and men women aging from 45-84. The following ethnic groups were included in the analysis: Caucasian, African American, Hispanic, and Chinese American. The survey began in July of 2002 and ended in August of 2004 with a total of 6,814 participants. The only inclusion criterion was that the individual be free of any clinically apparent cardiovascular disease and not considered morbidly obese. Participants were thus excluded if they had a previous diagnosis of CVD, any obvious signs of the disease or BMI >40. The main goal of the study was to investigate the historical perspective that asserts that the association between CVD and obesity is mediated virtually completed by traditional CVD risk factors (Burke et al., 2008).

Participants were evaluated and information gathered at 6 field sites across the United States. Baseline socio-demographic information was obtained through written questionnaires. Also, participants were examined thoroughly for the existence of cardiovascular disease risk factors by monitoring blood pressure, lipids, lipoproteins, and diabetes. Subclinical vascular markers were also tested for including carotid artery

intimal medial thickness, left ventricular mass, and coronary artery calcium score. Body mass index (BMI) was determined and individuals were divided into three categories. All blood samples were collected after a 12 hour fasting period. Computed tomography, ultrasound, and magnetic imaging resonance were used to determine coronary calcium assessment, carotid artery IMT, and left ventricular mass alike. Identical data collection techniques, equipment, and imaging tools were used at each of the clinical sites. Written informed consents were obtained from each participant and the institutional review boards from all participating centers approved the study prior to any data collection.

After the cross-sectional data was collected it was analyzed using SPSS and Intercooled Stata software. In each sex and ethnic group, CVD risk factors were compared across 3 level BMI groups. Linear regression models were used to tell the differences in means. Relative risk (RR) regression models were used to compare proportions for binary outcome variables. The RR coefficients were translated into prevalence ratios. The RR regression models containing cardiovascular risk factors and those containing subclinical markers were adjusted for age, sex, and race. Statistical significance was defined as $P < 0.05$. (Burke et al., 2008)

The results of the study showed that hypertension, diabetes, and lower levels of HDL were more common in the obese populations despite a much higher usage of hypertension and diabetic medications. Obesity was also associated with a higher risk of increased coronary artery calcium (17%), common carotid IMT (45%), internal carotid IMT (32%), and left ventricular mass (2.7 fold greater) compared to normal body mass people. These correlations existed even after modifications were made for traditional

CVD risk factors. The relationship of CVD and obesity were common across all ethnic backgrounds.

The study was informative and information rich. The fact that the study analyzed both male and female subjects from multiple ethnicities provided a sample that was very indicative of today's general population. However, the fact that morbidly obese individuals were excluded from participation could have skewed the numbers to show a somewhat lower risk group. This would have caused the results to be less indicative of the actual general population. The fact that the data was also collected in a cross-sectional manner could have altered the statistical analysis that was performed showing CVD risk factors and its effects on actual atherosclerotic disease. The authors recommended that we begin to place even greater importance on the implantation of a healthy lifestyle and that we remove environmental barriers to maintaining a healthy weight for our patients. The data gathered throughout the evaluation of this article further confirmed the challenge we face as future practitioners to guide and direct our patients to a healthy lifestyle. The epidemic of obesity clearly has a correlation to the many chronic diseases people all over the world face today.

The authors' study was helpful to the current research project in their recommendation that increased weight has a large impact on the prevalence of obtaining hypertension, diabetes, and decreased HDL levels. The study also indicated that obesity amplifies the incidence of individuals developing cardiovascular risks factors but that this increased pattern is not seen in those that fall within a normal BMI range. Increased weight has a direct impact on the development of co-morbid conditions and the incidence

of increased mortality. The following review provides an alarming analysis linking increased mortality to increased weight.

In 2011, Zimmermann and Sorensen conducted a quantitative study seeking to discover the relationship between being obese in early adulthood and its impact on lifelong, all-cause mortality. The authors understood that there was a strong link between higher rates of morbidity and mortality among obese men. This study's aim was to determine if entering young adulthood as an obese man increased the lifelong incidence of morbidity and mortality compared to non-obese men of the same age group.

The list of referenced articles dated back as far as 1977 but this study took place over a 64-year period beginning in 1943. At least 10 of the articles used in the review were less than five years old at the time this study was published. While there were some outdated articles, most were current at the time of this publication. No specific conceptual or theoretical framework was listed for this study. This prospective cohort study included all adult Danish men between the ages of 18 and 25 years who were required to be examined by the Danish military draft board between 1943 and 1977. The men were weighed and measured with bare feet, wearing nothing but underwear. Obesity was defined as 35% overweight utilizing the Scandinavian standard that was in use at the time of this study. This number corresponds to a BMI of 31. The obese cohort had an average BMI of 32.7, while the control cohort had an average BMI 21.4. All of the participants were then followed during the age span of 18 to 80 years of age, from the time of the draft board to the time of their death, or October 31, 2007, whichever came first. The age of death among the obese sample was then compared with the age of death among the non-obese sample.

The study did not mention exactly how the participant's rights were protected. However, no personally identifiable health information was found anywhere in the body of this publication. The study was supported by grants from the Cluster for Endocrinology and Metabolism, University of Copenhagen, Denmark. Therefore, it required approval from the IRB at the University of Copenhagen, Denmark. The study gathered data from a large sample studied over a 64-year period of time. The population was comprised of 362,200 Danish men between the ages of 18 and 25 years who were required by law to be examined at the Danish military draft boards between the years of 1943 and 1977. This comprised approximately 93% of the male population in Denmark over the age of 18 during this time period. Approximately 5% of the male Danish population over the age of 18 was excluded from the draft and this study due to severe medical disabilities while another 2% were excluded due to having volunteered for military duty prior to age 18. A randomized sample of all Danish men who were required to be examined by the draft board between the years of 1943-1977 was included in the sample selection. This randomized sample produced 1862 participants in the obese group, and 3476 participants in the control group.

The study was to examine the relationship between the presence of obesity at the time of entering young adulthood and the influence it had on all cause morbidities and mortality throughout the life span. The study utilized every single Danish man between the ages of 18 and 25 years from 1943 to 1977 who were eligible for draft board examination. This included 97% of the Danish men in this age group during that time period. No other exclusion from the study was utilized. The data were analyzed using Stata software version 9.2. The observation time for each participant was the period

beginning on the date of draft board examination until the date of death, age of 80, loss to follow up, or October 31, 2007, whichever came first. The only individuals who were classified as lost to follow up were those who disappeared from the Civil Registration Registry for unknown reasons. Cox proportional hazard regression was used to estimate hazard ratios of mortality. Other methods such as stratified estimation, double Nelson-Aalen plot, and Kaplan-Meier method were used to offset putative confounding by the draft board, differences in hazard of mortality based on age group, allow baseline hazards to differ by district, and to ensure that comparison of men in the same age group occurred. There was no stated level of strength accepted.

The study discovered that 1191 of the 5338 men died during follow up. The study also identified that the men in the obese cohort had a lifelong doubling of mortality when compared with the control cohort. The authors also discovered that the men in the obese cohort had a mean age of death eight years earlier than the mean age of death of the control group.

The authors recommended that further steps need to be taken to ensure that all people know the chances of early death among men are doubled when entering early adulthood with obesity. This article helps solidify the hypothesis that many co-morbidities are linked to obesity in adults. This study pointed out that men who enter young adulthood with obesity are twice as likely to die early from all causes of mortality than their non-obese peers.

Several articles were reviewed that further demonstrated that weight loss even through bariatric surgery should be the primary focus of treatment for obesity related co-

morbidities. These articles connected weight loss with the significant improvement and/or the resolution of the co-morbidities associated with obesity.

In 2008, Batsis et al conducted a quantitative study seeking to discover the effects that bariatric surgery had on patients with metabolic syndrome and to examine the predictors of metabolic syndrome resolution. The authors understood that substantial evidence revealed insulin resistance as the main pathophysiological cause of metabolic syndrome. Research established that lifestyle modifications including increased physical activity and a healthy diet are the best methods to reduce the incidence of type II diabetes and metabolic syndrome. Most dietary interventions alone produce no more than a 10% reduction in body weight, which is often regained over time.

Bariatric surgery is an approved method of achieving significant and longstanding weight loss. With this knowledge in mind the authors hypothesized that bariatric surgery would significantly increase weight loss, decrease insulin resistance, and ultimately, decrease the prevalence of metabolic syndrome. The majority of the articles in their review of literature were current at the time of publication. The study was conducted using a population-based, retrospective, cohort study. There were no specific details listed concerning how the patient's rights were protected. However, no personally identifiable health information was identified anywhere in this article. The institutional review boards of the Mayo Clinic and the Olmstead Medical Center approved this study.

This population-based, retrospective, cohort study utilized all patients referred to the Mayo Clinic's site in Rochester, MN for bariatric surgery over a 14-year time period. This time period was between January 1, 1990 and December 31, 2003. This yielded a population of 483 patients. After inclusion criteria were implemented, a sample selection

of 337 patients remained. Patients who met the Mayo Surgical Index, received Roux-en-Y gastric bypass surgery for weight reduction, had a BMI greater than 35, had complete chart data, and had follow-up time of three months or greater were included in the surgical cohort. This yielded a surgical cohort of 180 patients. The comparison cohort was made up of patients who were evaluated for bariatric surgery at the Mayo Clinic Nutrition Center during the same time frame but did not undergo surgery. There were several reasons these patients did not undergo the surgery including voluntarily declining, denial by insurance, failure to maintain lifestyle interventions during their pre-surgical evaluation period or psychiatric reasons. To be included in the comparison cohort, the patients had to have a BMI greater than 35, have complete chart data, and follow up time of three months or greater. This resulted in a comparison cohort of 157 patients. The control cohort group underwent weight loss counseling, along with dietary and lifestyle changes directed by the Mayo Clinic.

The data was collected utilizing retrospective chart reviews of the two cohort groups at the Mayo Clinic in Rochester, MN. The two cohorts were then further broken down into groups that had a diagnosis of metabolic syndrome and groups that did not. The patients had to have three of the five components of metabolic syndrome at the time of surgery to be included in the group of patients diagnosed as having metabolic syndrome. The five components of metabolic syndrome were increased serum TG levels, low serum HDL-C levels, increased blood pressure, increased fasting plasma glucose, and an increased waist circumference or BMI greater than 35. 156 patients, or 87%, of the surgical cohort met the criteria for a diagnosis of metabolic syndrome. 133 of the control cohort, or 85%, met the criteria for a diagnosis of metabolic syndrome. The

researchers avoided bias in sampling by using a population-based cohort. This included all patients evaluated for bariatric surgery by the Mayo Clinic in Rochester, MN who met the standardized inclusion criteria of the study during this 14-year period. The statistical methods utilized during the study included a 2-sided, paired t test, Wilcoxon signed rank test, McNemar test, 2-sample t test of unequal variances, Wilcoxon rank sum test, X 2 test, Fisher exact test, comparison of 3-point scale distributions, Cochran-Armitage trend test, logarithmic transformation, construction of multiple logistic regression models, and stratification of quartiles according to follow up time. To analyze the sensitivity of their methods the authors used a carry-forward method of imputation for patients lost to follow up. The patients who were excluded from the analysis because of missing data were assumed to have metabolic syndrome at baseline and follow up. All statistical analyses were performed using JMP for SAS, a program produced by the SAS institute in Cary, NC. There was no stated level of strength accepted.

The findings of the study demonstrated that the surgical cohort had a much greater decrease in excess body weight and decrease in the prevalence of metabolic syndrome than did the control cohort. However, overall prevalence of metabolic syndrome decreased significantly in both the surgical cohort and the control cohort. At follow up, the surgical cohort had a 58% decrease in the overall prevalence of metabolic syndrome while the control cohort had a 10% decrease. At follow up, the control cohort had a 99% obesity rate, while only 63% of the surgical cohort remained obese. Multiple logistical regressions of the entire cohort showed that the main predictor of metabolic syndrome resolution was the percentage of excess weight loss. The percentage of excess weight loss remained a highly significant predictor of metabolic syndrome resolution

after statistical adjustments were made for varying follow up times. Based on the findings of this study, the authors recommend that Roux-en-Y gastric bypass surgery be considered as a treatment option for patients diagnosed with metabolic syndrome that have not responded to more conservative weight reduction measures.

This article was useful to the study because it showed a direct relationship between weight reduction and the reduction of metabolic syndrome. Metabolic syndrome is the name of a diagnosis used when three of five specific factors are present. This group of factors includes a large waistline, high triglycerides, low HDL cholesterol, high blood pressure, and elevated fasting blood sugar. All five of these factors are also considered comorbidities of obesity. This study solidifies the hypothesis that bariatric surgery can have a profound impact on the reduction of obesity and its associated comorbidities.

Sjostrom (2008) conducted a quantitative study based on the Swedish Obesity Subjects (SOS) matching and intervention studies. The author was seeking to discover the effects bariatric surgery had on morbidity and mortality at a 10-year post-operative time compared to that of the SOS study's obese control group that did not undergo surgery. He discussed the fact that many observational epidemiologic studies have shown an increase in cardiovascular mortality after weight loss. He pointed out that the majority of these studies are limited in the fact that they cannot distinguish between intentional and unintentional weight loss. He theorized that the observed weight loss in these studies might not have been the cause of increased mortality, but rather a side effect of some other condition that led to the increased mortality. The author hypothesized that intentional weight loss, such as that with bariatric surgery, would lead to a reduction in overall morbidity and mortality in obese patients.

The SOS study methods included a 13.4-year recruitment campaign that resulted in 11,453 subjects applying to take part in the study of which 6,905 completed a matching examination. Inclusion criteria were implemented mandating that the subjects had to be between the ages of 37 and 60, with a BMI of 34 or greater for men and 38 or greater for women. These criteria reduced the population to a sample of 4,047 subjects who were chosen to take part in the SOS study. The subjects were allowed to choose whether they desired bariatric surgery or to be in the control group. The final result was 2,010 subjects in the surgical group and 2,037 contemporaneously matched subjects in the control group. The subjects in the surgical group underwent gastric banding, vertical-banded gastroplasty, or gastric bypass surgery. A matching program of 18 matching variables was implemented to match those of the surgical group to those in the control group. The follow up examinations and questionnaires for the surgically treated subjects and their matched control cohorts were to be performed at six months and at 1, 2, 3, 4, 6, 8, 10, 15, and 20 years. The follow up times were calculated based on the date of the surgically treated subject's operation. There was no specific mention of how the participants' rights were protected but no personally identifiable health information was found anywhere in this article. The institutional review board of Sahlgrenska University Hospital, Goteborg Sweden approved this study. The study design is an ongoing, prospective, matched, surgical interventional trial. The study recruited participants and performed the surgical procedures over a 13.4 year time period from September 1, 1987 through January 31, 2001.

The data was collected through follow-up examinations and questionnaires over a 20 year time period. The population was 11,453 Swedish subjects who initially applied

for inclusion in the SOS study. The sample was 2,010 subjects in a surgical group and 2,037 subjects in a control group. The sample selection was based on completion of a matching profile by the applicants, males having a BMI of 34 or greater, females having a BMI of 38 or greater, and being between the ages of 37 and 60 at the time of selection. The data was collected at base line and postoperatively at six months and at 1, 2, 3, 4, 6, 8, 10, 15, and 20 years. The SOS study utilized physical examinations, lab work, and questionnaires. The follow-ups for the surgically treated subjects and their matched control cohorts were automatically scheduled by the SOS secretariat based on the date of surgically treated subject's operation. The researchers avoided bias in sampling as all applicants who filled out a matching profile, met the BMI criteria, and met the age criteria were allowed to participate in the SOS study. The author of this article, Dr. Lars Sjostrom, is the chair of the Swedish Obese Subjects study. He utilized the SOS study's statistical data that was previously recorded to complete this article. No further statistical computation was needed to complete this article and no discussion about the SOS study's statistical methods is present in it. Dr. Sjostrom did use I-bar graphs, bar graphs, line graphs and panels depicting odds ratios, percentages, and p values. The graphs and panels were representations of hypertriglyceridemia, low HDL, hypercholesterolemia, diabetes, hypertension, hyperuricemia, weight changes, and mortality rates at different time intervals. The graphs that were utilized in this article were directly from the SOS study data and state a 95% confidence interval. There was no stated level of strength accepted in this article.

The article listed several significant study findings. The percentage of body weight lost by patients who underwent gastric bypass was 24-40% at 2 years, 14-36% at

10 years, and 15-39% at 15 years. The percentage of body weight lost by patients who underwent vertical-banded gastroplasty was 14-34% at 2 years, 5-27% at 10 years, and 7-29% at 15 years. The percentage of body weight lost by patients who underwent gastric banding was 10-30% at 2 years, 0-28% at 10 years and between a 1% weight gain to 27% loss at 15 years. The control group stayed within plus or minus 2% of their baseline weight for the entire 15 years of follow up for which data was available at the time of this publication. The 2 and 10 year recovery rates from diabetes, hypertriglyceridemia, low levels of high-density lipoprotein cholesterol, hypertension and hyperuricemia were much better in the surgical group than in the control group. Over the follow-up period, the surgical group experienced a less than 8% cumulative mortality rate while the control group experienced a greater than 12% cumulative mortality rate.

The author recommends that bariatric surgery is a favorable option in the treatment of obesity. He based this recommendation on the fact that bariatric surgery is the only obesity treatment that results in more than 15% weight loss over 10 years, greatly effects established type II diabetes, helps prevent new cases of type II diabetes, and significantly reduces the mortality associated with obesity.

This article was useful to our study because it demonstrates a direct relationship between bariatric surgery, weight loss, and the reduction of obesity associated co-morbidities. It also illustrates a significantly lower risk of mortality associated with bariatric surgery when compared to the risk of mortality associated with remaining obese.

Johnson and other researchers verified that the global obesity epidemic has been well documented and is associated with multiple detrimental health outcomes. Bariatric surgery has been noted to result in substantial and sustained weight loss in the majority of

patients as well as successful resolution of a number of comorbid conditions (Johnson et al., 2012). Individuals with a history of cardiovascular events are a population at high risk of premature mortality and although the safety of bariatric surgery in patients with established cardiovascular disease has been demonstrated, little is known about the mid- to long-term survival of these patients after surgery (Johnson et al., 2012, p. 685). Therefore, the purpose of this study was to expound on the relationship of bariatric surgery with survival in a population of morbidly obese patients with a history of cardiovascular events (Johnson et al., 2012).

This quantitative research study obtained administrative inpatient hospitalization data (i.e., UB92 Universal Billing Code of 1992) from the South Carolina Office of Research and Statistics (SCORS) on all patients between 1996 and 2008 who met the study inclusion criteria. The data had been collected from all South Carolina hospitals by SCORS since 1995. Each patient was assigned a unique registry identification that allowed for linkage and tracking of all reported patient records across multiple hospital admissions and facilities. Death data were obtained from the South Carolina Department of Health and environmental Control Office of Vital Statistics and linked to SCORS data (Johnson et al., 2012). The study was approved by the Greenville Hospital System University Medical Center Institutional Review Board and all patient linkages were performed by SCORS personnel with all patient identifiers removed from the final linked dataset before study analyses. Before querying the SCORS database for all inpatients aged 40-79 years discharged between January 1, 1996 and December 31, 2008, with a diagnosis of morbid obesity (ICD-9-CM 278.01) and a primary surgical procedure of interest, a review of cases of morbidly obese patients was done by our own institution,

with Institutional Review Board approval as well (Johnson et al., 2012). During this review, two groupings of elective surgical procedures that were commonly performed in morbidly obese patients were identified. Patients undergoing selected primary orthopedic procedures (joint replacement/revision or spinal/vertebral/disc surgery) or gastrointestinal procedures (cholecystectomy, hernia repair, or lysis of adhesions) were identified.

After a retrospective review of medical records was conducted to verify the demographic characteristics and co-morbidities of the morbidly obese patients undergoing these non-bariatric elective procedures were comparable with that of the bariatric patients, these became our surgical control group (Johnson et al., 2012). Of these morbidly obese patients that underwent bariatric surgery and were identified as having a pre-surgical diagnoses of myocardial infarction/angina (ICD-9-CM diagnosis codes 410-413) or stroke (ICD-9-CM diagnosis code 434) as considered for inclusion in the study. The final dataset included all hospitalization and death data available on eligible patients through December 31, 2008 (Johnson et al., 2012). All patients admitted non-emergently and having an ICD-9-CM primary geriatric procedure code for gastric bypass (44.38, 44.39) or adjustable gastric banding (44.95) were identified as the bariatric cohort (BAR) and any patient not having a bariatric procedure but having a primary orthopedic or gastrointestinal procedure of interest was then considered for inclusion in the surgical control group. Patients having a primary outcome within 30 days of the index procedure, had missing or implausible data, or a history of non-primary bariatric surgery were excluded (Johnson et al., 2012). Co-morbid conditions were evaluated for each hospitalization and defined according to the corresponding ICD-9-CM diagnosis codes: morbid obesity (278.01), hypertension (401), diabetes (250), dyslipidemia (272), sleep

apnea (780.5), tobacco abuse (305.1), and history of transient ischemic attack (435) and were considered positive if occurring before or concurrent with the index surgical procedure admission (Johnson et al., 2012). Primary outcome was death from any cause as identified from hospital discharge records and South Carolina Department of Health and Environmental Control vital records. Patients not experiencing the outcome during the study period were censored at the study end date of December 31, 2008 and cardiovascular and non-cardiovascular mortality were evaluated as secondary outcomes (Johnson et al., 2012).

Bivariate analyses were conducted using Fisher's exact test for categorical data and the Wilcoxson rank-sum test for continuous data (Johnson et al., 2012, p. 686). Kaplan-Meier life table analysis was used to estimate survival, and the Log-rank test was used to identify differences between groups (Johnson et al., 2012, p. 686). Cox proportional hazards regression techniques were used to estimate hazard ratios (HR) and 95 per cent confidence intervals (CI) using the PHREG procedure in SAS version 9.2 (Johnson et al., 2012, p. 686). Models were adjusted for all demographic characteristics, co-morbid conditions, and cardiovascular event history, the proportional hazards assumption as assessed by review of log-log survival curves, and statistical significance was assessed using an alpha = 0.05 (Johnson et al., 2012).

The results of the study were consistent with a 40 per cent relative risk reduction in all-cause mortality associated with bariatric surgery in morbidly obese patients with a history of cardiovascular events (Johnson et al., 2012, p. 688). Younger and non-diabetic patients having bariatric surgery demonstrated stronger estimated relative risk reduction from deaths attributed to cardiovascular causes whereas older patients, as well as diabetic

patients, experienced more marked reductions in deaths from non-cardiovascular causes (Johnson et al., 2012). In addition to reporting results from this study, this article also discussed results from the Swedish Obese Subjects Study (Johnson et al., 2012), T. D. Adams, et al (Johnson et al., 2012) and Flum and Dellinger (Johnson et al., 2012) studies. The key strength of this study was the inclusion of a surgical control group (Johnson et al., 2012). This should help eliminate the bias effect of including patients considered unfit for elective surgery. Moreover, the choice of procedures from which surgical controls were selected was based on a review of procedures commonly performed on morbidly obese patients (Johnson et al., 2012).

This study demonstrated a significant survival advantage of bariatric surgery for the treatment of obesity. This study further not only serves as strong evidence of bariatric surgery being associated with a significant decrease risk of all-cause mortality due to weight loss but with morbidly obese patients with a history of major cardiovascular events. These results also further demonstrate that bariatric surgery could be considered a possible and sustainable treatment for the treatment of morbid obesity, for weight loss, especially with co-morbid conditions.

The article *Bariatric Surgery for the treatment of Obesity* focused on bariatric surgery as the standard of care for treatment of obesity (Eldar, Heneghan, Brethauer, & Schauer, 2011). Because of the rising prevalence of obesity and the high failure rates of non-operative weight-reduction programs, bariatric surgery has become popular. Because of this popularity and an increased volume of bariatric cases, longer term follow-up is now possible to formulate better outcomes of bariatric surgery (Eldar et al., 2011). This quantitative review summarized the published outcomes of bariatric procedures including

weight loss, perioperative morbidity and mortality, late complications as well as the impact of bariatric surgery on the co-morbidities of obesity, cardiovascular risk and mortality. The authors used data that was obtained from previous studies and ongoing research to evaluate the current trends in bariatric procedures. They evaluated the outcomes from the various procedures which enables informed decision making and patient tailored procedure selection as well as helps the surgeon and the patient determine realistic outcome expectations.

Data were collected from research obtained over the last decade on the different types of procedures and compared the effectiveness of each procedure leading to the conclusions of which procedures have become the most popular based on the number performed worldwide (Eldar et al., 2011). The data collected also compared the prevalence of procedures as used throughout the world especially in the United States and Europe (Eldar et al., 2011). This article summarized data that was collected on the perioperative morbidity and mortality rates. This data was obtained from other researchers who conducted reviews and longitudinal assessments of bariatric surgical outcomes of various procedures. The article also discussed the complications, morbidity and mortality rates as reported by these studies. The study was conducted by compiling the results obtained by collecting and compiling the results of various studies which discussed the morbidity and mortality of different possible complications; events that may occur early or late during the surgery or post-surgery. The most prevalent complications associated with bariatric surgery were discussed as well as the incidence of potentially fatal complications. These complications included sepsis from an anastomotic dehiscence, shock secondary to hemorrhage or cardiopulmonary events, thromboembolic

events, gastrointestinal leaks and early bleeding episodes (Eldar et al., 2011). Long term morbidity associated with the specific procedures were compared including narrowing of the anastomosis resulting in strictures, car tissue formation, ulceration proximity of the gastrojejunal anastomosis, incisional and internal herniation as well as nutritional deficiency of the bariatric patient (Eldar et al., 2011).

The article went on to discuss the weight loss and the impact of bariatric surgery on the co-morbidities of obesity including diabetes, hypertension and dyslipidemia. The study reviewed the difference in degree of improvement based on the specific procedures. The resolution and/or improvement of diabetes as well as the effects on hypertension and dyslipidemia were found to be similar with long term follow-up (Eldar et al., 2011). The impact of weight loss from bariatric surgery on cardiovascular risk profile and overall mortality was discussed as well. It was concluded that bariatric surgery significantly reduces the risks for cardiovascular events, i.e. myocardial infarction, as well as cancer and other cardiovascular diseases (Eldar et al., 2011). This article concluded that bariatric surgery is a treatment for obesity which results in achieving substantial and durable weight loss in addition to favorable metabolic effects far beyond those achieved by lifestyle modifications and pharmacological treatments (Eldar et al., 2011). Given the improvements and advances in laparoscopic surgery and improvements of perioperative morbidity and mortality rates, bariatric surgery has emerged as a safe and efficient standard of care for the treatment of severe obesity (Eldar et al., 2011). This article also concluded statically that bariatric surgery is becoming an acceptable and viable option for the treatment of obesity and its co-morbidities (Eldar et al., 2011). This is significant for the research of the group's proposal of providing evidence that bariatric surgery is a

treatment option that should be considered an acceptable intervention along with other non-surgical interventions for obesity (Eldar et al., 2011).

The strength of this article is that these conclusions were obtained by more than one source or study. This article used results collected from numerous studies which obtained similar results. The weakness of this study was that the authors, by using previously conducted studies to obtain their data were not able to control any variables that may have occurred either in conducting the research or collecting the data. This article proved useful to support our project which showed that bariatric surgery could be considered by the primary care provider and the patient as a primary treatment for obesity and its co-morbidities through safe weight loss to significantly decrease the risks of complications due to co-morbidities.

Athyros and others reported that morbid obesity represents a major healthcare problem with increased incidence worldwide (Athyros, Tziomalos, Karagiannis, & Mikhailidis, 2011). Obesity is associated with increased morbidity and is the leading cause of preventable deaths. The major co-morbidities associated with obesity include type 2 diabetes mellitus, hypertension, dyslipidemia, metabolic syndrome, non-alcoholic fatty liver disease, nephropathy, left ventricular hypertrophy and obstructive sleep apnea. The authors of this research were seeking to discover the benefits of bariatric surgery for weight loss in morbidly obese patients. They discovered that morbid obesity was largely refractory to diet and drug therapy but generally responded well to bariatric surgery (Athyros et al., 2011). The questions posed included: 1) what were the cardiovascular effects of bariatric surgery on the more common co-morbidities of obesity; 2) was bariatric surgery safe, and if so which of the two more commonly performed procedures

was more effective; and 3) the mechanisms underlying these effects of the surgery (Athyros et al., 2011). The authors were seeking to discover if weight loss by bariatric surgery had any benefits of resolution or decrease in the more common co-morbidities of obesity (Athyros et al., 2011). These questions were based on the premise that weight loss decreases the prevalence of the major co-morbidities of obesity.

This retrospective quantitative study obtained data about patients who had undergone bariatric surgery and were followed over a certain period. It looked at the data collected regarding the resolution or the significant reduction of the major co-morbidities, comparing the data obtained with pre-surgery data (Athyros et al., 2011). The study also compared the effectiveness of the two more commonly performed bariatric procedures, the laparoscopic adjustment gastric banding (LAGB) and laparoscopic Roux-en-Y gastric bypass (LRYGB) and the overall safety and efficacy of bariatric surgery (Athyros et al., 2011). Data for this review was obtained from papers on MEDLINE, Current Content and the Cochrane library published on bariatric surgery in English from January 1, 1990 to July 20, 2010 using certain keywords. Some data was also obtained from the references of retrieved articles for other pertinent materials (Athyros et al., 2011).

This article summarized the effects of bariatric surgery on co-morbidities and cardiovascular disease mortality as well as the mechanisms underlying those effects and compared the safety and efficacy of LAGB and LRYGB. The review article concluded that bariatric surgery is considered an effective option for the management of morbid obesity. It is both safe and beneficial to the patient and appears to reduce cardiovascular mortality and the resolutions or reduction of obesity related co-morbidities (Athyros et al., 2011). Other findings of the article were that significant decreases were observed

when compared with the pre-surgery data for cardiovascular disease from 44% to 14% and type 2 diabetes mellitus from 20% to 8% as well as significant decreases for other co-morbidities (Athyros et al., 2011). The study also showed a 99-100% prevention of progression to type 2 diabetes mellitus with patients who had impaired glucose intolerance and a 64-93% resolution rate of cases after surgery as well as a substantial reduction in oral medication and/or insulin doses in patients whose diabetes was not resolved (Athyros et al., 2011). There was also a significant decrease in systolic blood pressure at 12 months after surgery with 46% of the patients achieving complete resolution of hypertension and another 19% showing significant improvement (Athyros et al., 2011). The article also discovered significant decreases in dyslipidemia, metabolic syndrome, nonalcoholic fatty liver disease, chronic kidney disease, left ventricular hypertrophy as well as obstructive sleep apnea (Athyros et al., 2011).

These results are significant for our proposal *Co-morbidities associated with adult obesity in Mississippi* in that they show that bariatric surgery is considered an effective option for the management of morbid obesity. Bariatric surgery is both safe and beneficial in the treatment of obesity appearing to reduce cardiovascular mortality and resolution or significant reduction of obesity related co-morbidities such as type 2 diabetes mellitus, hypertension, dyslipidemia and other major co-morbidities through sustainable weight loss.

The major strength of this article was that the authors used several studies to obtain data over a period of time, which looked at long-term benefits and risks. The studies used came to similar conclusions, giving certain strength to the article. This however was a weakness of the study as well. Because the authors relied on research of

others they could not control the variables within the groups and therefore could not account for any variables that may have affected the validity of the study.

This article was used in our topic to show that bariatric surgery, as a means of sustainable weight loss, is a viable, safe treatment option for the treatment of obesity. Bariatric surgery greatly reduces the co-morbidities associated with morbid obesity as well as reducing the cardiovascular risk of obese patients.

**Conclusion**

Obesity has become the most preventable nutritional disease in the United States and Mississippi has the highest obesity rate in the United States. The development of numerous co-morbidities has been linked to obesity. This review of literature demonstrated through research that sustainable weight loss significantly reduces or resolves the co-morbidities associated with obesity. The literature review also demonstrated that weight loss, obtained through bariatric surgery, greatly decreases the risks of developing type II diabetes mellitus, all cancers except esophageal and prostate cancer, all cardiovascular diseases, asthma, gallbladder disease, osteoarthritis and chronic back pain.

# Chapter III

## Design and Methodology

This quantitative chart review was conducted to evaluate the most common co-morbid conditions associated with obesity. Select literature reviews and data analysis were also utilized to show how weight loss through bariatric surgical procedures produced a decline in the number of co-morbid conditions that were present prior to weight loss. A quantitative, retrospective chart review was used to review 300 charts from thee different clinical sites. This chapter defines the setting, sample, and the implementation of the project.

### Setting for the Research Project

The setting of this research project was three rural health clinics. The three clinics chosen were located in central Mississippi.

### Population and Sample

The population for this research project was all patients receiving care at the clinics mentioned above from January 2013 to March 2013. One hundred charts were selected from each of the three clinics for a total of 300 charts using convenience sampling. Charts were selected based on set criterion. Inclusion criteria consisted of any non-pregnant adults who were 20 years of age or older, of any race, ethnicity, or gender that had a body mass index of 30 or greater based on documented height and weight.

### Implementation of the Project

The researchers received Institutional Review Board approval from Mississippi University for Women (Appendix A). Written consent from each participating clinic was obtained (Appendix B). The researchers involved in the study then evaluated 300 charts that fit inclusion criteria and documented the presence or absence of certain co-morbid conditions. Data was collected at three clinics in the central Mississippi. This retrospective chart review followed HIPPA guidelines and did not involve any human participants. Confidentiality was maintained at all times to protect all information obtained during the chart reviews. The chart reviews were placed on a data collection worksheet approved by Mississippi University for Women (Appendix C). The data collection sheet maintained confidentiality and refrained at all times from identifying information. Numbers were used to avoid a break in confidentiality. The office managers pulled the charts of the aforementioned patients and placed them in a private room out of sight and secure from clinic traffic. Once the charts were in the private rooms, the researchers examined them for the presence and frequency of recurring co-morbidities based on the documentation in the charts. The data was recorded and saved on jump drives, the charts were immediately returned by the office manager, and the jump drives were kept secure to ensure patient confidentiality. The results of this study might be published; in which case neither the clinics' nor the patients' information will be identifiable.

**Data Analysis**

Analysis was completed using specific statistical instruments that test each question proposed by the researchers. Data was collected from the charts of 300 patients from rural health clinics in Mississippi. Subsequent analyses, such as descriptive statistics

and chi square comparisons were performed using Minitab statistical software, version 16. An alpha value of 0.05 was used to determine significance. Graphical summaries were produced using Minitab and Microsoft Excel, version 2010.

# Chapter IV

## Results

The obesity epidemic has become a severe public health crisis with more than 75 million Americans and approximately 1 billion people worldwide considered obese. Mississippi is considered the most obese state in the United States with an alarming 34.9% of adults considered obese. The results revealed that obese individuals are at an increased risk of acquiring certain co-morbid conditions. An alarming percent (93.3%) of the charts examined revealed the presence of at least one of the documented co-morbid conditions. The purpose of this study was to determine which co-morbidities are most prevalent among obese residents of rural Mississippi and how they can be reduced or reversed through significant weight reduction such as that with bariatric surgery. Additionally, the researchers attempted to illustrate the benefits of weight loss and the reduction or reversal of the co-morbidities associated with obesity. The following data shows the percentage of obese individuals with co-morbid conditions and the corresponding most prevalent co-morbid conditions. This study also utilized prior studies on the results of bariatric surgery to illustrate how significant weight loss can reduce or reverse the co-morbidities associated with obesity.

### Participant Characteristics

Data was collected from 300 medical charts of individuals of different genders, ages, and ethnicities of whom were at least 20 years of age, non-pregnant and possessed a BMI of 30 or greater. The medical charts were from three rural health clinics in central Mississippi. A wide array of demographic variances were noted which aided in better

representing the general population. Table 1 will provide a summary of the patient demographics.

| | Count | Percentage of Sample |
|---|---|---|
| Gender | | |
| Male | 115 | 38.33% |
| Female | 185 | 61.67% |
| Age | | |
| 20-30 years | 34 | 11.33% |
| 31-40 years | 51 | 17.00% |
| 41-64 years | 147 | 49.00% |
| 65 years and greater | 68 | 22.67% |
| Ethnicity | | |
| African-American | 178 | 59.33% |
| Caucasian | 115 | 38.33% |
| Other | 7 | 2.33% |
| BMI | | |
| 30-34.9 | 112 | 37.33% |
| 35-40 | 97 | 32.33% |
| 40 or greater | 91 | 30.33% |

Table 1. Summary of patient demographics (n=300)

**Findings**

1. What percent of obese adult patients of rural health clinics in Mississippi have a co-morbidity associated with their obesity? The data collected revealed that 93.3% (n=280) of the medical charts reviewed contained at least one co-morbid condition. Only 6.7% of the 300 obese patients did not have one of the documented co-morbid conditions.

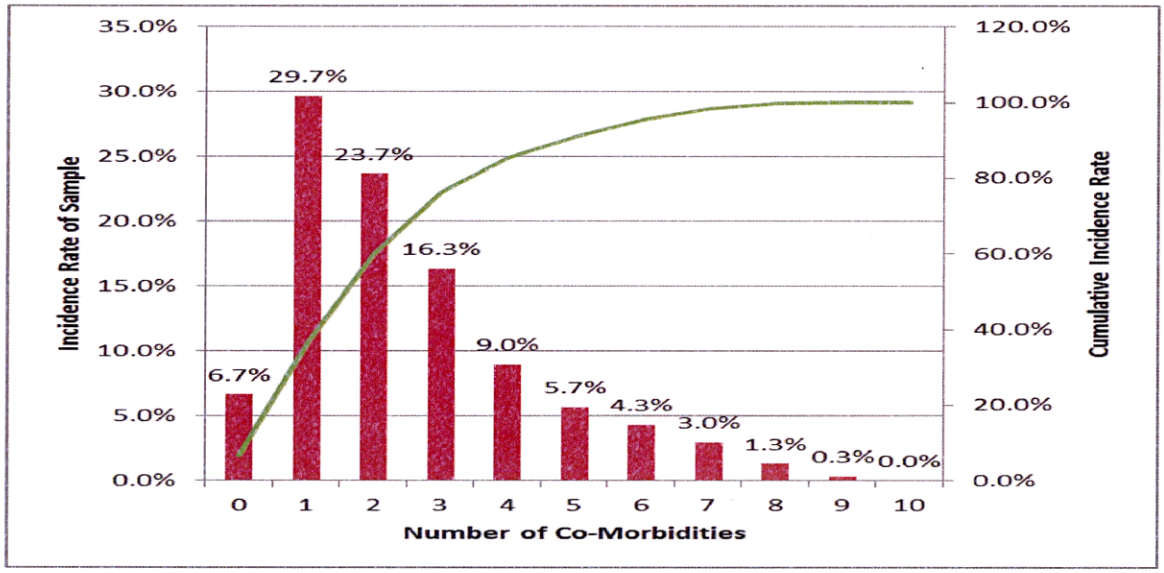



Figure 1. Number of total co-morbidities per patient (n=300)

2. What are the most common co-morbidities associated with obesity among patients of rural health clinics in Mississippi? The incidence rate of the ten co-morbidities evaluated is shown in Figure 1. The sample had the highest incidences of cardiovascular disease (66%), type II diabetes (43%), and dyslipidemia (40%). The co-morbidities with the lowest incidence rates in the sample included gallbladder disease (3%) and liver disease (6%).

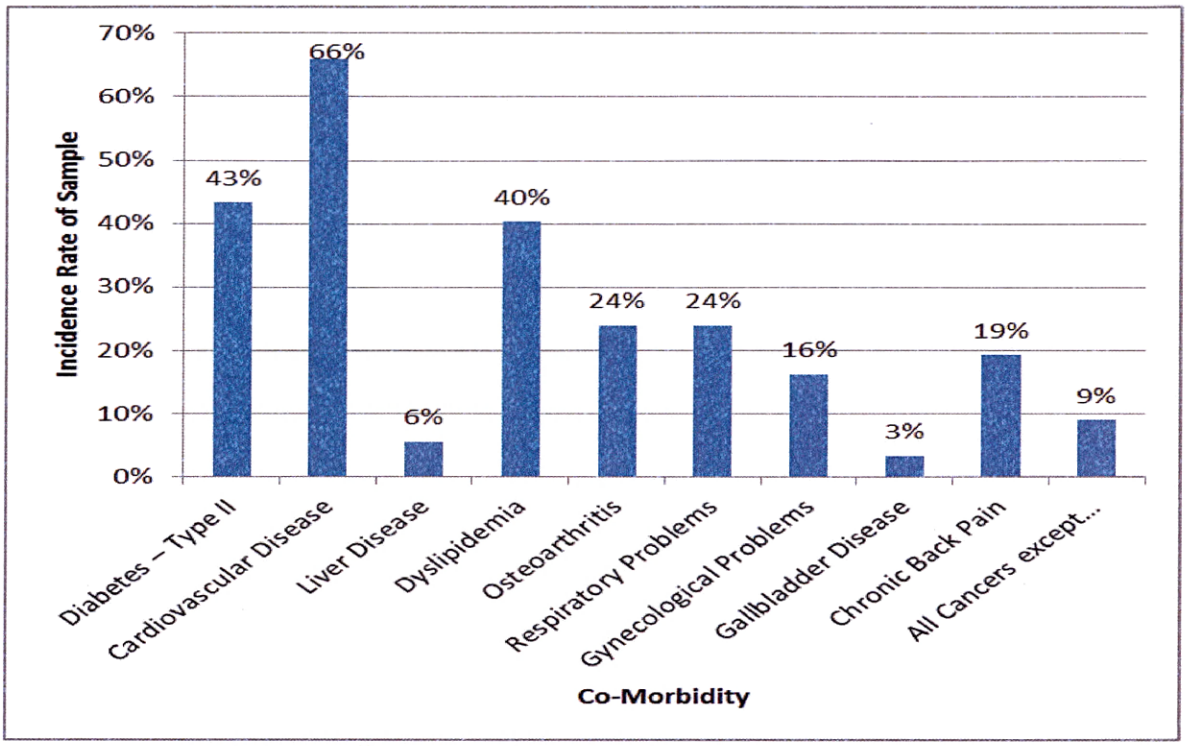



Figure 2. Incidence of co-morbidity amongst the sample of patient charts (n=300)

**Additional Findings:**

The difference in BMI classification by various demographic factors is shown in Table 2. Figure 3 displays the difference in BMI based on gender. The differences between gender is statistically significant ($\chi^2(2,N=300)=15.470$, $p<0.001$). Females had a significantly larger proportion of patients with a BMI over 40. As shown in Figure 4, the BMI of the patients was also significantly different based on age classification ($\chi^2(6,N=300)=15.889$, $p=0.014$). The younger age groups had a significantly higher percentage of its patients with a BMI over 40. The differences in BMI across ethic groups was also statistically significant ($\chi^2(4,N=300)=10.876$, $p=0.028$). African American patients had a higher proportion of its patients with a BMI over 40 (34.27%) compared to the Caucasian ethnic group (25.22%).

| | BMI | | |
|---|---|---|---|
| | 30-34.9 | 35-40 | >40 |
| Gender | | | |
| Male | 41.74% | 40.87% | 17.39% |
| Female | 34.59% | 27.03% | 38.38% |
| Age | | | |
| 20-30 years | 20.59% | 35.29% | 44.12% |
| 31-40 years | 39.22% | 19.61% | 41.18% |
| 41-64 years | 36.73% | 33.33% | 29.93% |
| 65 years and greater | 45.59% | 38.24% | 16.18% |
| Ethnicity | | | |
| African-American | 32.58% | 33.15% | 34.27% |
| Caucasian | 41.74% | 33.04% | 25.22% |
| Other | 85.71% | 0.00% | 14.29% |

Table 2. BMI by gender, age, and ethnicity

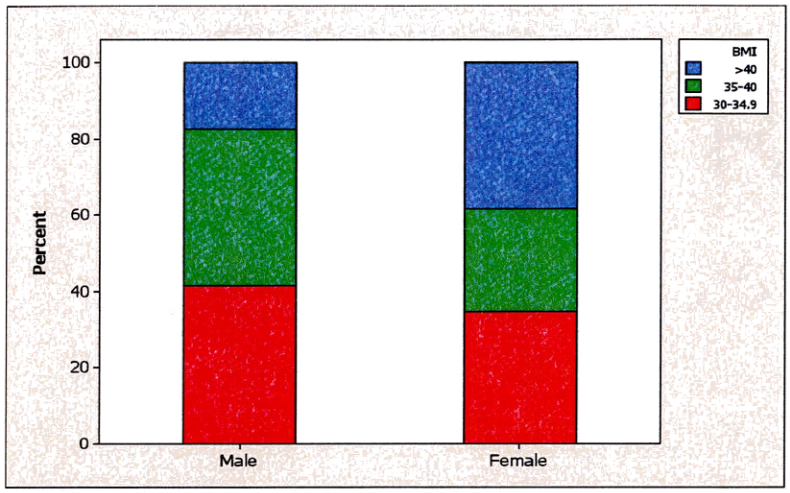



Figure 3. BMI by gender

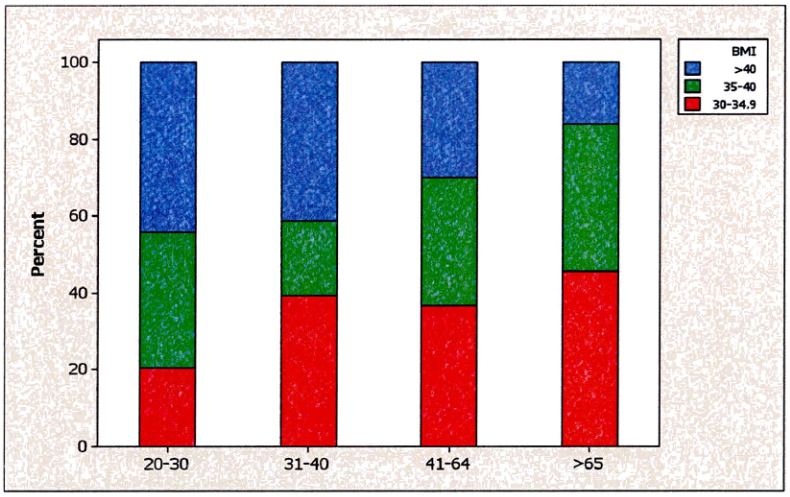



Figure 4. BMI by age classification

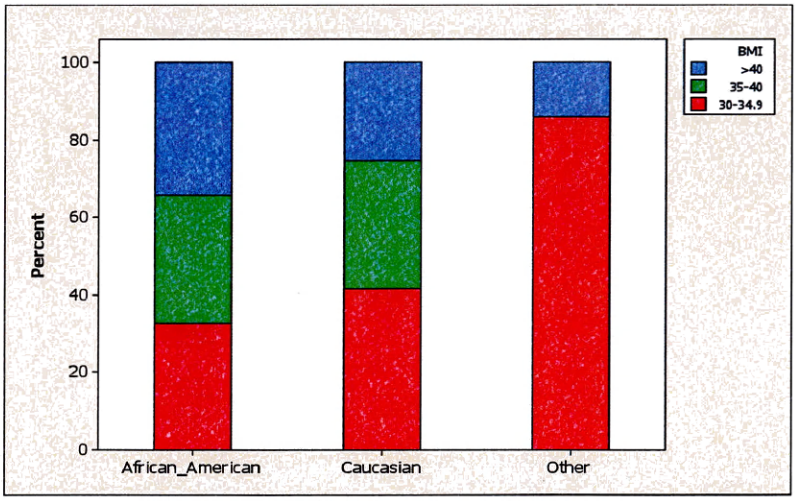



Figure 5. BMI by ethnicity

## Summary

The researchers discovered that an overwhelming number of obese individuals possessed at least one co-morbid condition. Of the 300 medical charts reviewed, 93.3% (n=280) of the charts contained one of the co-morbid medical condition diagnoses. The researchers were also able to isolate the most common co-morbid disorders associated with obesity. Cardiovascular disease (66%), DM Type II (43%), and Dyslipidemia (40%) were the most common conditions affecting the obese population.

# Chapter V

## Summary and Conclusions

### Summary of the Investigation

The prevalence of obesity in Mississippi is alarming as this state leads the nation in the percentage rate of obesity. Numerous studies have shown that the risk of developing co-morbidities increases once a person develops obesity. The purpose of this study was to determine which co-morbidities are most prevalent among obese residents of rural Mississippi and whether they can be reduced or reversed with significant weight reduction. The study posed two questions: (1) What percent of obese adult patients of rural health clinics in Mississippi have a co-morbidity associated with their obesity, and (2) What are the most common co-morbidities associated with obesity among the patients of rural health clinics in Mississippi. Nola Pender's Health Promotion Model was used as the framework for this study. After setting the framework, a tool was developed to assist in data collection from randomized charts in three rural health clinics in Mississippi. Once the data was collected, it was analyzed to answer the questions posed by this study. This chapter covers the research findings, limitations, implications, recommendations, and conclusion to this study.

### Interpretations of Findings and Conclusions

The first question posed by this study was what percentage of obese adult patients of rural health clinics in Mississippi had a co-morbidity associated with obesity? In order to get this percentage, one hundred randomly selected charts were reviewed in three rural health care clinics for a total of three hundred charts. The next question posed by this study, what are the most common co-morbidities associated with obesity among the

patients of the rural health clinics in Mississippi, was answered by the data collected in the rural health clinics. After data was collected, it was compiled in Microsoft Excel and then analyzed using Mini Tab statistical software, version 16.

**Outcomes Related to Research Questions**

**Research Question 1: What percentage of obese adult patients of rural health clinics in Mississippi had a co-morbidity associated with obesity?**

The researchers found that the vast majority, 250 patients or 93.3%, had at least one co-morbidity associated with obesity. This means that only 6.7% of obese patients had no co-morbidities. The research also found that of these 93.3% who had co-morbidities, 66% had cardiovascular disease. These findings were supported by the literature in that obesity and weight gain were associated with an increased risk of developing certain co-morbidities (Hwang, Bai, Sun, & Chen, 2011).

**Research Question 2: What are the most common co-morbidities associated with obesity among the patients of the rural health clinics in Mississippi?**

The researchers identified that the most common co-morbidities associated with obese patients in rural health clinics in Mississippi were cardiovascular disease (66%), type II diabetes (43%), and dyslipidemia (40%). These findings are consistent with the literature in that studies determined statistically significant association for obesity and the incidences of type II diabetes, cardiovascular diseases including hypertension, cardiovascular artery disease, and metabolic syndrome. (Hwang et al., 2011) and (Guh, et al., 2009)

**Literature Applications to the Outcomes**

The findings of this study were in keeping with the results found in the review of literature. Studies conducted by Guh et al. (2009) and Hwang, Bai, Sun, & Chen (2011) concluded that obesity significantly increases the incidence of hypertension, type II diabetes, metabolic diseases, cardiovascular diseases (except congestive heart failure), asthma, gallbladder disease, osteoarthritis, and chronic back pain. The literature review also established that weight reduction significantly reduces the risks for the co-morbidities associated with obesity. Several articles further demonstrated that weight loss, even through bariatric surgery, should be the primary focus of treatment for obesity related co-morbidities. The research demonstrated in the articles established a connection between weight loss and significant improvements and/or resolution of the co-morbidities associated with obesity (Batsis et al., 2008), (Johnson et al., 2012), and (Sjostrom 2008). Other literature recommended that greater importance be placed on the implementation of a healthy lifestyle and the removal of environmental barriers to maintaining a healthy weight for our patients. (Burke et al., 2008).

**Limitations**

Limitations may exist in this research as the population, sample, and methods were that of convenience. The data may be skewed due to the small sample size utilized for this study. A total of 300 charts from 3 separate rural health clinics in Mississippi were reviewed to determine which co-morbidities were most prevalent among adult residents of Mississippi who are obese.

Limitations also existed due to data being collected only from three rural health clinics in the state of Mississippi. Different results may be present if clinical sites included areas with a broader range of ethnic groups as Mississippi 2011 census lists its

populations as consisting of 60% Caucasians and 37.3% African Americans which is different from results of data from the rural health clinics. Our sample was comprised of 59.33% African Americans and 38.33% Caucasians. Also, this study utilized a retrospective chart review and only data that was documented in the charts was used.

**Implications and Recommendations**

The implications of the results of this study for nursing practice are great. A clear link is established between obesity and multiple co-morbidities through the research. Nursing practice will benefit because the literature shows that prevalent co-morbidities are not only treatable with medication regimens, but also by reduction of weight in patients who are obese. This provides the nurse practitioner a patient education platform to teach each patient about medications, healthy lifestyles, exercise to reduce weight and the complications of obesity.

**Nursing Theory**

Nola Pender's Health Promotion Model could be used as a way to construct nursing interventions tailored to the patient's perceptions and to address barriers to health and wellness. Pender's HPM can influence attitudes and beliefs. This, in turn, can increase the patient's willingness and ability to participate in a plan to achieve treatment goals (Murphy and Rew, 2009). Achieving treatment goals would greatly improve or resolve the incidence of type II diabetes, hypertension, dyslipidemia and all of the other co-morbidities of obesity.

**Nursing Research**

The impact of this study on nursing research is diverse. This study could be expanded to identify the prevalence of co-morbidities, not only in rural health clinics, but

also the more densely populated urban areas in Mississippi. This study could also be expanded to show the decrease in the prevalence of co-morbidities of patients who have undergone bariatric procedures in Mississippi. Implications for research also include recommendations for further research of the incidence of obesity in children and the prevalence of co-morbidities focusing on prevention in order to benefit the future adult population of Mississippi.

**Advanced Nursing Practice**

The implications of this study on advanced nursing practice includes recommendations to focus mainly on the prevention of obesity and the implementation of weight management programs in order to reduce the co-morbidities associated with obesity. This study shows how imperative it is for patients to maintain a healthy weight, especially when they are at high risk of developing obesity related co-morbidities. The researchers found through this study and the review of literature that the chance of developing hypertension, type II diabetes, and hyperlipidemia is increased with weight gain and obesity. The advanced practice nurse should develop patient education models to reinforce weight management and medication regimens based on standards of care for the management of the co-morbidities associated with obesity.

**Nursing Practitioner Education**

Nurse Practitioners face the challenge of guiding and directing our patients to a healthy lifestyle. The epidemic of obesity has a clear correlation to many chronic diseases. This study exhibits the importance of educating nurse practitioners regarding weight management and the reduction of obesity related co-morbidities among their clients. It calls for the promotion of healthy behaviors, enhancement of functional

abilities, and the improvement in quality of life among obese adults in rural Mississippi. It also points to the need for treatment of these chronic diseases associated with obesity through medication regimens.

**Summary**

Obesity has become the most prevalent metabolic disease in the United States and Mississippi has the highest obesity rates in the country. Obesity leads to the development of multiple co-morbidities. Nurse Practitioners, especially in rural Mississippi, constitute an integral part of the interpersonal environment that exerts influence on patients throughout their lifespan. Advanced practice nurses must focus on the prevention of obesity and the implementation of weight loss programs in order to reduce the incidence of the co-morbid diseases of obesity. Patients must be encouraged and educated on the proper decisions to make regarding lifestyle changes to improve the management of these chronic diseases. Through a review of literature for this project, it has been demonstrated that sustainable weight loss significantly reduces or resolves the co-morbidities associated with obesity. Nurse practitioners should incorporate these standards of care into their practice to provide the best care for all patients who entrust their lives to them.

## References


Athyros, V. G., Tziomalos, K., Karagiannis, A., & Mikhailidis, D. P. (2011). Diagnosis in obesity and its comorbidities; Cardiovascular benefits of bariatric surgery in morbidly obese patients. *Obesity reviews 2011 International Association for the Study of Obesity, 12*, 515-524.

Batsis, J. A., Romero-Corral, A., Collazo-Clavell, M. L., Sarr. G., Somers, V. K., & Lopez- Jimenez, F. (2008). Effect of bariatric surgery on the metabolic syndrome: A population- based, long-term controlled study. *Mayo clinic proceedings,8 3*(8), 897-906.

Burke, G. L., Bertoni, A. G., Shea, S., Tracy, R., Watson, K. E., Blumenthal, R. S., Carnethon, M. R. (2008, May 12). The impact of obesity on cardiovascular disease risk factors and subclinical vascular disease: The multi-ethnic study of atherosclerosis. *Archives of Internal Medicine, 168.*

Burke, L. E., & Wang, J. (2011, September 6). Treatment strategies for overweight and obesity. *Journal of Nursing Scholarship, 43:4*, 368-375.

Centers for Disease Control and Prevention, (2011). *Adult obesity facts*. Retrieved from website: http://www.cdc.gov/obesity/data/adult.html

Eldar, S., Heneghan, H. M., Brethauer, S. A., & Schauer, P. R. (2011). Bariatric surgery for treatment of obesity. *International Journal of Obesity, 35*, S17-S21. http://dx.doi.org/10.1038/ijo.2011.142

Guh, D. P., Zhang, W., Bansback, N., Amarsi, Z., Birmingham, C. L., & Anis, A. H. (2009, March 25). The incidence of co-morbidities related to obesity and

overweight: A systematic review and meta-analysis. *BMC Public Health.* Retrieved from http://www.biomedcentral.com/1471-2458/9/88

Hwang, L. C., Bai, C. H., Sun, C. A., & Chen, C. J. (2011, July 3). Prevalence of metabolically healthy obesity and its impact on incidences of hypertension, diabetes and the metabolic syndrome in Taiwan. *Asia Pacific Journal, 21,* 227-233.

Johnson, R. J., Johnson, B. L., Blackhurst, D. W., Bour, E. S., Cobb, IV, W. S., Carbonell, II, A. M.,...Scott, J. D. (2012, June). Bariatric surgery is associated with a reduced risk of mortality in morbidly obese patients with a history of major cardiovascular events. *The American Surgeon, 78,* 685-692. Retrieved from

Kelley, J. A., Sherrod, R. A., & Smyth, P. (2009). Coronary artery disease and smoking cessation intervention by primary care providers in a rural clinic . Online journal of rural nursing and health care, 9(2), 82-94.

Lexi-Comp, Inc. Stedman's medical dictionary™, Hudson, OH: Lexi-Comp, Inc.; November 13, 2012.

Murphey, C., & Rew, L. (2009). Three intervention models for exploring oral health in pregnant minority adolescents. Journal for specialists in pediatric nursing, 14(2), 132-141.

Nursing theories a companion to nursing theories and models. (2012). Retrieved from http://nursingplanet.com/health_promotion_model.html

Padula, C. A., & Sullivan, M. (2006). Long-term married couples' health promotion behavior: Identifying factors that impact decision making. Journal of gerontological nursing, 32(10), 37-47.

Sjostrom, L. (2008). Bariatric surgery and reduction in morbidity and mortality: Experiences from the sos study. *International journal of obesity*, *32*, s93-s97.

Smith, L. B., Gretebeck, K. A., Kazanis, A. S., & Pender, N. J. (2006, May/June). Girls on the move program to increase physical activity participation. Nursing Research, 55, 206-216. Retrieved from knowledgetranslaation.ca

U.S. Department of Commerce, United States Census Bureau. (2011). *Mississippi state & county quick facts*. Retrieved from website: http://quickfacts.census.gov/qfd/states/28000.html

World Health organization, (2012). *10 facts on obesity*. Retrieved from website: http://www.who.int/features/factfiles/obesity/en/

Zimmermann, E., Holst, C., & Sorensen, T. (2011). Lifelong doubling of mortality in men entering adult life as obese. *International journal of obesity*, *35*, 1193-1199

(2009). D. Venes (Ed.), *Taber's cyclopedic medical dictionary* (21st ed.). Philadelphia, PA: F.A. Davis Company.

(2011). R. Porter & J. Kaplan (Eds.), *The merck manual* (19th ed.). Whitehouse Station, NJ: Merck Sharp & Dome Corp., A Subsidiary of Merck & CO., INC.

# Appendix A

## IRB Approval Letter

Mississippi University
for Women
*A Tradition of Excellence for Women and Men*

Provost and Vice President for Academic Affairs
1100 College St. MUW-1603
Columbus, MS 39701-5800
(662) 329-7142
(662) 329-7141 Fax

www.muw.edu

February 26, 2013

Patsy Smyth, DSN
Mississippi University for Women
College of Nursing and Speech-Language Pathology
MUW - 910
Columbus, Mississippi 39701-5800

Dear Dr. Smyth:

I am pleased to inform you that the members of the Institutional Review Board (IRB) have reviewed the following proposed research and have approved it as submitted:

| | |
|---|---|
| **Name of Study:** | Comorbidities Associated with Adult Obesity in Mississippi |
| **Investigator(s):** | Tonda Wells, Daniel Walker, and Richmond Lachney |
| **Research Faculty/Advisor:** | Patsy Smyth |

I wish you much success in your research.

Sincerely,

Dan Heimmermann, Ph.D.
Provost and Vice President for Academic Affairs

DH/jh

pc: Tammie McCoy, Institutional Review Board Chairman

# Appendix B

## Letter of Consent for Rural Health Clinic

Date

A rural health clinic in central Mississippi

SUBJECT: Permission to participate in a research project

Dear XXXX,

We are graduate students in the family nurse practitioner program at Mississippi University for Women in Columbus, MS. As a program requirement, we are conducting a research study to assess the most common co-morbid conditions associated with obesity. Literature review and analysis will also be performed in order to show how weight loss, particularly through bariatric surgery, can have a positive effect on decreasing these same co-morbid conditions.

Your participation will involve granting us the privilege of reviewing medical records of your clients who are over the age of 20. As researchers, we understand that we must maintain the confidentiality of all information collected from the charts. This information includes, but is not limited to, all identifying information and research data that we will come into contact with while performing chart reviews. We agree to refrain from discussing or disclosing any information regarding your clients. Each researcher will receive HIPPA and Corporate Compliance training through the facility before beginning the research. These chart reviews will be recorded on a Data Collection Tool. The information will be entered into a computer data sheet. The data sheet will be saved to a portable jump drive which will be kept in a locked area. This area will only be accessible by the researchers. After completion of the project, all physical data will be destroyed.

appropriately. The results of this study may be published, but your name, the clinic, nor any of the patient's information will be identifiable.

Your participation in this study is strictly voluntary. The possible benefit of your participation is that the research project will serve as a quality assurance measure for you. The amount of time required for us to review charts and collect data will be approximately 1 day. After the research project is complete, we will provide you with the results from the study.

If you have any questions concerning this research study, please call Richmond Lachney at (601) 416-9780, Daniel Walker at (601) 507-0392, Tonda Wells at (334) 868-1692 or contact the chair of our research committee, Dr. Patsy Smyth, at (662) 392-7321. In addition, you may withdraw your consent and participation in this study at any time by contacting me or the chair of my research committee.

Sincerely,

Richmond Lachney, RN, BSN

Daniel Walker, RN, BSN

Tonda Wells, RN, BSN

**********

I have read this letter of consent and have been given the opportunity to ask questions. I give my consent to participate in the above study.

| _____ | _____ | _____ |
|---|---|---|
| Clinic Manager | Signature | Date |

# Appendix C

## Data Collection Instrument (Proposed)

Chart# _____

1. Chart data complete (0) Yes (1) No
2. Age:_____ (0) 20-30 (1) 31-40 (2) 41-64 (3) >65
3. Gender: (0) Male (1) Female
4. Ethnicity: (0) African American (1) Caucasian (2) Other _____
5. Height:_____
6. Weight:_____
7. BMI: _____ (0) 30-34.9 (1) 35-40 (2) >40
8. Diabetes-Type II (0) Yes (1) No
9. Cardiovascular Disease x CHF (0) Yes (1) No
10. Liver Disease (0) Yes (1) No
11. Dyslipidemia (0) Yes (1) No
12. Osteoarthritis (0) Yes (1) No
13. Respiratory Problems (0) Yes (1) No
14. Gynecological Problems (0) Yes (1) No
15. Gallbladder Disease (0) Yes (1) No
16. Chronic Back Pain (0) Yes (1) No
17. All cancers except esophageal, prostate, and pancreatic (0) Yes (1) No