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Prenatal Nutrition Counseling Designed to Reduce the Intake of Moderate and High Glycemic Index Foods among Selected Normal, Overweight, and Obese Patients from a Nonprofit Faith-based Patient Medical Care Home

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Executive Summary

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Problem

Minority and economically disadvantaged clients at a faith based nonprofit patient medical care home were identified as needing dietary counseling in the first trimester of pregnancy. There has existed a preponderance of evidence linking excessive weight gain in pregnancy to multiple complications for mother and child with a suggested relationship specific to the inflammatory processed initiated within the human body related to the ingestion of excessive calories and foods with a glycemic index (GI) greater than 50 (Jenkins & Willett, 2013; Marsh & Brand-Miller, 2008; Moses, Luebake, Coleman, Tapsell, and Petocz, 2006). Minority populations have been disproportionately affected by excessive weight gain during pregnancy. A need for multifaceted research and for the development of policies and interventions to address maternal weight gain that considered social, economic, political, and ethical issues was identified (Fleishman, 2012; Gennaro, 2005; Gordon-Larsen, Nelson, Page, Popkin, 2006). Women wanted to learn how to have healthy pregnancies. Nutritional education during pregnancy could serve as an impetus for changing behaviors (Healthy People 2020, 2013).

Purpose

The purposes of this project were to examine the problem of excessive weight gain during pregnancy and provide an intervention appropriate for the selected patient population.

Goals

Overall goals were to improve the prenatal health of a selected sample of pregnant women by evaluating their current eating habits and fostering change in those eating habits where indicated and practical to reduce weight gain during pregnancy.

Plan

Assess the 24 hour dietary intake of selected clients, identify foods with a glycemic index greater than 50, review suggested changes with clients, and reevaluate BMI and weight gain 4 to 8 weeks after the initial intervention.

Outcome and Results

Participants who completed the intervention experienced no statistically significant change in weight or BMI. Mean weight gain was 0.38 pounds. The control group's mean weight gain was 0.89 pounds. Statistical findings failed to reject the null hypothesis.

Recommendations for further study

A study of greater duration and larger sample size may capture additional data regarding the usefulness of the GI tool in weight management for pregnant and non-pregnant clients.

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Prenatal Nutrition Counseling Designed to Reduce the Intake of Moderate and High Glycemic Index Foods among Selected Normal, Overweight, and Obese Patients from a Nonprofit Faith-based Patient Medical Care Home.

In order to address the complexity of the overweight and obese milieu in today's environment, a multifaceted plan was needed to create an effective intervention for prevention of excessive weight gain during pregnancy (Holm, 2007; Warren, Rance, & Hunter, 2012; Wright & Aronne, 2012). Given that excessive weight gain during pregnancy has been associated with multiple complications for mother and infant, during pregnancy and throughout life (Centers for Disease Control and Prevention (CDC), 2013; March of Dimes, 2014), selected pregnant patients at Good Samaritan Health Center of Gwinnett (GSHCG), a faith based, non-profit patient medical care home (PMCH), received an individualized intervention strategy targeting nutrition and specifically glycemic index (GI) intake.

Problem Recognition and Definition

Evidence indicated an association between excessive weight gain during pregnancy in normal, overweight, and obese women and significant complications such as gestational diabetes, prematurity, preeclampsia, increased caesarean births, and childhood and lifetime obesity (March of Dimes, 2014). In the past 20 years there has been a surge in overweight and obese populations in the U.S. and the developed world (CDC, 2012). Along with this trend in excessive weight gain, increased incidences of heart disease, diabetes, and metabolic syndrome have been noted (IOM, 2009). In 2012, 69.2 % of the US population was overweight or obese (CDC, 2012). Georgia's rank among the states in percentage of adults who were obese was 30th, with 64.8 percent obese (America's Health Ranking, 2013). The obesity epidemic has

disproportionately affected people of color, who are also disproportionately affected by all negative health outcomes, including maternal morbidity (CDC, 2012). In 2013, Georgia currently ranked 50th among the states in maternal morbidity (Miller, 2013). Diseases of obesity that affect the general population carried corollaries into the vulnerable populations of pregnant women and infants. For example, preeclampsia, a hypertensive disorder of pregnancy, has remained a major cause of maternal and fetal morbidity and mortality with significant ramifications for later pregnancies and increased lifetime cardiovascular risk (Young, Levine, & Karumanchi, 2010). Preeclampsia has also been identified as a major comorbidity of prematurity, long associated with lifetime disabilities such as cerebral palsy (March of Dimes, 2013). Examination of the phenomenon of obesity revealed studies which showed that the way consumed calories have been delivered in food affects overall blood glucose and insulin levels, indicating that total calories may be less important in the obesity epidemic than types of calories (Jenkins & Willet, 2013). Glycemic index, as a measurement for the rate at which foods raise blood glucose, has been posited as having the potential to provide meaningful information for clients seeking weight reduction and weight management.

The current state of obesity and its epidemic proportions in the United States, the relationship between this epidemic and the complications of pregnancy, and the disproportionate incidence of obesity among minority populations were examined to develop a prenatal educational intervention involving GI. Warren, Rance, and Hunter (2012) noted that pregnancy motivated women to change and improve their lifestyle behaviors to benefit their fetuses, further noting that midwives were uniquely able to aid women as they made these changes through education and lifestyle counseling. These authors further posited that pregnancy may be viewed

as a primary period for the lifetime development of obesity due to patient and cultural belief systems promoting the notion that pregnant women are "eating for two" (Warren, Rance, & Hunter, 2012).

Statement of Purpose

The purpose or goals of this evidenced based project were to

- Develop a prenatal teaching plan specifically addressing Institute of Medicine (IOM) guidelines from 2009 which included targeting dietary teaching with respect to moderate and high glycemic index (GI) foods. Implement the plan with selected patients.
- Provide one hour of nutritional counseling for prenatal patients including 24 diet review/recall, evaluation of diet for GI, and teaching specific to reduction of GI.
- Reduce subject weight gain during the time interval observed when comparing the study population to a demographically similar control group.
- Evaluate the use of MUAC as an indicator of weight gain during pregnancy.
- Create a sustainable project for future health care students.

PICO Statement

In pregnant women whose gestation is less than 14 weeks (P=population), will prenatal teaching that includes a dietary teaching plan specifically addressing a reduction in foods with a moderate to high glycemic index (55 or greater) (I=intervention), compared to women from a general data base from the pregnant population of Georgia who did not receive prenatal dietary teaching prior to 14 weeks specifically targeting a reduction of glycemic index foods (C=control) have stable or

improved BMI's and stable or improved MUAC test results between weeks 4 and 8 after the initial intervention (O=outcomes).

Project Significance, Scope, and Rationale

Few problems in the past three decades facing science and society have been as alarming as the increased and increasing prevalence of excessive weight among all demographic groups, especially those of childbearing age (Barger, 2010; Gordis, 2009; Gunatilake, & Perlow, 2011;Siega-Riz, Deierlein, & Stuebe, 2010). According to the National Center for Health Statistics (NCHS), 2009-2010, 35.9 % of Americans were obese. When obesity and overweight numbers were combined, 69.2 % of Americans were afflicted with a BMI > 25 %. (Centers for Disease Prevention and Control, CDC, 2012). Among women 12 to 44 years of age, the prevalence of obesity has doubled in the past twenty years. During the five year period between 1999 and 2004, the NCHS showed that nearly two-thirds of women of child-bearing age were overweight with a BMI greater or equal to 25 kg/m2 and nearly one-third were obese with a BMI of greater or equal to 30 kg/m2. Furthermore obesity has been more common among minority groups, and its prevalence increased with advancing age within all groups. Finally, excessive gestational weight gain, associated not only with increased pregnancy risks, was increasingly associated with childhood obesity (Branum, Parker, Keim, & Schempf, 2011).

The once rare condition of severe obesity has shown dramatic increases among women of childbearing age. Class I (BMI >30 .0) and class II (BMI >34.9) obesity numbers have doubled, and class III (BMI> 40) numbers have tripled over the past two decades. Similar trends were noted as one examined the evidence by age and parity, with increased maternal age showing an association with increased weight at conception. Among ethnic groups, non-Hispanic Black

women had a prevalence of class I obesity of nearly 25 percent. Class II and class III obesity had each claimed a prevalence that exceeded 10 percent among non-Hispanic Black women. Among Hispanic women, nearly 20 percent had been classified with class I obesity (CDC, 2013). Hispanic women also had class II and class III obesity approaching 10 percent. Data from the Pregnancy Risk Assessment Monitoring System (PRAMS) has shown that more women were already obese when they became pregnant (CDC, 2013). Based on data from nine reporting states, among White women the prevalence of obesity had doubled and the prevalence of obesity among Black women had increased by fifty percent. It is incumbent upon the entire health care system to address these worrisome trends, especially since more than half of all pregnancies in the United States are unplanned. "It starts before birth and it goes from the cradle to the grave." said Kimberlee Wyche, M.D., MPH, director of the Bureau of Family, Youth and Infant Health for the Metro Nashville Davidson County Public Health Department in Tennessee. "It's really about well-woman's health and having a healthy society, because if your women are healthy, your babies are going to be healthy and your society will be healthy" (Curley, 2008).

Early prenatal care with nutritional counseling and assessment as an evidenced based intervention has been acknowledged to result in better antenatal outcomes for all groups of women irrespective of demographic group (Iams, Romero, Culhane, & Goldenberg, 2008). As of this writing, Georgia provided prenatal care for under and uninsured women who demonstrated financial need through Medicaid funding unless the individual was an undocumented immigrant. Individuals without legal status were not provided prenatal care under Medicaid in Georgia (Georgia Department of Community Health, 2013). Care was rendered at delivery via the Emergency Medical Treatment and Active Labor Act (EMTALA)

when hospitals and the providers who delivered that care were reimbursed through emergency Medicaid funding (Centers for Medicare and Medicaid Services, 2012). A significant percentage of patients receiving care at GSHCG from which the study population was obtained were undocumented Hispanic immigrants, undocumented African immigrants, African Americans, or non-Hispanic blacks. As previously stated, if the patient was an undocumented immigrant in the state of Georgia, she was ineligible for Medicaid coverage until delivery of the infant. The costs related to lack of prenatal care suffered by the patient, her baby, and the community, were and are currently unquantifiable and include complications from the unintended consequences inherent in a lack of prenatal care, not the least of which is appropriate dietary counseling by a qualified provider (Barger, 2010).

Although the IOM guidelines from 2009 regarding prenatal weight gain were not substantially different from its guidelines published in 1990, the 2009 summary stated that implementing those guidelines would dramatically change care provided by women of childbearing age (Institute of Medicine, IOM, 2009). Full implementation of the guidelines would include diet counseling to all women designed to help them achieve those weight gain guidelines. When clinicians implement the IOM guidelines, they have an opportunity to reduce obstetrical risk, reduce postpartum weight retention, improve long term patient health, normalize infant birth weight, and provide additional tools for society's efforts to help reduce childhood obesity (IOM, 2009; Robert Woods Johnson Foundation, RWJF, 2013). Observational data, generated and extrapolated from the guidelines posted in 1990, demonstrated that women who maintained weight gains within those guidelines had better pregnancy outcomes than those women who gained outside the recommended limits (IOM, 2009). Experimental studies were

needed, however, to validate these recommendations. Additionally, validation through intervention requires statistical power if it is to be useful as a recommendation for formal policy and intervention (IOM, 2009). In 2013, 64.8 percent of the population of Georgia was overweight with a BMI >25 kg/m2, including the 29.6 percent who were morbidly obese with a BMI of >30 kg/m2 (CDC, 2013). Identified causes of increased population obesity were multifactorial and included multiple environmental, behavioral, genetic and sociocultural variables (Gunilake & Perlow, 2011). One of these identified variables related to the manufacture, marketing, and consumption of highly processed foods including juice and soda. These foods uniformly were found to have moderate and high GI's with the potential to raise the overall glycemic load (GL) in a patient's diet (Jenkins & Willett, 2013). Health care providers addressing the comorbidities of population obesity, such as metabolic syndrome, type II diabetes, and cardiovascular disease, needed to consider the many sociocultural factors that entered into diet and food consumption (Gunilake & Perlow, 2011).

GIycemic index is a ranking tool that describes how quickly a given carbohydrate food raises the blood sugar (American Diabetes Association, ADA, 2014). Kirpitch and Maryniuk (2011) noted evidence presented by eleven Cochrane random control studies involving 402 patients in which consumption of low GI diets demonstrated a decrease in glycated hemoglobin (Hgb A1C), the average plasma glucose concentration, by 0.5 %. They posited that a decrease in gluconeogenesis after consumption of decreased GI foods caused suppression of the release of non-esterified fatty acids (NEFA). This suppression resulted in increased high density lipoprotein (HDL) levels. This supported theories that decreasing the GI may decrease the body's inflammatory response by increasing HDL levels. Glycemic load (GL) and Glycemic

Response (GR) have been the subjects of increased scientific interest. The relationship between these entities and coronary heart disease (CHD) and type 2 diabetes mellitus (DM) has received sufficient study such that specific recommendations for dietary counseling and management can be made (Jenkins & Willett, 2013).

The scope of this project, therefore, had broad health applications for mothers and families. Healthy People 2020 (HP2020) identified the science supporting the benefits of maintaining a healthy body weight and consuming a healthy diet. Efforts to change behavior that improve diet and reduce weight were listed as important goals for community settings such as schools and health care organizations. Good nutrition was acknowledged to be important for the growth and development of children. The reduction of the risks from being overweight or obese include reduced risks for the aforementioned cardiovascular diseases, type II diabetes, metabolic syndrome, dyslipidemia, and high blood pressures (Healthy People 2020, HP2020, 2013).

Based upon these recommendations from HP 2020 and the IOM prenatal weight guidelines, it was believed that changes in food choices that reflected a decrease in high GI foods would result in improved or stable BMI's and reduced weight gain according to IOM guidelines at 4 to 8 weeks after the initial intervention. The IOM recommendations encouraged a practice change that included comprehensive dietary evaluation and counseling for all pregnant women beginning in the first trimester (Young, Levine, & Karumanchi, 2010). All patients presenting to GSHCG with a diagnosis of pregnancy were offered a free prenatal visit to review dietary modifications that included discussion of high GI foods. All normal, overweight, and obese patients received recommendations to reduce the intake of moderate and high GI foods, since there existed a preponderance of evidence indicating that dietary recommendations significantly

impact gestational weight gain (Siega-Riz, Deierlein, & Stube, 2010; Walsh, McGowan, Mahoney, Foley, & McAuliffe, 2012).

Finally, discussions and dietary interventions could not be considered outside of the framework of culture and sociocultural norms and values. Nutrition has been identified as a cultural operative with intrinsic cultural significance and meaning (Leininger, 2002). An individual's food habits and preferences form early in life (Roy, 2009). Within the framework of this capstone proposal, the cultural characteristics of immigrant, specifically Hispanic, and African American populations as they relate to diet were considered, since these individuals were the primary populations of GSHCG. These populations were those afflicted with the highest incidences of obesity-related, pregnancy- induced complications. These populations have been disproportionately affected and have experienced the most severe outcomes in both maternal and neonatal consequences (Fleischman, 2010; Gunatilake & Perlow, 2011; IOM, 2009). Based upon these findings, the author presupposed that these populations stood to experience the greatest benefit from appropriate, culturally sensitive interventions promoting a reduction in the intake of moderate and high GI foods and a reduction in dietary GL.

Theoretical Foundation

This capstone project utilized the principles of the educator, Lev Vygotsky's Sociocultural Learning Theory combined with the nursing theorists, Sister Callista Roy's Adaptation Model for Health, and Madeline Leininger's Theory of Cultural Care and Diversity as its theoretical underpinnings. Vygotsky explained human cognition as a social and cultural phenomenon and construct rather than an individual phenomenon. He theorized that no human learning occurred outside of a cultural need to know, since one of the main goals of learning is

the transmission of culture from one generation to the next. According to Vygotsky's theoretical framework, change is a constant, and learning is a phenomenon to be examined as part of the developmental process. Vygotsky developed his theory during a period of great social and economic upheaval, a historical period when individuals of different social and ethnic groups were forced by their times into the same educational paradigm. He described signs, symbols, and social interaction as being culturally specific rather than universal, directing attention to a general belief that significant positive educational outcomes could be achieved when cultural specificity was fully taken into account by educators. He further believed that in order to fully meet the needs of human potential, educators must consider their own personal goals, motives, and methods. Vygotsky believed that one must have awareness of the motivations for one's own actions and thoughts and must consider these motivations in order to transcend one's own short comings and meet the needs of the student (Kozulin, Gindis, Ageyev, & Miller, 2003). As an example, one can discover underpinnings of the theories of Vygotsky in the work of Johnson et al. (2011), as they compared the perceptions of providers and patients as barriers, motivators, and facilitators of prenatal care. These researchers illuminated a cultural gap existing between the beliefs of providers regarding the value their socioeconomically disadvantaged clients placed on education. Clients placed higher value upon education regarding their health than was expected by prenatal care providers. Though Vygotsky's theories were originally applied to children, his social and cultural tenets have broad applicability to learners of all ages and settings and his theoretical framework was useful as this project unfolded and proceeded.

Furthermore, the educational principles of Vygotsky were readily linked to the cultural components of Roy's Adaptation Model, known as RAM, as well as the culturally congruent

core values of Leininger. In 2009 Roy discussed culture as occurring within the interactions between individuals and their environment. She stated one's self concept was influenced by "confirmation through social interaction" (Roy, 2009, p. 344). She maintained that individuals begin to see themselves through the lens of others and to internalize the positive and negative beliefs of society and social interaction. Transmission of culture subsequently occurred from society to the individual. Roy used the term *self-schema* to describe the perception of self, resulting from an individual's interpretation of that individual's interactions with the environment and with others. The effects obesity has had upon our society in the United States, included the dual phenomena of "food deserts" and "food swamps", could not be overlooked as critical factors in this epidemic (Nijjer-Sidha, 2012). Food deserts have been described as economically depressed areas where there were scarce grocery stores and scarce supplies of fresh foods. Food swamps have been described as economically depressed areas where there were numerous fast food establishments offering cheap, high calorie, food items.

In addition to the culturally appropriate tenets of RAM, Roy's theory contained a biologically applicable component related to obesity within the mechanical and physiological processes of nutrition. Roy listed nutrition as one of the five physiological needs of humans. The presence of food deserts and food swamps within the environment has contributed to an individual's risk of obesity because cheap foods containing excessive amounts of sugar and fats have been plentiful. High sugar and high fat content diets have been associated with poor lipid profiles. Nutritious foods that did not contain excessive sugar were less readily available within the food desert/food swamp environment. Furthermore, individuals who experienced economic deprivation also experienced greater stress. Stress disrupts serum cortisol regulation, which in

turn disrupts the leptin/ghrelin system contributing to deregulation and disruption of fat accumulation and resulting in central obesity (Bjorntorp & Rosmond, 2000). When an individual was overweight or obese, the physiologic regulator of eating was disrupted. Internal cues and external cues had not adapted to meet the physical needs of the individuals, instead maladaptation has occurred. Glycemic load further presented the potential for excessive nutrient intake, since foods with a high GL have been demonstrated to disrupt the response of insulin release and production, as well as gluconeogenesis (Jenkins & Willett, 2013). Roy stated. "All effective weight management programs must be personalized for the individual" (p. 132). Roy elucidated the role of providing support and education regarding weight management as an important nursing function. Nurses make assessments regarding the interaction between behaviors of the individual and the stimuli from the environment that influence an individual's intake of nutrients. Finally, further support is lent to the use of RAM as a theoretical underpinning for this capstone project by describing the human biologic tendencies to obesity as understandable in the paradigms of evolution and culture, since both of these operatives were adaptive in times when food was scarce (Brown, 1991).

By further utilizing and including Leininger in the project's theoretical underpinnings, the researcher was able to use this theory in the design of a new approach to culturally congruent care for the clients receiving prenatal care at GSHCG. Leininger focused on comparing cultural values and beliefs within specific groups with the goal of helping nurses recognize these values and beliefs and design culturally competent care. Leininger also considered the nurse-client relationship as a factor that must be considered when culturally competent care is designed. Leininger believed that culture was the missing element needed to link nursing knowledge and

practice. She derived her concept of culture using anthropology and her concept of care from nursing and combined them to create a theory of cultural care and diversity. Leininger believed that by fully exploring cultural meanings inherent in human behavior, such as diet and food preparation, nurses could positively impact the health outcomes of individual clients as well as populations and communities (Leininger, 2002).

Literature Selection and Systematic Process

A comprehensive literature review was completed using sources from Google Scholar, PubMed, Cochrane, CINAHL, and NCBI data bases. Subject headings searched included glycemic index, obesity, prenatal diet, prenatal education, nutrition education in pregnancy, excessive weight gain in pregnancy, complications of pregnancy, obesity indicators, mid upper arm circumference and obesity, prenatal education and minority populations, immigrant populations and pregnancy, and Hispanic pregnancy. Literature review began in 2013 and continued through 2014. A systematic review of the literature is included in Appendix B. Articles were evaluated using criteria established by the GRADE Working Group (2004). Only articles evaluated to have an overall quality of high or moderate were included.

Scope of Evidence Summary

Articles pertaining to GI, prenatal diet, prenatal education, nutrition education in pregnancy, and obesity in pregnancy were less than eight years old with the exception of eleven articles published from 1991 to 2004 included to establish historical evidence, the significance of GI, and in order to obtain articles specifically addressing the needs of immigrant, minority, and Hispanic populations. All studies concerning obesity and pregnancy reviewed during the selection process for this capstone project cited either the 1990 or 2009 IOM recommendations

for prenatal weight gain as critical information for patients and practitioners. Specifically, since 2010, the 2009 recommendations from the IOM were cited in all articles selected for inclusion in this capstone project. A total of 52 articles were selected for inclusion in the literature review to provide evidence and understanding of the problem. For the purpose of further discussion, search terms were combined into four general categories; glycemic index, obesity, prenatal nutrition education, and immigrant and minority populations.

Review of Evidence

Background of the Problem

An examination of the social and economic forces behind the obesity epidemic in the United States and the potentially catastrophic association between excessive weight gain during pregnancy and outcomes for women and infants served as the impetus for a capstone project initiated within the new prenatal clinic at GSHCG. The literature review for the capstone project provided a deeper understanding of the problems of obesity and led the writer to formulate and develop a dietary intervention for the pregnant patients who present to GSHCG.

Recognition of the poor nutritional condition of military recruits and food insecurity during World War II initiated formulation of government policy establishing the school lunch program in 1946 as part of the Federal Farm Act (School Nutrition Association, n.d.). Foods provided in the program were nutrient dense and high in fats and sugars. The U.S. agricultural economy, notably producers of corn, sugar beets, soy beans, and dairy, received heavy subsidies from the Federal government as suppliers to state school systems. Head Start, food stamps, breakfast programs, and WIC were later established to provide nutrition to U.S. women and children. Changes in the food pyramid in the 1980's and 1990's suggesting the reduction in all

dietary fats and an increase in consumption of carbohydrates in the form of grains contributed to a worsening dietary problem and have been implicated in the obesity epidemic (Healthy Eating Politics, 2008). The substitution of high fructose corn syrup for sugar in processed foods and the substitution of trans-fats for healthy fats primed the food environment to contribute to an obesity epidemic (Bray, Nielson, & Popkin, 2004; Stanhope, et al., 2009). Tied into these programs was the governmental commitment to the agriculture industry in the U.S, for without secure food sources the country would not be secure from hunger (Swann, 2014). When one considers the complexity of governmental support of the agricultural economy with a biologically driven mechanism for over consumption, one begins to understand the compound and dynamic process that is resulting in the declining health of the people in the U.S. and the world (Neurofast, 2014). Humans are biologically primed to prefer sweets and fats to prevent starvation irrespective of an intellectual recognition that the food supply is plentiful. Stress hormones change the release of cortisol and insulin (Neurofast, 2014). There has been too much food, but recognition of this fact requires the ability to delay reward today in order to achieve a tangible benefit from not over eating later. One may be good at recognizing the immediate pain of not getting to eat a cheeseburger and less able to recognize that sacrifice as increased physical comfort in 10 years. Further complicating the consumption of excess calories has been a dramatic decrease in activity among all demographic groups, but especially among minority populations (Gorden-Larsen, Nelson, Page, & Popkins, 2006).

These problems facing science and society have been alarming and beg for public recognition and action. (Barger, 2010; Gordis, 2009; Gunatilake & Perlow, 2011;Siega-Riz, Deierlein, & Stuebe, 2010). As previously stated, excessive gestational weight gain, associated

not only with increased pregnancy risks, has been increasingly associated with childhood obesity (Ludwig, Rouse, & Currie, 2013). It is incumbent upon the entire health care system to address these worrisome trends.

HP2020 (2013) listed efforts to change behavior that improved diet and reduced weight as important goals for community settings such as schools and health care organizations. Finally, this writer found the following statement made by Iams et al. (2008) to be especially significant and worth restating. "Primary prevention strategies for cancer and vascular disease have begun to show benefit only after decades of effort through education and public policy built on sound science" (p. 164).

Systematic Review of the Literature

Once the keyword search was further defined and narrowed to four categories, the systematic review continued. Appendix A contains the complete list of all articles selected for guidance and inclusion in the capstone project.

Glycemic index. Eleven articles discussing GI were determined to have significance with respect to the proposed capstone project. Discussion of GI and GL occurred within the context of general descriptions of carbohydrate (CHO) metabolism and nutrient intake of fiber, protein, fats, and micronutrients (ADA, 2013).

Atkinson, Foster-Powell, and Brand-Miller (2008) described teaching patients to lower the GI in their diets as a tool for weight management, noting that teaching about the difference between simple and complex CHO's was no longer a useful paradigm for education about weight loss or weight management. Moses, Luebake, Coleman, Tapsall, and Petrocz (2009) demonstrated a statistically significant reduction in need for insulin in a population of pregnant

women randomized to receive a low GI diet. The overall reduced need for insulin was greater than 50 percent in the population study by Moses, et al. (2009).

Augustin, Francheschi, Jenkins, Kendall, and LaVecchin (2002) and Scholl, Chen, Khoo, and Lenders (2004) discussed the relationship between GI and chronic inflammatory diseases and diseases of obesity. Marsh and Brand-Miller (2008) described research linking GI with obesity and multiple chronic modern diseases, most notably diabetes and diseases of CHO metabolism. Research by Kirpitch and Maryniuk (2010) demonstrated that not all CHO's exerted the same effect on blood glucose, and therefore recommended using the GI in meal planning to improve diabetes control. Citing evidence that lowering the GI may decrease inflammatory markers by raising high density lipoprotein (HDL) levels, they posited this increased HDL may result from decreased gluconeogenesis after consumption of low GI foods. By this proposed mechanism, decreasing GI facilitates weight loss and weight balance. This study also found that lowering dietary GI resulted in greater satiety in the subjects for 180 minutes, reducing the participants overall consumption of food. Bray, Nielson, and Popkins (2004) described the increased use of high fructose corn syrup (HFCS) as a sweetener used to improve the palatability of processed foods whose fat content was reduced in response to changed USDA dietary fat intake recommendations. The role of HFCS consumption in beverages in the obesity epidemic was quantified by Stanhope et al. (2009) in a randomized study demonstrating increases in visceral adiposity, serum lipids, and decreased insulin sensitivity in overweight subjects whose intake of glucose and fructose was controlled. These subjects experienced an overall increase in inflammatory markers while consuming HFCS when compared to glucose even though calorie consumption was equal. Kirpitch and Maryniuk(2011)

recommended that practitioners know and understand GI in order to inform diet planning as they educate patients.

Esfahani, Wong, Mirrahimi, Villa, and Kendall (2011) identified the need for long term randomized, controlled trials that focused on weight loss and weight maintenance and body composition citing the many inconsistencies in findings of clinical trials to date regarding the application of low GI/GL diets and weight loss as primary outcomes measures. In 2012, Walsh, McGowan, Mahoney, Foley, and McAuliffe, released the results of a randomized control trial demonstrating the use of a low GI diet to prevent infant macrosomia among a selected group of pregnant women. The specific quantifiable physiologic properties of carbohydrates and the effects on post prandial glucose (PPG) and the beneficial effects of lowering PPG, such as decreasing the progression to type II diabetes and coronary heart disease, were elucidated by Jenkins and Willet (2013).

Obesity. Twenty articles were selected that described the complex phenomenon of obesity. The sociocultural, socioeconomic, sociopolitical, biologic and physiologic ramifications of the obesity epidemic were examined. Brown (1991) discussed the phenomenon and occurrence of human obesity in cultural terms relating assurances of an adequate food supply as opposed to starvation to the phenomenon of over consumption. Bjorntorp and Rosemond (2000) linked obesity to increased serum cortisol levels and inflammatory markers. Base-Smith and Campinha-Bacote (2003) described the phenomenon of obesity as a cultural operative among African Americans across all economic strata, that is, not limited to the poor. Holm (2007) expanded upon the ethical aspects of interventions designed to address obesity as they related to the freedom individuals have to determine their own health destinies when destructive personal

behaviors were both legal yet contrary to societal good. Puhl and Heuer (2012) discussed these societal aspects as they related to the continued stigmatization of obese individuals, especially the morbidly obese.

Humphreys (2007), Edlich et al. (2005), Gordon-Larsen et al.,(2006), and Jung (2009) quantified the obesity epidemic in terms of physical and social costs, and especially to health care workers, notably nurses. Haboubi, Kennedy, Sheriff, and Haboubi (2010) noted that 21.6 % of males and 24.6 % of females had a BMI >30 kg/m2 and were therefore obese, stating that obesity has tripled throughout the world since the 1980's. They further listed obesity as a leading cause of preventable death and one of the most serious public health problems of the 21st century. These authors stated that the current generation of children and young adults will be expected to have a shorter life-expectancy than the previous generation. Wright and Aronne (2012) described evidence listing the multifactorial causes of obesity and described the complex reality of effective medical care and treatment.

Phelan et al. (2011) remarked that only 13 % of Americans were obese in 1962 and also stated that obesity rates had doubled for adults since 1980 and had tripled in children aged 12-19. These authors asserted that health improvements made since the beginning of the 20th century were being lost. In an early study comparing child obesity to maternal obesity, Kral et al. (2006) noted that bariatric surgery with subsequent large maternal weight loss prevented the transmission of obesity to children studied. Ludwig, Roese, and Currie (2013) quantified the relationship between maternal weight gain during pregnancy and childhood body weight among offspring. Zhang et al. (2010) described abnormal labor patterns in obese women, while Iams (2008) also noted a rise in maternal deaths directly attributed to maternal obesity. Young,

Levine, and Karumanchi (2010) related maternal obesity and diseases of CHO metabolism, describing the evidence of the relationship between the disease of maternal obesity and the incidence and pathogenesis of preeclampsia and hypertensive disorders of pregnancy.

Gunilake and Perlow (2011); Tanentsapf, Heitmann, and Adegboye (2011); and Young, evine, and Karumanchi (2010) linked maternal obesity with multiple negative pregnancy outcomes as well as multiple negative outcomes occurring outside of pregnancy. Combined, these conditions included hypertensive disorders, coronary artery disease, dyslipidemia, preeclampsia, gestational diabetes, required induction of labor, failed induction of labor, cesarean delivery, stillbirths, perinatal deaths, macrosomia, congenital anomalies, increased childhood obesity, and the development of type II diabetes. Barger 2010; Tanentsapf et al., 2010; Brawarsky et al., (2005); and Gunatilake et al., 2011 stated that achieving a healthy weight gain during pregnancy was important for all women, again noting the increased incidence of risk factors related to maternal obesity.

Prenatal nutrition education. Four of twelve articles selected that addressed prenatal nutrition also addressed obesity, GI, or minority populations. Olsen, Strawderman, and Reed (2004) evaluated the efficacy of an education program to prevent excessive weight gain in pregnancy. They reported that of 179 women selected for an intervention, those women of low income had a statistically significant reduction of gestational weight gain compared to a historical population of 381 women serving as control. Penny and Miller (2008) referred to prenatal nutritional evaluation and assessment as essential components of the teaching plans of health care providers, citing the mounting research evidence accumulating since the 1990 IOM weight gain recommendations of the importance of prenatal diet teaching. Warren, Rance, and

Hunter (2011) recommended pregnancy as an excellent time for providers to influence the health behaviors of women, especially with regards to diet and limiting caloric intake and weight gain. Results from a study by Johnson et al. (2011) confirmed that both African American and Latino patients valued prenatal care more than was expected by providers.

Barger (2010) cited research indicating that nutritional counseling by health care providers during pregnancy could have meaningful positive outcomes. Barger stated that one third of all pregnant women reported not being told how much weight to gain during their pregnancies. As part of nutritional counseling and assessment, Barger discussed the negative consequences of high GI foods and the production of the inflammatory proteins, thrombosane and leukotrienes, proteins associated with chronic diseases such as diabetes, cancer, and heart disease. Additionally, Barger (2010) cited research indicating a possible/probable association between prenatal nutrition and phenotypic expression in the child/adult. These epigenetic associations, well documented by numerous studies involving populations that survived extended periods of starvation, are now being studied through the lens of obesity and over nutrition.

Young et al. (2010) identified strategies designed to prevent weight gain and obesity, such as educational interventions, as easier to implement and more cost effective than interventions designed to treat individuals who were already obese. Young et al. recommended targeting pregnant women for the focus of dietary interventions. Penny and Miller (2008); Siega-Riz et al. (2010); Stotland et al.(2010) ; and Tanensapf et al. (2011) addressed the behavioral changes attained during pregnancy as an opportune time for health care providers to positively impact these changes. Stotland et al. (2010) and Wilkinson et al. (2013) drew attention to a reported lack of effective tools for use by clinicians as they approached the subject

of nutritional counseling and safe weight gains within pregnant populations. Barger (2010) and Phelan et al. (2011) offered further substantiation for gestational weight gain recommendations and counseling by practitioners as having the potential to positively impact population and public health due to the influence mothers have with respect to the nutritional intake of their families. These studies suggested that practitioners ought to promote interventions that are timely and accurate and target patient ideas about healthy weight gains during pregnancy. Herring et al. (2010) identified incorrect information regarding BMI by practitioners and poor compliance from practitioners regarding the IOM guidelines as factors influencing the current state of prenatal nutritional counseling.

Phelan et al. (2011) reported the results of a randomized assessor-blind, controlled trial of 400 women that demonstrated the efficacy of practitioner intervention through education with respect to weight gain during pregnancy among normal, overweight, and obese women. Patients rated adequate nutritional knowledge and knowledge that positively affected their health as more valuable than was anticipated by interviewed providers. In a discussion of the clinical management of the obese gravida, Gunatilake and Perlow (2011) described the positive influences upon patient health that resulted from practitioner education regarding diet and nutrition.

Minority populations in pregnancy. Four of ten articles selected for information regarding minority populations contained evidence regarding GI, obesity, and prenatal education. All minority populations, and populations of non-Hispanic Black women especially, were disproportionately affected by obesity (Berggren, Boggess, Funk, & Stuebe, 2012; Brawarsky, et al., 2005; Gennaro, 2005; Healy, et al., 2006; Rhoads-Baeza & Reis, 2012). Although Ahmed,

Alam, Sayeed, Pressman and Powers (2006) described barriers that limited access of the poor to health services in third world nations, the identified barriers; transportation, money, and education were also identified as contributing to the lack of access to health care services experienced by socioeconomically disadvantaged individuals in the United States (RWJF, 2013). Madan, et al. (2006) described additional sociocultural factors contributing to obesity and pregnancy outcomes among immigrant populations in the United States.

Biological studies addressing minority populations included that of Scholl et al. (2004) which computed the GI from three 24 hour recall interviews occurring during the course of pregnancy. Blood samples obtained at 24-28 weeks determined that the glycemic index was related to maternal Hgb A1c and plasma glucose. Results showed that the type of carbohydrate (CHO) in the diet of urban, low income women influenced fetal growth and infant birth weight. Gennaro (2005) noted that health disparities continued in the United States despite improvements in overall prenatal health present in the 21th century. Gennaro also stated that there has been a widening disparity between outcomes for both Black infants and women compared to White women with respect to mortality and morbidity. Non-Hispanic Black women were noted to have the highest incidences of all types of obesity (Barger, 2010; Brawarsky, 2005; Curley, (n.d.); Gennaro 2005; Gunatilake et al. 2011; Gould et al. 2003; Healy et al. 2006; Iams et al. 2008; Marsh et al. 2008; Rhoads-Baeza et al. 2012; Scholl et al. 2004; Thornton et al. 2006; Tovar et al. 2009; Young et al. 2010). Gennaro further noted a death rate among Black women that was 3 to 4 times higher than that of White women. However, among Hispanic populations residing in the United States, Mexican American infants experienced better outcomes than did Puerto Rican infants and infants of other Hispanic subgroups.

Gennaro (2005), Gould et al. (2003), and Rhoades-Baez et al. (2012) discussed the need for research on culturally competent health care as well as new systems of health care delivery that promoted healthy pregnancies while being sensitive to the needs of specific communities of disproportionately affected women. Ogunyemi, Hallet, Leeper, and Risk (1998) provided historical data to the current discussion and described the influence of body mass index on outcomes within a rural black population. Walker, Hoke, and Brown (2009) reported that the prevalence of excessive gestational weight gain among Hispanic women was 35.7 %. Tovar et al. (2009) noted that by 2009 Hispanic women were projected to have the highest birth rate for any minority. Tovar et al. emphasized the importance of incorporating appropriate dietary advice into preventive intervention programs like prenatal education. Rhoads-Baeza et al. (2012) asserted that due to Hispanic women's elevated risk for gestational diabetes mellitus (GDM), it was important to stress dietary changes in culturally relevant straightforward messages. Base-Smith and Campinha-Bacote (2003) described obesity in terms of a sub-culture within the broader African American culture recognizing that in many communities obesity has come to be a culturally accepted phenomenon irrespective of current and future health consequences.

Summary of Historical Evidence and Literature Review

In summary, there exists a preponderance of evidence linking excessive weight gain in pregnancy with multiple complications and diseases of both mothers and infants, particularly among people of color. Studies indicated that these weight gains may be partially attributable to the GI of foods. This evidence also clearly showed that a relationship between minority race and ethnicity was a risk factor for obesity in the United States, and therefore, a risk factor for those aforementioned diseases. Providers may have previously discounted patients desire to learn

about nutrition, but there has existed evidence that women want to learn about ways to have healthy pregnancies irrespective of socioeconomic status. Culturally sensitive prenatal education specific to GI, obesity, gestational weight gains, and nutritional advice could be used to intervene and promote healthy pregnancy outcomes.

Project Plan and Evaluation

Market/ Risk Analysis

Data from the March of Dimes, Georgia PRAMS project, and the Guttmacher Institute were reviewed as part of the market analysis. The market risk analysis for this capstone project was based upon the perceived need for a first trimester prenatal clinic that included intensive nutritional counseling in GSHCG, a nonprofit, faith based patient medical care home (PMCH) in Gwinnett County, Georgia. After a review of the historical background of the problem and a review of the literature, the market risk analysis for the project included a SWOT analysis (Table 1) listing the strengths, weaknesses, opportunities, and threats present within the proposal. A logic model for the project listing outcomes is presented in Appendix B and presented as the conceptual diagram in Appendix C. The project aimed to use the principles of effective marketing described by Freshman, Rubino, and Chassiakos (2010) to identify and meet the learning needs of the patients and the community as it built upon the relationships within the community already fostered by GSHCG. The project's market analysis included assessing the community's capacity for health. "Health is not an individual process, rather a patient's 'relational community' significantly impacts treatment plans, eating habits, and material resources" (Reed & Shearer, 2011, p. 124).

Strengths, weaknesses, opportunities, and threats. Strengths for the project included some of the following, (a) patient and family need for nutrition education, (b) a low cost, low risk program of intervention, and (c) user friendly tools such as the GI food list (Appendix D) and 24 hour diet recall (Appendix E). Tied to these strengths were opportunities for community recognition, improved community health, a platform serving as a stepping stone for larger projects with the potential to generate grants for future research, and a clinical service platform for multiple university health science students (SWOT Analysis Table 1).

Identified weaknesses included the four month time frame originally allocated for the project and the need for an expedited IRB procedure since this was an educational intervention for a vulnerable population. However, it was believed the principles of autonomy, justice, and beneficence, respected by the study design, would hasten the IRB process. The subjects available for sample size and statistical significance were an unknown quantity, and there was a perceived lack of awareness of the extent of the problem within the community at large and within the proposed sample. Additional threats to the project included the WIC food program, popular media saturation touting high glycemic index foods, access to fast foods, the locus of control for the advertising and manufacturing of these foods, and the characteristics inherent in the foods themselves. These characteristics included price, convenience, availability, and addictive properties (Ziol-Guest & Hernandez, 2010). Another identified threat to this project was the strength of branding by the food manufacturers (Fortenberry, 2010). Kraft Foods, Inc. the largest US food company and the maker of Oscar Meyers, Jell-O, and Post cereals, and the Nabisco Holdings Corporation, makers of Oreos, Ritz, and Snackwells, were each parented by separate major tobacco corporations, (Mollenkamp, Levy, Menn, & Rothfelder, 1997) expert at

producing and marketing highly addictive commodities (Drug war facts.org. n.d.).

However, as previously noted, a report by Johnson et al. (2011) found that patients rated the quality of education higher than did the providers of that education. Patients value education and educational interventions when they believe these interventions and educational strategies will benefit their families. It was imperative for this capstone project to provide high quality teaching by utilizing nonthreatening user friendly literature like the Glycemic Index 100 Food List and the 24 Diet Recall while considering the cultural implications of working with minority and immigrant populations.

The market analysis included examining the costs for not having an intervention. These were difficult to quantify. One 2005 estimate reported the annual United States cost of obesity at 190 billion (United States Chamber of Commerce, 2013). The Guttmacher Institute (2002) in a report based upon a two year retrospective study conducted at California hospitals stated that undocumented immigrants who did not receive prenatal care experienced four times the incidence of preterm birth. This report further estimated the dollar costs by stating that for each dollar cut from the budget to pay for prenatal care, $3.33 more was spent providing care for these infants. According to The March of Dimes (2011), obesity increased the rates of medical complications such as hypertension and diabetes, both of which are associated with increased preterm births and estimated the cost of prematurity for one preterm infant was more than ten times the cost for a term infant. The estimated socioeconomic cost of prematurity was 26.2 billion annually in 2011 (March of Dimes).

There were no identified risks or subsequently identified unintended negative consequences to the study participants, the organization providing the sample, or the community.

Sustainability was identified as being contingent upon the ability of the organization to obtain further grant monies to provide prenatal care that included the dietary intervention and upon obtaining the interest and cooperation of nurse practitioner and physician assistant students completing clinical hours at GSHCG.

Driving and restraining forces. Cork (2005) citing Lewin's Change Theory posited that it is easier to remove restraining forces than it is to create driving forces. Cork also noted that patient benefit could be a major driving force. Considering these elements of change theory, an individual patient's desire to have healthy a healthy pregnancy was a major driving force for this intervention. The growing debate and understanding of the health risks of obesity examined in the IOM 2009 guidelines and Healthy People 2020 also contributed to the capstone project's identified major driving forces. Restraining forces for the capstone project included the short time frame allotted for the study, budgetary considerations as the monies for the initial grant were used, a lack of community interest evidenced by the small number of clients who accessed the prenatal care provided, and the lack of community knowledge about glycemic index.

Stakeholders and Project Team

The project's team included the DNP-c candidate, the capstone chair, the candidate's mentor, leadership at GSHCG, the center's volunteers and paid personnel. These individuals were also included among the stakeholders. Stakeholders included the patients, the community at large, the medical establishments within the community, and students from various universities and schools.

Stakeholders included the pharmacy and food industries and their subsidiaries whose profit margins have been directly tied to the production, distribution, sales and overconsumption

of food (Lubin & Sprung, 2012). These included the agriculture industry, the processed food industry, the sugar industry and the pharmaceutical industry. Other market stakeholders included the plethora of wellness industries that have arisen around the fitness and obesity epidemic including healthcare businesses and industries tied to profits directly attributed to treating obese individuals. Some examples of these included bariatric centers and weight loss clinics (Lubin & Sprung, 2012; Peretti, 2013).

With two thirds of the adult U.S. population affected and one in three children either overweight or obese, the rising costs of medical care related to the diseases of obesity affects the entire United States economy. Therefore, we are all stakeholders. Overweight and obesity problems have been associated with 10 percent of medical expenses at $147 billion per year in direct medical costs (Reinberg, 2013). According to Frieden (2009), obese people spent almost $1500 more on health care than normal weight people per year. Obesity also caused disability and early death. Obesity and diabetes were the only major health problems getting worse in this country. At the time of this writing, the average American was 23 pounds overweight. In 2009, Medicare expenditures for a normal weight person were $4700 and $6400 for the obese individual. Prescription drugs represented the biggest expenditure in this analysis. “The clear link between rising rates of obesity and increasing medical costs is alarming, but not unexpected" (Jung, 2009, para. 2, “The costs of obesity”). "Obesity is the driver of so many chronic conditions - heart disease, diabetes, cancer -- that generate the exorbitant costs that are crushing our health-care system" (Jung, 2009, para. 3, “The costs of obesity”). “The only way to show real savings in health expenditures in the future is through efforts to reduce the prevalence of obesity and related health conditions" (Reinberg, 2013). Added to the costs of obesity to adults

and children was epigenetic information regarding the impact of unhealthy maternal weight and weight gain upon fetuses (Kral, et al., 2006).

Cost Benefit Analysis

All resources for this project were provided by the DNP student, with the exception of the generous use of the GSHCG facility itself, the use of its personnel, and computer scheduling system. There were no added costs for utilities or rent of the space. GSHCG received a $60,000 donation to provide prenatal care. Some of these monies were used to advertise the prenatal clinic and cover clerical costs and administrative costs. The identified costs for the project and an estimated cost analysis for project replication are included as Table 2. Patient literature for the project included the consent form (Appendix H), the 24 hour dietary recall form (Appendix E), the Glycemic Index 100 food list (Appendix D) and the IOM Weight Gain Chart (Appendix F). It was anticipated that, upon completion, and with publication, the study would generate interest within the community of universities and technical colleges that provided volunteer hours for the GSHCG and that relied upon the GSHCG for clinical hours. This generated interest, coupled with the IOM recommendations and the goals of HP2020 regarding weight gain during pregnancy, had the potential to sustain the project indefinitely after the completion of the DNP capstone project. It was the intention of the project manager, the DNP-c, to write the project to facilitate this sustainability. Individuals wishing to replicate the study would be referred to several organizations offering grant funding for research concerning the prevention and treatment of obesity. These organizations included the National Institute of Health (National Institutes of Health, 2013), the Aetna Foundation (Aetna Foundation, 2013) and the Robert Woods Johnson Foundation (RJWF, 2013). Future research will be encouraged to continually

consider the significance of educational interventions to target the relationship between obesity and the increased medical complications associated with maternal obesity that contribute to preterm birth. The budget cost analysis is presented as Appendix J.

Project Mission, Vision, and Goals

The over-arching mission of the project was to provide comprehensive nutritional counseling for patients during the first trimester of pregnancy using glycemic index as a weight management tool and to add to the scare body of literature regarding the benefits of intense nutritional counseling to overall prenatal health and potentially individual, family, and community health. Its vision was to improve the prenatal health of a selected sample of pregnant women by evaluating their current eating habits and fostering change in those eating habits where indicated and practical. Its goals were to address the IOM's suggested prenatal weight gain guidelines by incorporating teaching about GI within routine prenatal care, to create a sustainable project for the multidisciplinary health care students receiving clinical education at GSHCG, and ultimately improve the health of the community surrounding GSHCG.

Process Outcomes and Objectives

- Develop a prenatal teaching plan specifically addressing IOM guidelines from 2009 that included targeting dietary teaching with respect to moderate and high glycemic index (GI) foods and used educational interventions established by The American College of Midwives and the American Diabetic Association.
- Describe how this plan may positively affect the outcomes of the selected patient population due to the plan's potential to reduce excessive weight gain during pregnancy.
- Implement the teaching plan with selected patients.

- Compare outcomes at return visit between Week 4 and Week 8 after the initial study intervention.
- Create a sustainable project useful to future health science students.

Logic model. A Logic Model (Appendix B) provided direction and focus for the project by synthesizing the projects core objective: develop and implement prenatal dietary counseling targeting a reduction in moderate and high GI foods. Inputs; various personnel involved in the project, and outputs; the dietary intervention, planning, and follow up interventions, and activities, PICO refinement, location of the tools (educational literature used), theoretical framework selection, and selection of literature were identified. Constraints; the IRB approval, time frame, characteristics of the population, community interest, and the sample size were addressed. Short and long term outcomes were proposed for evaluation of the project along with the potential impact the project may have on subjects and the community at large.

Conceptual diagram. The conceptual model (Appendix C) provides graphic representation of the project's process outcomes and objectives and rephrases the intervention to further clarify the projects intent; to discover a health care need and formulate a plan to address that need as part of a DNP capstone project, by examining the problems of excessive weight gain in pregnancy within the larger issue of the generalized obesity epidemic. It functioned to inform the study's design by depicting both short and long term goals as dependent upon the resources available to the project and DNP candidate. By so doing it contributed to the overall goal of developing a

realistic project based upon relevant research and given the resources at hand. It depicts updated short and long term outcomes of the project.

The project's objectives were met with the exception of follow up community forums regarding the project. As of this writing, the GSHCG was involved in procuring a larger facility. The current facility and physical plant cannot accommodate a large group of individuals. Once that facility is secured, stakeholders will be notified and a community forum will be scheduled to discuss the results of the intervention.

Methodology

Population and sampling parameters. When the study was originally developed and presented to the Regis IRB, a power analysis for a t-test comparison showed that a sample of 30 was needed for reliable statistical comparison. No reliable estimate of population availability was identifiable prior to initiation of the study. The executive director of the GSHCG, the facility, anticipated a large response from the patient population from which a sample could be drawn. However, the population response was small, with fewer than 7 patients at the targeted midpoint for sample recruitment. Therefore, the study had to be amended and a pilot study was proposed. In the amended IRB application, it was anticipated that at least 15 patients would be available for the intervention group. This was a single group comparison at initiation of intervention with one follow up visit occurring 4 to 8 weeks from the original intervention.

Recruitment and retention of sample. All patients presenting to GSHCG with a diagnosis of pregnancy and able to read and write English were offered a free prenatal visit to include a diet review with dietary modifications that discussed a reduction of moderate and high GI foods. Patients who agreed to participate signed the consent form and then received the teaching

intervention. Only normal weight, over-weight, and obese patients within the first trimester of pregnancy received the intervention recommendations to reduce the intake of moderate and high glycemic index foods (Siega-Riz, Deierlein, & Stube, 2010). Patients with a BMI indicating they were underweight were not included in the study. These patients received nutritional counseling specific for their health needs as mandated by the principles of justice and beneficence according to the protection of human subjects. Since the study involved human subjects, specifically pregnant women, an identified vulnerable population, a Citi Training Certificate (Appendix L) and Protection of Human Rights certificate were completed prior to start of the study. After the initial screening, subjects were scheduled to return 4 to 8 weeks after the initial intervention for follow up teaching and to evaluate weight and BMI. Although statistical analysis was limited to evaluation of weight and BMI, additional demographic information was obtained at the initial visit and included age, ethnicity or race, gravity, and parity. Twenty nine subjects were enrolled in the study between March 2014 and October 2014. Seventeen completed the intervention and were retained in the study.

Project setting. Subject's weight and height were obtained in the intake room at GSHCG. Subjects were escorted per center protocol to an examination room for a prenatal visit provided by the student investigator, a board certified and licensed CNM. The CNM provided information about the study and obtained consent.

Obtaining a control group. Since the population of GSHCG was unable to provide a large enough sample for both an intervention and control group within the time frame of the study, another source for subjects available for comparison was sought. A reduced fee clinic with a demographically similar population was identified. The study's objectives and assurance

of adherence to all HIPAA regulations were provided to the clinic owner, an advanced practice nurse. Permission was obtained to perform a chart review. All prenatal charts from one week were reviewed by the DNP candidate. Only those charts recording at least one clinic visit before 12 weeks gestation were included in the control group. As with the sample group, statistical analysis was limited to evaluation of weight and BMI. However, additional demographic information was obtained and included age, ethnicity or race, gravity, and parity. These data were not compared in the statistical analysis.

Data collection and treatment procedure and protocol. Intervention group subjects were weighed and measured for height at intake. BMI was calculated using a standard height weight chart (Appendix G). Subjects received an explanation of the study and potential benefit of free prenatal office visits through the first trimester as well as a follow up visit 4 to 8 weeks after the initial intervention should that visit occur outside the parameter of the first trimester. After subjects signed the consent, routine first trimester prenatal teaching was provided. In addition a 24 hour diet recall (Appendix E) was obtained for each subject. The investigator reviewed the diet recall with the subject identifying foods from the Glycemic Index 100 food lists. Subjects and the investigator identified consumed foods with a GI greater than 55 and looked for substitutions with a lower GI. For example, white rice was a dietary staple for 29 of 29 patients sampled. On the GI food list, white rice has a GI of 89 whereas brown rice has a GI of 50 and Uncle Ben's converted white rice has a GI of 38. The identified benefits of low GI foods and reduced consumption of high GI foods as relating to IOM weight gain guidelines were reviewed with each subject. Subjects were provided the food list and encouraged to review it at home and make substitutions for lower GI foods at their discretion. When subjects returned for

their follow up visit 4 to 8 weeks after the intervention, subject's weight and BMI were calculated. The GI 100 food list was reviewed with each subject. The study opened March 1, 2014 and closed October 30, 2014. The time frame is included as Appendix I. The initial IRB approval letter (Appendix I), and the amended IRB approval letter (Appendix J) are included along with letters of approval from GSHCG (Appendix M), and Clinica Medica (Appendix N).

Instrumentation reliability and validity and intended statistics. The evidence based study design's original intent was to use a nonprobability convenience sample of up to 500 patients presenting for prenatal care at GSHCG during the study time frame. It was originally anticipated that at least 30 patients would be available for the study population. This was to be a single group comparison at initiation of intervention and at 4 to 8 week intervals thereafter. However, as previously stated, the population for recruitment of the intervention group and the control group from GSHCG was smaller than anticipated. Statistical methodology was a two sample t-test for each group, sample and control, comparing weight and BMI at intake and return visit.

Details of instrumentation and findings. Statistical analysis of the intervention and control group used a t-test comparison and tested the hypothesis: *In pregnant women whose gestation is less than 14 weeks, prenatal teaching that includes a dietary teaching plan specifically addressing a reduction in foods with a moderate to high glycemic index, compared to women from a general data base from the pregnant population of Georgia who did not receive prenatal teaching prior to 14 weeks specifically addressing a reduction in glycemic index foods, will not have stable or improved BMI's and stable or improved MUAC test results between weeks 4 and 8 after the initial intervention.* T-test comparisons of both groups were performed.

Results failed to reject the null hypothesis. Twenty-nine subjects enrolled in the intervention. Seventeen participants who completed the study experienced no statistical change in weight or BMI. The mean weight gain for the intervention group was 0.38 pounds (Table 2). The total change in BMI for the intervention group was 0.05 percentage points (Table 2). The control group of 47 subjects experienced a mean weight gain of 0.89 pounds, significant to a p value of 0.055 and a total BMI change for 47 combined subjects of 0.147 percentage points, significant to a p value of 0.051 (Table 3). For those data obtained, subjects in the intervention group had a smaller mean gain (0.38 pounds) than the control group (0.89 pounds). A randomly selected sample (17) from the control group of 47 chosen to match the intervention sample size revealed a mean weight change of 1.0 pounds between the two intervals measured and a 0.188 % change in BMI between the two intervals measured (Table 4). Table 5 presents a comparison of means for the control group and sample taken from within the control group. The percent change in BMI for the intervention group was smaller (0.05) than the control group (0.147). There was no statistically significant weight change or BMI change pre and post intervention within the intervention group sample. SPSS generated statistical tables showing paired sample statistics, paired sample correlations, and the paired samples test for all three groups.

Project Findings and Objective Results

- Adding to the scarce body of literature regarding the benefits of intense nutritional counseling to overall prenatal and subsequently individual, community, and family health.

The DNP capstone project provided evidenced based findings to support the benefits of intense nutritional counseling regarding reduction of the intake of moderate and high GI foods during

pregnancy. Statistical evaluation of the results of the t test failed to reject the null hypothesis tested.

- Providing one hour of nutritional counseling for prenatal patients including 24 diet review/recall, evaluation of diet for GI, and teaching specific to reduction of GI.

All 29 subjects within the intervention group received a review of their diet for the 24 hours preceding the first visit and an evaluation of that diet with respect to moderate and high GI foods. Subjects were provided a list of the Glycemic Index of 100 foods with GI values. Subjects were encouraged to make substitutions within their diets choosing lower GI foods.

- Providing one follow-up prenatal visits per study subject.

Seventeen subjects returned for a follow up visit 4 to 8 weeks after the initial educational intervention. Weight and BMI were obtained and GI index tool and foods reviewed.

- Reducing weight gain during the time interval observed when comparing the study population to a demographically similar control group.

Mean weight gain for the intervention group was 0.38 pounds. Mean weight gain for the control group was 0.89 pounds. 2009 IOM stated average weight gains for the first trimester of pregnancy were between 1 and 5 pounds. Both intervention and control groups maintained weight gains below IOM recommendations.

- Inferring a potential in improvement of overall prenatal health by reducing weight gain during the study period when compared to a demographically similar control group.

Since 11 of the subjects in the intervention group had BMI's corresponding to overweight or obese categories at the beginning of the study and 6 had BMI's categorized as normal weight (Table VI), a reduction in first trimester weight gain below average may potentially reduce the

overall weight gain the subjects experienced during the remainder of their pregnancy. A reduced weight gain in this sample may be associated with decreased weight gain for the fetus and with reduced post partum weight retention. According to the evidenced based PICO question, the intervention group showed a smaller change in mean weight gain and mean BMI than did the control group. The intervention group experienced no significant change in mean weight or mean BMI during the study. The control group experienced a change in both weight and BMI approaching a p value of 0.05.

- Evaluating the use of MUAC as an estimate of BMI.

The MUAC arm of the study was discontinued once evaluation of a comparison between standard height/weight BMI calculations and use of MUAC were found not to correlate within this sample group.

Limitations, Recommendations, and Implications for Change

Study Limitations

Identified limiting factors included (a) time frame for recruiting sample, (b) recruitment and retention of sample group, (c) availability of control group, and (d) small study size.

Time frame. As the study was originally conceived, subjects had to be return for subsequent visits at 4 and 8 weeks after the initial intervention. This schedule mimicked traditional prenatal care visits recommended by the American Congress of Obstetricians and Gynecologists (2013). This also required that at least 30 subjects be admitted to the study within the first 60 days in order for the study to be completed within 4 months, the originally allotted time frame. Though the clinic director anticipated a large influx of patients requesting free prenatal care, that population did not materialize. The project required a revised IRB review in

September 2014 due to the arisen need for another control population and the small number of subjects completing the intervention, thus adding to the length of time required to complete the intervention.

Recruitment and retention. It was expected that when GSHCG began to offer free first trimester, prenatal care to patients within its geographic range and patient population, a large patient population from which to draw both intervention and control groups would be available. The service was advertised on the GSHCG home page and area resource centers were contacted by the center's executive director, Gregory Lang, PhD via email making these centers aware of the service. However, when patients began to telephone the clinic to schedule appointments, front desk personnel screened them for eligibility based upon patient statement of estimated due date and gestational age. This served as an unexpected threat. At GSHCG, front desk personnel did not have the medical training necessary to evaluate the gestational age of patients requesting appointments. Approximately 5 weeks into recruitment for the study, this threat was identified and removed. Subsequent patients calling for prenatal care were given an appointment. When patients arrived, the principle investigator evaluated the gestational age. If the patient was less than 14 weeks pregnant and English language requirements were met, the patient was offered enrollment in the study. Twenty-nine out of 51 patients presenting for prenatal care during the study time frame enrolled in the study. However, the threat of unqualified staff screening patients for a first visit reappeared in September 2014 when it was again noted, new personnel were screening patients based upon patient's statements of expected gestational age.

Loss of retention of recruited subjects occurred after the first visit when Medicaid-eligible patients were not allowed to return to GSHCG for follow up appointments. Front office

personnel independently made the decision to withhold follow-up visits by patients once those patients obtained Medicaid. This represented a previously unidentified social and economic threat to the project. The inability to follow up resulted from front office personnel who did not schedule follow-up appointments, even though the care provided was free, and therefore not incurring any billable charges. Resistance on the part of front office personnel to the principle investigator's provision of free prenatal care became an actual threat to patient recruitment. Since GSHCG is a reduced fee-for-service, faith-based clinic operating as a non-profit, non-governmental organization, staff believed that seeing Medicaid patients under any auspice might endanger the status of the non-profit, non-governmental organization. Once this threat was uncovered, the principle investigator attempted to contact the subjects lost to follow up due to Medicaid enrollment by telephone. Of those 12 patients lost to follow-up, eight had contact information that was not current at time of follow-up. This may also have been a manifestation of unidentified social and economic threats as patients were no longer available for follow-up. Four stated they would return for a visit to discuss the intervention. Of these four, two returned. One of those stated she had decided to terminate the pregnancy. The time for subject recruitment was then extended from June 30, 2014 until October 1, 2014 with the expectation that at least 15 subjects would be available for a sample size and in order to identify a control population.

Obtaining a control group. The second major challenge facing the study involved obtaining a control group. At the outset of the study, and prior to opening the prenatal clinic, both the executive director and the principle investigator expected a large patient response. The expectation was to draw both sample and control from the data base at GSHCG. The primary investigator maintained an office presence at GSHCG for approximately 1.5 clinic days per week

from mid-February until June 30, 2014 with the exception of one two week period in May, 2014. From August 2014 until October 2014, the primary investigator maintained an office presence of 0.5 clinic days. During 2103, GSHCG provided 12,000 reduced fee visits to Gwinnett County (GSHCG, 2014). No exact data were available with respect to numbers of patient presenting for care who were pregnant, however, the office manager estimated that at least five patients per week presented for pregnancy testing (personal communication K. Herrera, January 2014). When a sufficient number to provide a control population from GSHCG was not forthcoming during the time frame of the study, the principle investigator petitioned the IRB at Regis University for an amended proposal. A search for a second patient population within the community suitable for a control group was undertaken. This patient population was eventually identified and the director of the clinic serving that group was contacted. Once the amended proposal was approved, data from the control group was obtained via chart review.

Small sample size. Finally, the small sample size available for analysis remained a limiting factor for evaluation of the educational intervention using the GI tool. Additional limitations were related to variables currently unquantifiable and unknowable from the statistical data obtained. A more in depth analysis of both populations, sample and control, may reveal similarities and differences in age, ethnicity, gravida and parity and socioeconomic status that could offer additional understanding and explain the weight gain and BMI variances observed. Furthermore, the total weight and BMI changes experienced by the patient population control group were well within the recommended IOM first trimester weight gain of 1 to 5 pounds. The prenatal teaching for the control group was provided by the center's on-site CNM. Certified

Nurse Midwives have historically provided evidenced based prenatal care with good outcomes (ACNM, 2009).

Recommendations and Summary

The historical evidence and the systematic review of the literature indicated that a multifaceted approach to weight management during pregnancy may have a positive effect on reduced weight gain and BMI. Inferring from these reviews, the principle investigator posited that a dietary educational intervention for the capstone project may show evidence that inclusion of GI as a tool for diet counseling may have a positive effect on reduced weight gain and BMI profiles for a sample selected from a pregnant population comprised of socio-economically challenged individuals during the first trimester of pregnancy. Evidence from the literature supported prenatal teaching designed to reduce weight gain during pregnancy as a means to improve the overall health of mother and child by reducing the burden of obesity upon the mother, child, family unit, and community. Statistical examination of the findings which fail to reject the null hypothesis may indicate this educational intervention may have reduced the burden of obesity upon this small study group. A study of greater duration may capture additional data regarding the usefulness of the GI tool with weight management during pregnancy. Further studies may indicate the usefulness of GI as a tool for weight management within pregnant and non-pregnant patients and across all socioeconomic groups. Using MUAC, while not useful with this sample within this population, bears further examination. It may prove a useful measurement in patients with a BMI greater than 30.

The intervention strategy presented could be combined with other weight management strategies that include intervention strategies such as distributing weight control literature,

providing mobile media content, and establishing group nutrition and activity classes. As one example, local video production classes at the technical college and high school could be recruited to produce clips for viewing within the patient waiting areas. Developing these tools is congruent with the theories of Vygotsky, Roy, and Leininger.

The educational intervention fit within the mission and values of GSHCG regarding its goals as a PMCH to help its population embrace health and reduce the burden of illness upon the local health care system. GSHCG is growing and will be moving to a new facility with space to accommodate additional programs. As a pilot intervention, the DNP capstone project has the potential to provide a model for other health and community projects within the GSHCG umbrella. These other projects might potentially provide additional clinical experiences for the health science students who need clinical experience opportunities or who seek research projects. GSHCG leadership considers educating health professionals, including advanced practice nurses, among its missions.

Conclusion

According to Zacaggnini and White (2011), the DNP project "fixes a gap in the system given the available research" (p. 456). This DNP project examined the epidemiological evidence surrounding the obesity health crisis and identified a gap in prenatal nutritional education. It sought to remedy that gap with an evidenced based project using GI as a teaching intervention by reviewing the preponderance of evidence linking excessive weight gain in pregnancy to multiple complications for mother and child, by developing an educational intervention, and by implementing that intervention using GI. The intervention used culturally appropriate concepts regarding family and food. The project added to the body of nursing literature and nursing theory

surrounding glycemic index, obesity, pregnancy, and underserved populations, a key outcome required by Regis University "to strengthen a commitment to social justice and community service" (Regis University, 2015). The project was not only designed to improve the health of patients but also to create a sustainable project for future health care projects. In March 2015, physician assistant students engaged in clinical activities at GSHCG approached the DNP candidate requesting information about the prenatal clinic established at GSHCG by the DNP as part of their capstone research. GI is now included as part of routine prenatal teaching via interpreters for all prenatal patients irrespective of English speaking ability. Non English speaking patients are referred to the internet for descriptions of GI. An additional grant has been obtained to provide free prenatal care for the remainder of the 2015 fiscal year. It is hoped future monies will be procured to sustain the provision of free first trimester prenatal care that incorporates information about GI.

The causes of increased population obesity and its comorbidities of metabolic syndrome, type II diabetes and cardiovascular disease are multifactorial and include environmental, behavioral, genetic, and sociocultural factors (Gunatilake & Perlow, 2011). As previously stated, the scope of this project contained broad positive health applications for mothers and families. Healthy People 2020 identified core measures directly related to dietary modification within each population in the United States (HP2020, 2013). Not the least among these recommendations was the recognition that pregnancy was a time when women are likely to change lifetime eating habits for the health of their babies, and in so doing improve the health of their families (Warren, Rance, & Hunter, 2012). It was the intention of this project to capitalize upon early pregnancy with this dietary educational intervention and to positively impact the

health of this selected population within its community by designing a capstone project specifically addressing the validity of the intervention. Since there was evidence that even modest reductions in weight have had positive consequences for individuals who are overweight and obese, it was believed that implementation of the intervention might improve the overall health of the patients who received the information (CDC, 2011). The cultural and theoretical operatives of Roy, Leininger, and Vgotsky suggested that patients will incorporate the information they receive from nurse practitioners and providers and transform that information into action if they believe that information will positively benefit their fetuses and children. It is hoped that through the increased awareness of the benefits of healthy eating specifically regarding GI, patients at GSHCG will have healthier pregnancies. Embedded within health care must be attention to healthy living (CDC, 2011). As long as clinicians fail to address the problem of obesity with a multifaceted approach, the problem of obesity and the status quo get worse and the outcomes of population obesity get worse. As early as 2003, PRAMS indicated that the mean gestational weight gain among obese women exceeded the 15 pound recommendation by the 1990 IOM (CDC, 2014). The 2009 IOM healthy weight gains represented an even stricter reduction in acceptable weight gain to promote healthy pregnancies. Gennaro (2005) stated a need for the development of prevention and treatment modalities that improved the pregnancy outcomes for all women, including improved education and lifestyle changes. Fortunately, there is new evidence suggesting that childhood obesity numbers declined between 2008 and 2011 in 19 of 43 states studied (CDC, 2013). This is a positive finding. It is hoped this capstone project can be used to build upon this positive trend, furthering the goals of

Healthy People 2020 as they pertain to diet and weight management for all the individuals residing within the United States irrespective of legal or socioeconomic status.

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Young, B., Levine, R., & Karumanchi, S., (2010). Pathogenesis of preeclampsia. *Annual Review of Pathology: Mechanisms of Disease.* 173-192. doi: 10.1146/annurev-pathol-121808-102149

Zhang, J., Landy, H., Branch, D., Burkman, R., Haberman, S., Gregory, K., . . .Reddy, U. for the Consortium on Safe Labor. (2010). Contemporary patterns of spontaneous labor with normal neonatal outcomes. *Obstetrics & Gynecology, 116,* (6), 1281-1287. doi: 10.1097/AOG.06013e3181fdef6e

Ziol-Guest K., & Hernandez, D. (2010). First- and second-trimester WIC participation is associated with lower rates of breastfeeding and early introduction of cow's milk during infancy. *Journal of the American Dietetic Association,* 5, 702-9. doi: 10.1016/j.jada.2010.02.013

List of Tables

Table 1

SWOT Analysis
Strengths – Patient and family need for nutrition education – Values driven leadership of Dr. Lang and Dr. Kludt – Identified need within ACNM and ACOG to improve prenatal nutrition education – Continuation of project provides multidisciplinary community health teaching opportunity for area students /adds value to patients – Low cost/low risk intervention – IOM tables and 100 item glycemic index of foods provide evidenced based user friendly tools for project continuation
Opportunities – Community recognition – Improved community health – Stepping stone for larger projects – Clinical site for multiple university health science students – Glycemic index tool transferrable to all patients requiring nutritional counseling at GSHCG
Weaknesses – Time frame/attrition – Required full IRB approval for vulnerable population study – Subjects available for recruitment/sample size/statistical significance – Awareness of problem within study population – Awareness of problem within general community and at large community
Threats – WIC food program – Lack of awareness/concern in community – Popular media saturation of high glycemic foodstuffs – Locus of control of advertising market – Characteristics of processed foods/price/convenience/availability/addictive properties – Loss of subjects due to Medicaid enrollment

Table 2.
Intervention Group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VAR00006	150.8235	17	27.50962	6.67206
	VAR00008	151.2059	17	27.51537	6.67346
Pair 2	VAR00007	27.4235	17	4.26564	1.03457
	VAR00009	27.4765	17	4.13560	1.00303

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	VAR00006 & VAR00008	17	.993	.000
Pair 2	VAR00007 & VAR00009	17	.991	.000

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	VAR00006 - VAR00008	-.38235	3.21874	.78066	-2.03728	1.27257
Pair 2	VAR00007 - VAR00009	-.05294	.58536	.14197	-.35391	.24802

Seventeen participants who completed the study experienced no statistically significant change in weight or BMI. The mean weight gain for the intervention group was 0.38 pounds (Table 1).

The total change in BMI for the intervention group was 0.05 percentage points (Table 1).

Variable 6 is weight at initial visit and 8 is weight at the subsequent visit 4 to 8 weeks later.

Variable 7 is BMI at initial visit and 9 is BMI at subsequent visit 4 to 8 weeks later.

When we perform the t-Test for weight and BMI in the intervention group, we see that the P value is point .631 and very large, greater than 0.05. Since the p value is very large it indicates weak evidence for the null hypothesis so I fail to reject the null.

Weight gain of the experimental group was not significant.

Table 3.
Control Group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VAR00006	148.4255	47	29.06196	4.23912
	VAR00008	149.2979	47	28.69625	4.18578
Pair 2	VAR00007	27.5652	46	4.98857	.73553
	VAR00009	27.7130	46	4.86628	.71749

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	VAR00006 & VAR00008	47	.995	.000
Pair 2	VAR00007 & VAR00009	46	.995	.000

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	VAR00006 - VAR00008	-.87234	3.04043	.44349	-1.76504	.02036
Pair 2	VAR00007 - VAR00009	-.14783	.49966	.07367	-.29621	.00056

	Paired Differences		
	t	df	Sig.(2-tailed)
Pair 1 VAR00006 - VAR00008	-1.967	46	.055
Pair 2 VAR00007 - VAR00009	-2.007	45	.051

The control group of 47 subjects experienced a mean weight gain of 0.87 pounds, significant to a p value of 0.055 and a total BMI change for 47 combined subjects of 0.147 percentage points, significant to a p value of 0.051 (Table 2).

Table 4
Randomly Chosen Sample from Control Group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VAR00006	149.2941	17	30.10142	7.30067
	VAR00008	150.2941	17	29.76106	7.21812
Pair 2	VAR00007	27.8706	17	5.46509	1.32548
	VAR00009	28.0588	17	5.37146	1.30277

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	VAR00006 & VAR00008	17	.998	.000
Pair 2	VAR00007 & VAR00009	17	.998	.000

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	VAR00006 - VAR00008	-1.00000	2.00000	.48507	-2.02831	.02831
Pair 2	VAR00007 - VAR00009	-.18824	.37895	.09191	-.38307	.00660

	Paired Differences		
	t	df	Sig.(2-tailed)
Pair 1 VAR00006 - VAR00008	-2.062	16	.056
Pair 2 VAR00007 - VAR00009	-2.048	16	.057

A randomly selected sample (17) from the control group of 47 chosen to match the intervention sample size revealed a mean weight change of 1.0 pounds between the two intervals measured and a 0.188 % change in BMI between the two intervals measured.

Table 5
Comparison of Means

Mean	Control Group Total 47	Random Sample 17
Variable 6	149.29	148.42
Variable 8	150.29	149.29
Variable 7	27.87	27.56
Variable 9	28.05	27.71

Comparison of Means between control group and random sample taken from control group.
Variable 6 weight at initial visit.
Variable 8 weight at subsequent visit 4 to 8 weeks later.
Variable 7 BMI at initial visit.
Variable 9 BMI at subsequent visit 4 to 8 weeks later.

Table 6

Table 6

Raw Data: Weight in Pounds and BMI: Intervention Group

	First Visit		Second Visit		Weight Change
Subject	Weight	BMI	Weight	BMI	
1	138	24.4	141	25	+3.0
2	162	28.7	168	29.8	+6.0
3	214	29.8	218	30.4	+4.0
4	171	30.3	169	29.9	-2.0
5	183	31.4	178	30.6	-5.0
6	149	28.2	143	27.0	-6.0
7	119	19.8	117	19.5	-2.0
8	134	21.0	138	21.6	+4.0
9	154	30.1	154	30.1	0
10	157	33.4	154	32.7	-3.0
11	113	22.1	115	22.5	+2.0
12	174	29.9	174	29.9	0
13	154	28.2	154	28.2	0
14	113	23	115	23.2	+2.0
15	157	30.7	159	31.00	+2.0
16	112	23	112.5	23.2	+0.5
17	160	32.2	161	32.5	1.0

List of Appendices

Appendix A

Systematic Review of Literature

Systematic Review of Literature					
Article	Key words	Subject	Level of Evidence	Year	Data base/search engine
1.Ahmed, N., Alam, M., Sultana, F., Sayeed, S., Pressman, A., & Powers, M. (2006).Reaching the unreachable: barriers of the poorest to accessing NGO healthcare services in Bangladesh. (2006). *Journal of Health Population and Nutrition*, *24*(4), 456-460.Retrieved from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001149/	Minorities, patient education	Minority populations Education	moderate	2006	Ncbi data base
2.Atkinson, F., Foster-Powell, K., & Brand-Miller, J. (2008). International tables of glycemic index and glycemic load values: 2008. *Diabetes Care, 31*(12), 2281-2283.	Glycemic index	Glycemic index	high	2008	Google scholar
3.Augustin, L., Franceschi, S., Jenkins, D., Kendall, C., & La Vecchin, C., (2002). Glycemic index in chronic diseases: a review. *European Journal of Clinical Nutrition*, *56*(11), 1049-71.	Glycemic Index	Glycemic index, obesity	high	2002	CINAHL
4.Ayatollabi, S. (2012). A systematic review of reference values for mid upper arm circumference (MUAC) in southern Iran. *Journal of Obesity and Weight loss Therapy*, *2*(2). http://dxdoi:.org/10.417212165-7904.1000119	Obesity, nutrition	Obesity,	high	2012	Google Scholar
5.Barger, M. (2010). Maternal nutrition and perinatal outcomes. *Journal of Midwifery &*	Nutrition,	Nutrition, prenatal	high	2010	Google scholar

Women's *Health*, *55*(6), 502-511. doi: 10.1016/jmwh.2010.02.017		educatio n			
6.Base-Smith, V, & Campinha-Bacote, J. (2003). The culture of obesity. *Journal of the National Black Nurses Association, 14*(1), 52-6. Retrieved from: www.ncbi.nlm.nih.gov/PubMed PMID: 15259999.	Key words Minoritie s, nutrition education	Subject Minoritie s	Level of Evidenc e modera te	200 3	Pubmed
7.Berggren, E., Boggess, K., Funk, M., & Stuebe, A. (2012). Racial disparities in perinatal outcomes among women with gestational diabetes. *Journal of Women's Health*, *21*(5), 521-527. doi: 10.1089/jwh.2011.3123	Minoritie s, obesity	Minoritie s, obesity, nutrition educatio n	modera te	201 2	CINAHL
8.Bjorntorp, P., & Rosmond, R. (2000). Obesity and cortisol. *Nutrition*, *16*(10), [Abstract], 924- 936. Retrieved from: www.ncbi.nlm.nih.gov/pubmed/11054598.	obesity	obesity	high	200 0	Ncbi
9.Brawarsky, P., Stotland, N., Jackson, R., Fuentes-Afflick, E., Escobar, G., Rubashkin, N., & Hass, J. (2005). Pre-pregnancy and pregnancy- related factors and the risk of excessive or inadequate gestational weight gain. *International Journal of Gynecology & Obstetrics*, *91*(2), 125-131.	Obesity, prenatal education	obesity	high	200 5	CINAHL
10. Bray, G., Nielson, S.J., & Popkins, B.M. (2004). Consumption of high fructose corn syrup in beverages may play role in the epidemic of obesity, 1, 2. *American Journal of Clinical Nutrition*, *79*(4), 537-543.	Obesity,	obesity	modera te	200 4	Google Scholar

11. Brown, P. (1991). Culture and the evolution of obesity. (1991). *Human Nature, 2*, (1), 31-57.					
12. Curley, F. (2008). Preconception care is not a luxury. The Office of Minority Health. U.S. Department of Health and Human Services. Retrieved from: http://minorityhealth.hhs.gov/	Key words Prenatal education minority populations	Subject Minority populations Prenatal education	Level of evidence high	2008	Google Scholar
13. Edlich, R., Hudson, M.A., Buschbacher, R.M., Winters, K.L., Britt, L.D., Cox, M.J., . . . Falwell, J. (2005). Devastating injuries in healthcare workers: Description of the crisis and legislative solutions to the epidemic of back injury from patient lifting. *Journal of Long Term Effects of Medical Implants, 15*(2), 225-242. doi: 10.1615/JLongTerm EffMedImplants.v15:2.90	obesity	obesity	high	2005	PubMed
14. Esfahani, A., Wong, J., Mirrahimi, A., Villa, C.R., & Kendall, C. (2011). The application of the glycemic index and glycemic load in weight loss: a review of the clinical evidence. *International Union of Biochemistry and Molecular Biology Life, 63*(1), 7-13. doi: 10.1002/iub.418	Obesity Glycemic index	Glycemic index obesity	high	2011	CINAHL
15. Gennaro, S., (2005). Overview of the current state of research on pregnancy outcomes in minority populations. *American Journal of Obstetrics and Gynecology, 192*(5). [Suppl. pages 3-s10].	Minority populations Obesity Prenatal education	Obesity, minority populations	high	2005	Google Scholar
16. Gordon-Larsen, P., Nelson, M.C., Page, P., & Popkin, B.M. (2006). Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics, 117*(2), 417-424. doi: 10.1542/peds.2005-0058	Minority populations	Minority populatons	moderate	2006	PubMed

17. Gould, J., Madan, A., Qin, C., & Chavez, G. (2003). Perinatal outcomes in two dissimilar immigrant populations in the United States: A duel epidemiologic paradox. *Pediatrics, 111*, [6 Pt1], e676-682. Retrieved from: www.ncbi.nlm.nih.gov/pubmed/12777585	Key word Prenatal education Minority populations	Subject Minority populations Prenatal education	Level of evidence moderate	2003	Search engine Google Scholar
18. Gunatilake, R., & Perlow, J. (2011). Obesity and pregnancy: clinical management of the obese gravida. *American Journal of Obstetrics and Gynecology.* 106-119. doi: 10/1016/ajog.2010.10.002	Obesity Obesity prenatal education Minority populations	Obesity Prenatal education Minority populations	high	2011	Google Scholar
19. Haboubi, H.N,, Kennedy, A., Sheriff, S., & Haboubi, N.Y. (2010). Mid upper arm circumference to estimate BMI in obese subjects. *Gastroenterology Today, 20*(2), 41-45.	obesity	obesity	moderate	2010	CINAHL
20. Healy, A., Malone, F., Sullivan, L., Porter, T., Luthy, D., Comstock, C, Saade, G., Berkowitz, R., Klugman, S., Dugoo, L., . . .D'Alton, M. (2006). Early access to prenatal care: Implications for racial disparity in perinatal mortality. *Obstetrics & Gynecology, 7*(3), 625-631. doi: 10.1097/01.AOG.0000201978.83607.96	Minorities, prenatal education	Minority populations obesity	moderate	2006	Google Scholar
21. Holm, S. (2007). Obesity interventions and ethics. *Obesity Reviews 8*,(Suppl.1), 207-210. The International Association for the Study of Obesity.	obesity	obesity	moderate	2007	Google Scholar
22. Humphreys, S.L. (2007). Obesity in patients and nurses increases the nurse's risk of injury lifting patients. *Bariatric Nursing and Surgical Patient Care, 2*(1), 2-6. doi: 10.1089/bar.2006.9998	Key word	Subject	high	2007	Google Scholar

23. Iams, J., Romero, R., Culhane, J., & Goldenberg, R. (2008). Primary, secondary, and tertiary interventions to reduce the morbidity and mortality of preterm birth. *Lancet, 371,* 164-175.	Key word Obesity Minority populations Prenatal education	S Obesity Minority populations Prenatal education ubject	Level of evidence high	2008	Search engine Cochrane
24. Jenkins, D., & Willett, W. (2013). Glycemic index, glycemic load, and glycemic response: Scientific consensus statement. *International Scientific Consensus Summit on Glycemic Index, Glycemic Load, and Glycemic Response,* [June 6-7, 2013, Stressa, Italy]. Retrieved from: http://oldwayspt.org/programs/special-custom-programs/glycemic-index-glycemic-load-and-glycemic-response	Glycemic index	Glycemic index	high	2013	Google Scholar
25. Johnson, A., Wesley, B., El-Khorazaty, M., Utter, J., Bhaskar, B., Hatcher, B., . . .Laryea, H. (2011). African American and Latino patient versus provider perceptions of determinants of prenatal care initiation. *Maternal Child Health Journal, Suppl. 1, s*27-34. doi: 10.1007/s10995-011-0864-z	Minorities, nutrition, education	minorities	moderate	2011	CINAHL
26. Kirpitch, A., & Maryniuk, M. (2011). The 3R's of Glycemic Index: Recommendations, research, and the real world. *Clinical Diabetes, 29*(4), 155-15. doi: 10.2337/diaclin.29.4.155	Glycemic index	Glycemic index	high	2011	Google Scholar
27. Kral, J.G., Biron, S., Simard, S., Hould, F., Lebel, S., Marceau, S., & Marceau, P. (2006). Large maternal weight loss from obesity surgery prevents transmission of obesity to children who were followed for 2 to 18 years. *Pediatrics, 118*(6), e1644-e1649. doi: 10.1542/peds.2006-1379	obesity	obesity	high	2006	Cochrane

28. Ludwig, D. S., Roese, H. L., & Currie, J. (2013). Pregnancy weight gain and childhood body weight. A weight comparison. *PLOS Medicine*. doi: 10.1371/journal.pmed.1001521	Key word obesity	Subject obesity	Level of evidence high	2013	Search engine Google Scholar
29. Madan, A., Palaniappan, L., Urizar, G., Wang, Y., Fortmann, S., & Gould, J. (2006). Sociocultural factors that affect pregnancy outcomes in two dissimilar immigrant groups in the United States. *The Journal of Pediatrics, 48*(3), 341-346.	Minorities, immigrant, nutrition	Minorities, education	high	2006	Google Scholar
30. Marsh, K., & Brand-Miller, J., (2008). State of the art review: Glycemic index, obesity, and chronic disease. *American Journal of Journal of Lifestyle Medicine, 2*(2), 142-150. doi:10.11771155982760731151 4	Glycemic index, obesity	Obesity, glycemic index	high	2008	Pubmed
31. Moses, R., Luebake, M., Coleman, K., Tapsell, L., & Petocz, P. (2006). Effect of a low glycemic index diet during pregnancy on obstetrical outcomes. *American Journal of Clinical Nutrition*, *84*(4), 807-12.	Glycemic index	Glycemic index	high	2006	Cochrane
32. Ogunyemi, D., Hullet, S., Leeper, J., & Risk, A. (1998). Prepregnancy body mass index, weight gain during pregnancy, and perinatal outcomes in a rural black population. *Journal of Maternal, Fetal, and Neonatal Medicine, 7*(4), 190-193.	Obesity, minorities, prenatal	Obesity, minorities	moderate	1998	CINAHL
33. Olson, C., Strawderman, M., & Reed, R. (2004). Efficacy of an intervention to prevent excessive gestational weight gain. *American Journal of Obstetrics and Gynecology, 191*(2), 530-536.	Obesity Prenatal education	Prenatal education obesity	moderate	2004	Cochrane
34. Penny, D. & Miller, K. (2008). Nutritional counseling for vegetarians during pregnancy and lactation. *Journal of Midwifery & Women's Health, 53*, 1, 37-44. doi:10.1016/j.jmwh.2007.07.003	obesity	Prenatal education, obesity	moderate	2008	CINAHL

35. Phelan,S., Jankovitz, K., Hagobian, T., & Abrams, B. (2011). Reducing excessive gestational weight gain: lessons from weight control literature and avenues for future research. *Women's Health*, 7(6), 641-661. doi: 10.2217/whe.11.70	Key word Obesity, prenatal education	Subject Obesity, prenatal education	Level of evidence moderate	2011	Search engine CINAHL
36. Puhl, R., & Heuer, C. (2012). The stigma of obesity: A Review and update. *Obesity*, *17*(5), 941-964. doi: 10.1038/oby.2008.636	Obesity, minority populations	Obesity, minority populations	moderate	2012	Google Scholar
37. Rhoads-Baeza, M., & Reis, J. (2012). An exploratory mixed method assessment of low income pregnant Hispanic women's understanding of gestational diabetes and dietary change. *Health Information Journal*, *71*(1), 80-89. doi: 10:1177/0017896910386287	Minority populations, obesity, prenatal education	Obesity, prenatal education, minority populations	moderate	2012	CINAHL
38. Scholl, T., Chen, X., Khoo, C., & Lenders, C. (2004). The dietary glycemic index during pregnancy: influence on infant birth weight, fetal growth, and biomarkers of carbohydrate metabolism. *American Journal of Epidemiology, 15*9(5), 467-474. doi: 10.1093/aje/kwh068	Glycemic index	Glycemic index	high	2004	Cochrane
39. Siega-Riz, A., Deierlein, A., & Stuebe, A. (2010). Implementation of the new Institute of Medicine gestational weight gain guidelines. *Journal of Midwifery & Women's Health, 55*(6), 512-519. doi:10.1016/j.jmwh.2010.04.001	Prenatal education, obesity	Obesity, prenatal education	Level of evidence high	2010	Google Scholar
40. Stanhope, K.L., Schwarz, J.M., Keim, N.L., Griffen, S.C., Bremer, A.A. Graham, J.L., . . . Havel, P.J. (2009). Consuming fructose sweetened, not glucose sweetened beverages increases visceral	Obesity,	obesity	high	2009	Cochrane

adiposity and lipids and decreases insulin sensitivity in overweight/obese humans. *The Journal of Clinical Investigation, 119*(5), 1322-1334. doi: 10.1172/JC137385					
41. Stotland, N., Gilbert, P., Bogetz, A., Harper, C, Abrahams, B., & Gerbert, B. (2009). Excessive weight gain in pregnancy: how do prenatal care providers approach counseling? *Journal of Women's Health, 19*(4), 807-814. doi: 10.1089/jwh.2009.1462	Obesity, prenatal education	Obesity, prenatal education	moderate	2009	CINAHL
42. Tanentsapf, I., Heitmann, B., & Adegboye, A. (2011). Systematic review of clinical trials on dietary interventions to prevent excessive weight gain during pregnancy among normal weight, overweight and obese women. *Bio-Med Central: Pregnancy and Childbirth, 11*(81). doi: 10.1186/1471-2393-11-81	Obesity, prenatal education, minorities	Obesity, prenatal education	high	2011	Cochrane
43. Thornton, P., Kieffer, E., Sallaberria-Pena, Y., Odoms-Young, A., Willis, S., Kim, H., &Salinas, M., (2006). Weight, diet, and physical activity-related beliefs and practices among pregnant and postpartum Latino women: The role of social support. *Maternal and Child Health Journal, 10*, 1, 95-104. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/16534660. doi: 10.1007/s10995,005.0025.3	Key words Obesity Minority populations	Subject Minorities, obesity, prenatal education	Level of evidence high	2006	Search engine CINAHL
44. Tovar, A., Must, A., Bermudez, O., Hyatt, R., & Shasen-Taber, L., (2009). The impact of gestational weight gain and diet on abnormal glucose tolerance in pregnancy in Hispanic women. *Maternal Child Health Journal, 13*(4), 520-530. doi: 10.1007/s10995-008-0381-x	Minorities, obesity	Minorities, obesity	high	2009	CINAHL
45. Walker, L.O. (2007) Managing excessive weight gain during pregnancy and the post	Obesity, prenatal	Minorities,	high	2007	CINAHL

partum period. *Journal of Obstetriccal, Gynecologic, & Neonatal Nursing, 36*(5). [Abstract]. doi: 10.1111/j.1552-6909.2007.00179.x	education	prenatal education			
46. Walker, L., Hoke, M., & Brown, A. (2009).Risk factors for excessive or inadequate weight gain among Hispanic women in a U. S. –Mexican Border state. *Journal of Obstetric, Gynecologic, and Neonatal Nurses, 38*(4), 418-429. doi: 10.111/j.1552-6909.2009.01031x	Minorities, obesity	Minorities, education	high	2009	CINAHL
47. Walsh, J., McGowan, C., Mahoney, R., Foley, M., & McAuliffe (2012). Low glycaemic index diet in pregnancy to prevent macrosomia (ROLO study): randomised control trial. *British Journal of Medicine*, 345. Retrieved from: http://www.bmj.com/content/345/bmj.e5605. doi: Http://dx.doi.org/10.1136/bmj.e.5605	Glycemic index, obesity	Glycemic index obesity	high	2012	Google Scholar
48. Warren, L., Rance, J., & Hunter, B. (2012). Feasibility and acceptability of a midwife-led intervention programme called 'Eat Well Keep Active' to encourage a healthy lifestyle in pregnancy. *BMC Pregnancy & Childbirth, 12*(27) doi:10.1186/1471-2393-12-27	Prenatal keywords education, obesity	Prenatal Subject education, obesity	high	2012	Google Scholar
49. Wilkinson, S., Poad, D., & Stapelton, H. (2013). Maternal overweight and obesity; a survey of clinician's characteristics and attitudes, and their response to their pregnant clients. *Bio-Medical Central: Pregnancy and Childbirth, 13*, (117). doi: 10.1186/1471-2393-13-117	Obesity Prenatal education	obesity	moderate	2013	Pub Med
50. Wright, S.M., & Aronne, L.J. (2012). Causes of obesity. A*bdominal Imaging, 37*, 730-732. doi: 10.1007/s00261-012-9862-x	Obesity Minority populations	Obesity education	high	2012	Cochrane

51. Young, B., Levine, R., & Karumanchi, S., (2010). Pathogenesis of preeclampsia. *Annual Review of Pathology: Mechanisms of Disease.* 173-192. doi: 10.1146/annurev-pathol-121808-102149	obesity	Obesity education	high	2010	Google Scholar
52. Zhang, J., Landy, H., Branch, D., Burkman, R., Haberman, S., Gregory, K., . . .Reddy, U. for the Consortium on Safe Labor. (2010). Contemporary patterns of spontaneous labor with normal neonatal outcomes. *Obstetrics & Gynecology*, *116*, (6), 1281-1287. doi: 10.1097/AOG.06013e3181fdef6e	obesity	obesity	high	2010	Pub Med

Appendix B

Logic Model

Logic Model

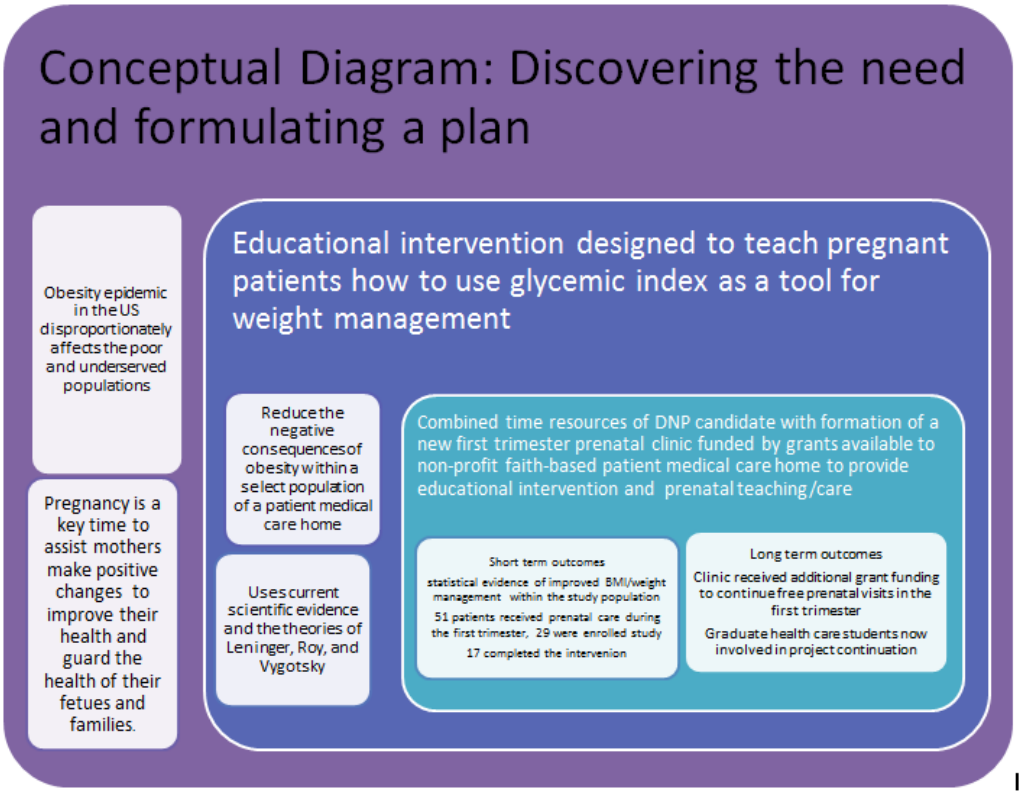
Development and Implementation of a prenatal dietary counseling intervention specifically targeting a reduction in moderate and high glycemic index foods within the selected population of a Patient Medical Care Home

Problem Identification:
Increased overweight/obesity in the general population
Increased morbidity and mortality due to overweight/ obesity
Minority populations are disproportionately affected
Increased overweight/obesity related complications of pregnancy
Increased morbidity and mortality in pregnancy due to overweight/obesity
Adverse effects of maternal overweight/obesity upon fetus, infant, and child health
Lack of prenatal care
Lack of prenatal nutrition education

Inputs	Constraints	Activities	Outputs	Outcomes Short term	Outcomes Long term	Impact
Student Investigator	IRB approval	PICO refinement	Individual diet evaluation	Tools evaluated	Sample metrics	Improved health of sample population
Faculty chair	Time frame	Locate tools for use	Dietary intervention	Sample population receives intervention	Contribution to general knowledge base	Improved community awareness of problem
Mentor	Vulnerable population	Theoretical framework selection	Planning	Sample evaluated	Longitudinal study opportunity for health science students across disciplines	Improved community health
Volunteers, PMHC director, staff, health care students	Community interest	Literature review and selection	Follow up interventions	51 patients received free prenatal care, 29 enrolled in study, 17 completed intervention	Interdisciplinary health care students involved in continuing prenatal care/intervention	Validation for individualized nutrition counseling as a useful prenatal intervention
	Sample size Medicaid insurance	Oral Proposal Written proposal	Community forum			More nutritional educational data generated

Appendix C

Conceptual Diagram



Appendix D

Glycemic Index 100 Food List

Glycemic index and glycemic load for 100+ foods

Glycemic index and glycemic load offer information about how foods affect blood sugar and insulin. The lower a food's glycemic index or glycemic load, the less it affects blood sugar and insulin levels. Here you'll find a list of the glycemic index and glycemic load for more than 100 common foods.

FOOD	Glycemic index (glucose = 100)	Serving size (grams)	Glycemic load per serving
BAKERY PRODUCTS AND BREADS			
Banana cake, made with sugar	47	60	14
Banana cake, made without sugar	55	60	12
Sponge cake, plain	46	63	17
Vanilla cake made from packet mix with vanilla frosting (Betty Crocker)	42	111	24
Apple, made with sugar	44	60	13
Apple, made without sugar	48	60	9
Waffles, Aunt Jemima (Quaker Oats)	76	35	10
Bagel, white, frozen	72	70	25
Baguette, white, plain	95	30	15
Coarse barley bread, 75-80% kernels, average	34	30	7
Hamburger bun	61	30	9
Kaiser roll	73	30	12
Pumpernickel bread	56	30	7
50% cracked wheat kernel bread	58	30	12
White wheat flour bread	71	30	10
Wonder™ bread, average	73	30	10
Whole wheat bread, average	71	30	9

100% Whole Grain™ bread (Natural Ovens)	51	30	7
Pita bread, white	68	30	10
Corn tortilla	52	50	12
Wheat tortilla	30	50	8
BEVERAGES			
Coca Cola®, average	63	250 mL	16
Fanta®, orange soft drink	68	250 mL	23
Lucozade®, original (sparkling glucose drink)	95±10	250 mL	40
Apple juice, unsweetened, average	44	250 mL	30
Cranberry juice cocktail (Ocean Spray®)	68	250 mL	24
Gatorade	78	250 mL	12
Orange juice, unsweetened	50	250 mL	12
Tomato juice, canned	38	250 mL	4
BREAKFAST CEREALS AND RELATED PRODUCTS			
All-Bran™, average	55	30	12
Coco Pops™, average	77	30	20
Cornflakes™, average	93	30	23
Cream of Wheat™ (Nabisco)	66	250	17
Cream of Wheat™, Instant (Nabisco)	74	250	22
Grapenuts™, average	75	30	16
Muesli, average	66	30	16
Oatmeal, average	55	250	13
Instant oatmeal, average	83	250	30
Puffed wheat, average	80	30	17
Raisin Bran™ (Kellogg's)	61	30	12
Special K™ (Kellogg's)	69	30	14
GRAINS			

Pearled barley, average	28	150	12
Sweet corn on the cob, average	60	150	20
Couscous, average	65	150	9
Quinoa	53	150	13
White rice, average	89	150	43
Quick cooking white basmati	67	150	28
Brown rice, average	50	150	16
Converted, white rice (Uncle Ben's®)	38	150	14
Whole wheat kernels, average	30	50	11
Bulgur, average	48	150	12
COOKIES AND CRACKERS			
Graham crackers	74	25	14
Vanilla wafers	77	25	14
Shortbread	64	25	10
Rice cakes, average	82	25	17
Rye crisps, average	64	25	11
Soda crackers	74	25	12
DAIRY PRODUCTS AND ALTERNATIVES			
Ice cream, regular	57	50	6
Ice cream, premium	38	50	3
Milk, full fat	41	250mL	5
Milk, skim	32	250 mL	4
Reduced-fat yogurt with fruit, average	33	200	11
FRUITS			
Apple, average	39	120	6
Banana, ripe	62	120	16
Dates, dried	42	60	18
Grapefruit	25	120	3
Grapes, average	59	120	11

Orange, average	40	120	4
Peach, average	42	120	5
Peach, canned in light syrup	40	120	5
Pear, average	38	120	4
Pear, canned in pear juice	43	120	5
Prunes, pitted	29	60	10
Raisins	64	60	28
Watermelon	72	120	4
BEANS AND NUTS			
Baked beans, average	40	150	6
Blackeye peas, average	33	150	10
Black beans	30	150	7
Chickpeas, average	10	150	3
Chickpeas, canned in brine	38	150	9
Navy beans, average	31	150	9
Kidney beans, average	29	150	7
Lentils, average	29	150	5
Soy beans, average	15	150	1
Cashews, salted	27	50	3
Peanuts, average	7	50	0
PASTA and NOODLES			
Fettucini, average	32	180	15
Macaroni, average	47	180	23
Macaroni and Cheese (Kraft)	64	180	32
Spaghetti, white, boiled, average	46	180	22
Spaghetti, white, boiled 20 min, average	58	180	26
Spaghetti, wholemeal, boiled, average	42	180	17
SNACK FOODS			
Corn chips, plain, salted, average	42	50	11
Fruit Roll-Ups®	99	30	24

M & M's®, peanut	33	30	6
Microwave popcorn, plain, average	55	20	6
Potato chips, average	51	50	12
Pretzels, oven-baked	83	30	16
Snickers Bar®	51	60	18
VEGETABLES			
Green peas, average	51	80	4
Carrots, average	35	80	2
Parsnips	52	80	4
Baked russet potato, average	111	150	33
Boiled white potato, average	82	150	21
Instant mashed potato, average	87	150	17
Sweet potato, average	70	150	22
Yam, average	54	150	20
MISCELLANEOUS			
Hummus (chickpea salad dip)	6	30	0
Chicken nuggets, frozen, reheated in microwave oven 5 min	46	100	7
Pizza, plain baked dough, served with parmesan cheese and tomato sauce	80	100	22
Pizza, Super Supreme (Pizza Hut)	36	100	9
Honey, average	61	25	12

The complete list of the glycemic index and glycemic load for more than 1,000 foods can be found in the article "International tables of glycemic index and glycemic load values: 2008" by Fiona S. Atkinson, Kaye Foster-Powell, and Jennie C. Brand-Miller in the December 2008 issue of Diabetes Care, Vol. 31, number 12, pages 2281-2283.

Appendix E

Client's 24-Hour Diet Recall

Name:_____

Date Taken:_____

Pregnant: Yes Nursing: Yes

No No

Taking Nutritional Supplements: Yes

No

Amount Spent on Food last month:_____

Check which food record:

Activity Level: Less than 30 min.

30-60

minutes

More than

60 min.

MEAL TYPE:

SERVING ABBREVIATIONS:

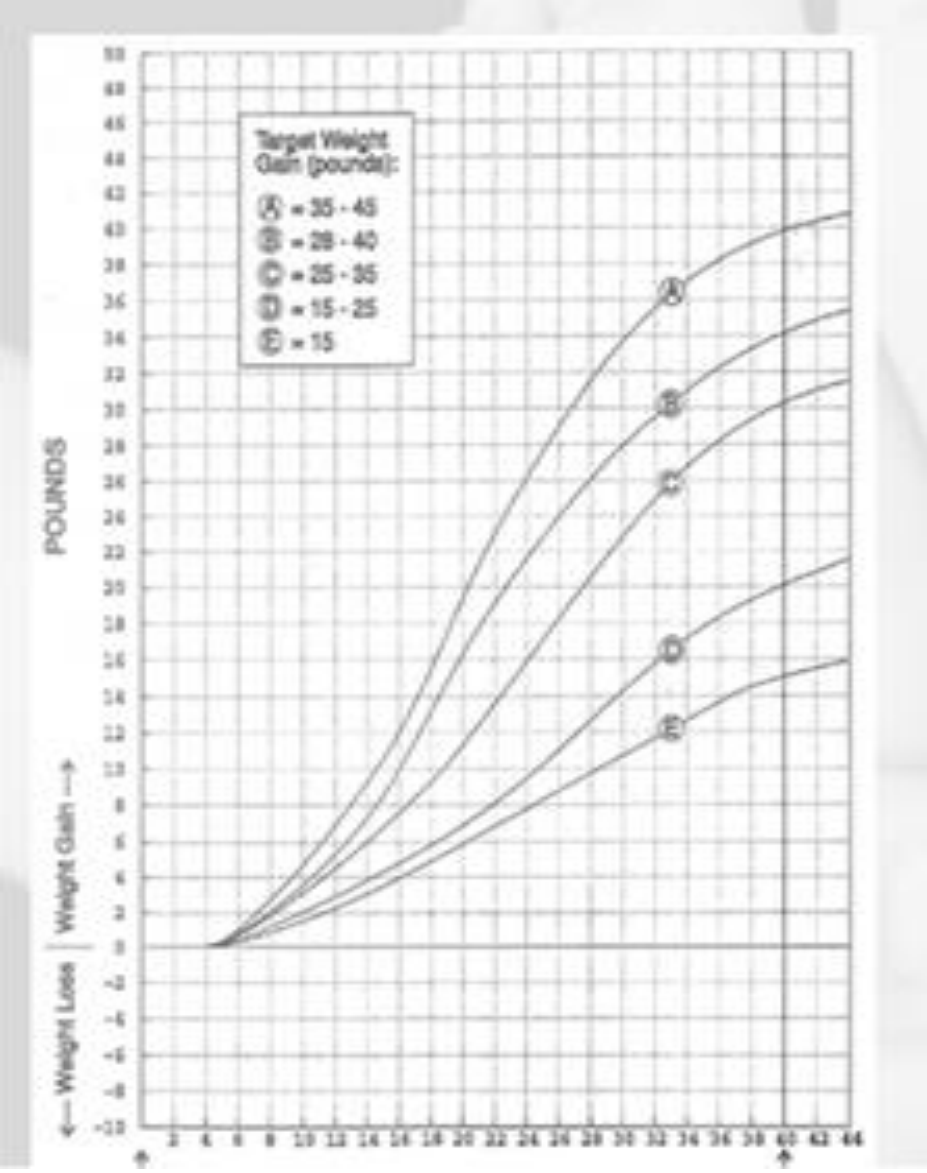
What did the client eat and drink in last 24 hours? (Be thorough.)

Foods and Beverages consumed. Describe in detail. List one food per line.	**AMOUNT EATEN**	**MEAL TYPE**

Number of Lessons Taught Since Last Record:		
Individual _____	Group _____	Other _____

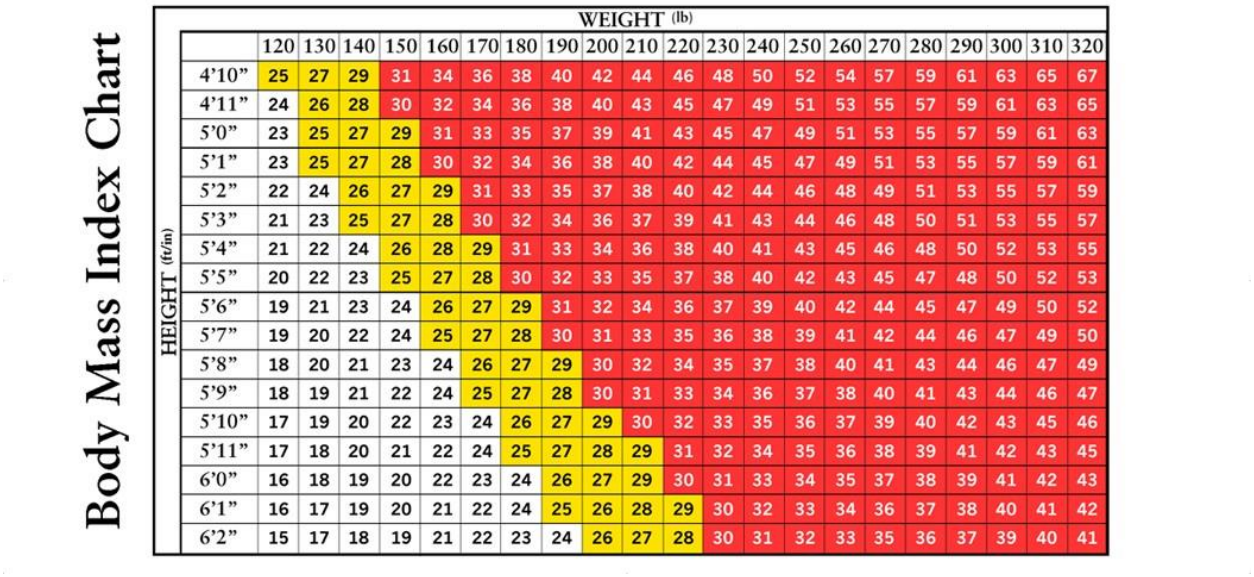
Appendix F

IOM Weight Gain Chart



Appendix G

Standard BMI Height and Weight Chart



HEIGHT (ft/in)	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320
4'10"	25	27	29	31	34	36	38	40	42	44	46	48	50	52	54	57	59	61	63	65	67
4'11"	24	26	28	30	32	34	36	38	40	43	45	47	49	51	53	55	57	59	61	63	65
5'0"	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63
5'1"	23	25	27	28	30	32	34	36	38	40	42	44	45	47	49	51	53	55	57	59	61
5'2"	22	24	26	27	29	31	33	35	37	38	40	42	44	46	48	49	51	53	55	57	59
5'3"	21	23	25	27	28	30	32	34	36	37	39	41	43	44	46	48	50	51	53	55	57
5'4"	21	22	24	26	28	29	31	33	34	36	38	40	41	43	45	46	48	50	52	53	55
5'5"	20	22	23	25	27	28	30	32	33	35	37	38	40	42	43	45	47	48	50	52	53
5'6"	19	21	23	24	26	27	29	31	32	34	36	37	39	40	42	44	45	47	49	50	52
5'7"	19	20	22	24	25	27	28	30	31	33	35	36	38	39	41	42	44	46	47	49	50
5'8"	18	20	21	23	24	26	27	29	30	32	34	35	37	38	40	41	43	44	46	47	49
5'9"	18	19	21	22	24	25	27	28	30	31	33	34	36	37	38	40	41	43	44	46	47
5'10"	17	19	20	22	23	24	26	27	29	30	32	33	35	36	37	39	40	42	43	45	46
5'11"	17	18	20	21	22	24	25	27	28	29	31	32	34	35	36	38	39	41	42	43	45
6'0"	16	18	19	20	22	23	24	26	27	29	30	31	33	34	35	37	38	39	41	42	43
6'1"	16	17	19	20	21	22	24	25	26	28	29	30	32	33	34	36	37	38	40	41	42
6'2"	15	17	18	19	21	22	23	24	26	27	28	30	31	32	33	35	36	37	39	40	41

Appendix H

Consent for Participation in Study

"Examination of the benefits of comprehensive nutritional education including discussion of moderate and high glycemic index foods and food choices made during pregnancy".

This is an experimental study involving research to help determine if teaching women about their food choices will help them have a healthy pregnancy weight gain. The principle researcher is a certified nurse midwife.

During the study, your height, weight, and upper arm will be measured at each visit. At the first visit, you will answer some questions about the food you ate during the past 24 hours. A list of those foods will be made and examined. From that list, a teaching plan will be designed for you. At the second and third visits your teaching plan and your results will be reviewed with you by the principle investigator.

Your participation is voluntary. As a participant in the study, you will receive three free prenatal consultations with a certified nurse midwife, the principle researcher. The first visit will last about an hour. The second two visits will last about 30 minutes each. There are no foreseeable risks or discomfort for participation in the study. By participating in the study, you may benefit from the teaching plan and from the information you gain. In addition, pregnant women will gain benefit because of the information the study provides.

Confidentiality will be maintained at all times. Your participation is voluntary. Refusal to participate will involve no loss or penalty. You may withdraw from the study at any time.

If you have questions about the study, contact Debra Gogatz at 770-378-4732 or the Institutional Review Board of Regis University at

IRB, Regis University
Main Hall,
Room 452,
Mail Code
H4 Denver,
CO 80221
email:
irb@regis.edu

I, , (printed name) agree to participate in a study that examines the eating habits of pregnant women. I understand there are no known risks, inherent or otherwise, for participation in this study. Participation in this study may not confer any

benefit to me. However, benefits may include improved health during pregnancy and beyond. I may withdraw from the study at any time.
I understand that I will receive no financial compensation.

You are being asked to join a study that looks at eating habits in pregnant women. You will be given instructions and teaching regarding healthy eating habits in pregnancy. The results of this study will be used to help clinicians talk to pregnant women about healthy food choices for themselves and their babies and families. These results will be compared to the results of women who have not received this additional prenatal teaching.
At the time of the study, the primary investigator, a certified nurse midwife, will review your eating patterns and compare the results to recommendations by the Institute of Medicine. You will then listen and participate in a discussion of healthy eating habits in pregnancy. This teaching session is expected to take from 45 minutes to one hour.
Four weeks after this education session and again at eight weeks after this session you will be asked to return to Good Samaritan Health Center of Gwinnett for a prenatal visit. You will receive a phone call or text message 48 hours before your appointment as a reminder. Follow up visits are expected to take about 30 minutes and involve a brief discussion with the primary investigator, a weight check, and to have your upper arm measured with a tape measure.
Your privacy will be protected and your personal information will be coded so that your information remains anonymous during and after the study. Your unique identifier and a complete roster of participants will be kept in a secure locked site during the study. In addition this consent and all the data obtained during the study will be maintained in a secure locked site for three years. After that time, the data will be destroyed. During and after the study, the principle investigator, Debra Gogatz, the medical director, Dr. John Kludt, and the executive director, Dr. Gregory E. Lang will have access to the data.

Thank you for your consideration and participation.

_____
_____

Signature of participant Date

_____
_____

Signature of principle investigator Date

Appendix I

Timeline

- October 31, 2013 Project Proposal submitted to NR706B Committee
- November 8, 2013 formal proposal submitted to faculty chair
- November 15, 2013 team assembly completed
- January 25, 2014 proposal accepted by Regis IRB
- February 15, 2014 patient recruitment begun *
- March 15, 2014 follow up visits begun
- June 15, 2014 study flaws uncovered during statistical analysis
- June 20, 2014 Search for control population begun
- June 30, 2014 amended IRB requested
- July 1, 2014 second recruitment phase begun
- August 1, 2014 control population site obtained
- September 30, 2014 amended IRB accepted
- October 01, 2014 patient recruitment completed
- October 15, 2014 control population statistics chart review
- October 30, 2014 follow-up visits completed
- November 15, 2014 Statistics are compiled and analyzed
- December 20, 2014 Final paper completed/first draft status
- December 30, 2014 Capstone power point completed/first draft status
- January 4, 2015 Capstone power point and final paper submitted to capstone chair for review and evaluation
- January 25-March 30, 2015 multiple revisions of presentation submitted and reviewed
- April 29, 2015 successful capstone defense
- May 12, 2015 received written comments/recommendations from capstone committee
- May 21, 2015 revisions and recommendations completed
- May 22, 2015 final capstone documents submitted to capstone chair and director of program for library submission

*At initial recruitment, each subject has her height and weight obtained and BMI is calculated, baseline weight entered into IOM grid, subjects receive intervention. At follow-up visit subjects weighed and BMI calculated and intervention reviewed

Appendix J

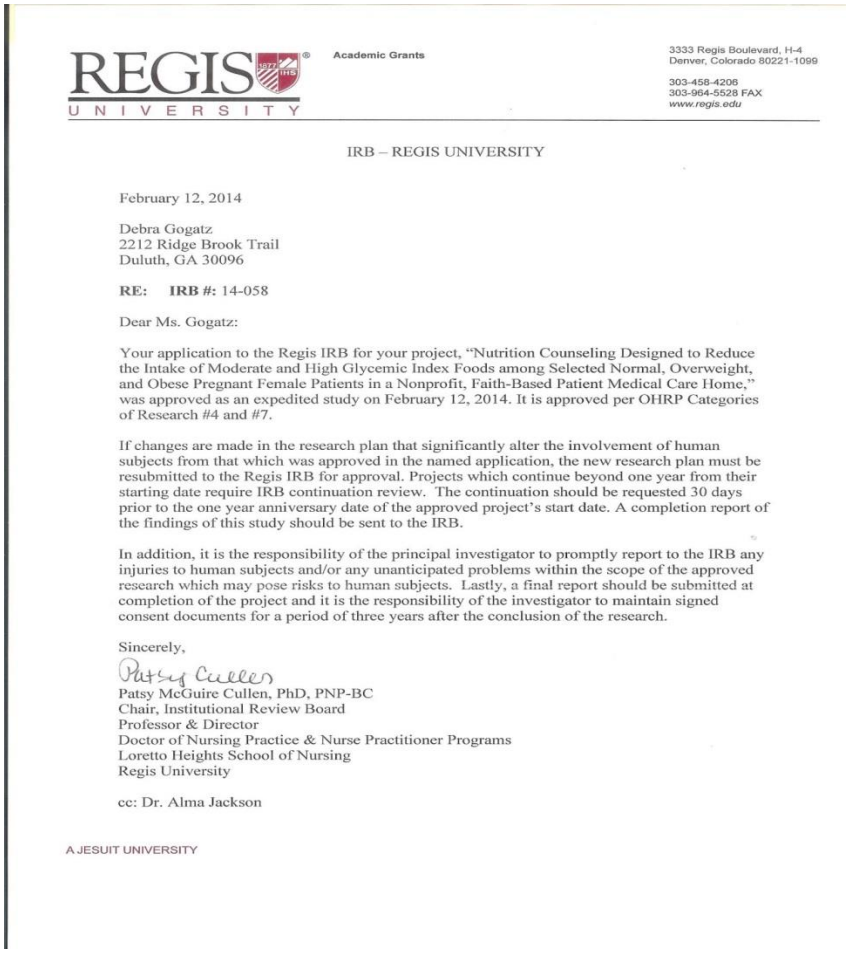
Budget Analysis

Budget /Cost Benefit* Analysis/Replication of study					
Actual Study Expenses			Projected Expenses to Duplicate Study		
Investigator Salary 1. Preparation 2. Patient visits 3. Screened 52 patients and 29 entered study with 17 completing study 4. Data compilation (hours not calculated) 5. Report completion (hours not calculated)	None (DNP candidate)	Screening time 0.5 HR. = 26 Hrs. Each subject entered in study required 1.5 hours face to face contact at first visit with 0.5 hours at follow-up visit. 29 received first visit =43.5 Hr. 17 follow up visits =t 8.5 Hr. Total =52.0 Hr.	$50/Hr. X 2 hours per subject (Example 26 Hrs. = 1300.00) (Example: 52 Hrs. = $2600 contact hours) Estimated salary 5,000.00		
Clerical Salaries	5000.00 (provided by GSHCG)		5000.00		
Statistician Expense	100.00 (friend of DNP candidate)		500.00		
Copy paper	75.00		75.00		
Ink	100.00		100.00		
Computer	450.00		450.00		
Advertising	400.00		400.00		
Total	$ 6125.00		$11,125.00		

*Benefits unquantifiable at study completion.

Appendix K

IRB Approval Letter



REGIS UNIVERSITY

Academic Grants

3333 Regis Boulevard, H-4
Denver, Colorado 80221-1099

303-458-4206
303-964-5528 FAX
www.regis.edu

IRB – REGIS UNIVERSITY

February 12, 2014

Debra Gogatz
2212 Ridge Brook Trail
Duluth, GA 30096

RE: IRB #: 14-058

Dear Ms. Gogatz:

Your application to the Regis IRB for your project, "Nutrition Counseling Designed to Reduce the Intake of Moderate and High Glycemic Index Foods among Selected Normal, Overweight, and Obese Pregnant Female Patients in a Nonprofit, Faith-Based Patient Medical Care Home," was approved as an expedited study on February 12, 2014. It is approved per OHRP Categories of Research #4 and #7.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval. Projects which continue beyond one year from their starting date require IRB continuation review. The continuation should be requested 30 days prior to the one year anniversary date of the approved project's start date. A completion report of the findings of this study should be sent to the IRB.

In addition, it is the responsibility of the principal investigator to promptly report to the IRB any injuries to human subjects and/or any unanticipated problems within the scope of the approved research which may pose risks to human subjects. Lastly, a final report should be submitted at completion of the project and it is the responsibility of the investigator to maintain signed consent documents for a period of three years after the conclusion of the research.

Sincerely,

Patsy Cullen

Patsy McGuire Cullen, PhD, PNP-BC
Chair, Institutional Review Board
Professor & Director
Doctor of Nursing Practice & Nurse Practitioner Programs
Loretto Heights School of Nursing
Regis University

cc: Dr. Alma Jackson

A JESUIT UNIVERSITY

Appendix L

Amended IRB Approval Letter

REGIS UNIVERSITY
Academic Grants
3333 Regis Boulevard, H-4
Denver, CO 80221-1099
303-458-4206
303-964-5528 fax
www.regis.edu

IRB – REGIS UNIVERSITY

October 31, 2014

Ms. Debra Gogatz
2212 Ridge Brook Trail
Duluth, GA 30096

RE: IRB #: 14-058**M**

Dear Ms. Gogatz:

The amendment to your original Regis IRB application, "Prenatal Nutrition Counseling Designed to Reduce the Intake of Moderate and High Glycemic Index Foods Among Selected Normal, Overweight, and Obese Patients from a Nonprofit Faith-based Patient Medical Care Home", was approved on October 14, 2014.

You have one year from this date of approval to complete the project. It is the responsibility of the investigator to maintain the submitted surveys (since submissions are done confidentially and without subject identifiers) for a period of three years after the conclusion of the research. The Office of Academic Grants does not retain copies of individual IRB documentation, including approval letters, past three years from approval date.

We wish you the best on your project!

Sincerely,

Patsy Cullen

Patsy McGuire Cullen, PhD, PNP-BC
Chair, Institutional Review Board
Professor & Director
Doctor of Nursing Practice & Nurse Practitioner Programs
Loretto Heights School of Nursing
Regis University

cc: Dr. Alma Jackson

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Appendix M

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report
Printed on 11/25/2012

Learner: Debra Tolley Gogatz (username: dgogatz)

Institution: Regis University

Contact Information 2212 Ridge Brook Trail
Duluth, GA 30096 USA
Department: DNP program
Phone: 770-378-4732
Email: debratolleycnm@hotmail.com

Social Behavioral Research Investigators and Key Personnel: Stage

1. Basic Course Passed on 11/23/12 (Ref # 9216747)

Required Modules	**Date Completed**	
Introduction	11/22/12	no quiz
History and Ethical Principles - SBR	11/22/12	5/5 (100%)
The Regulations and The Social and Behavioral Sciences - SBR	11/23/12	5/5 (100%)
Assessing Risk in Social and Behavioral Sciences - SBR	11/23/12	5/5 (100%)
Informed Consent - SBR	11/23/12	5/5 (100%)
Privacy and Confidentiality - SBR	11/23/12	5/5 (100%)
Regis University	11/23/12	no quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

Appendix H

Agency Letter of Support GSHCG

Good Samaritan

Health Center

doing likewise

November 16, 2013

To Whom It May Concern:

Please let this letter serve to confirm that Debra Gogatz, CNM, APRN, has permission to access our patients to recruit them for voluntary participation in her academic research, and further, may utilize anonymous personal health information from our patient records in her research activities.

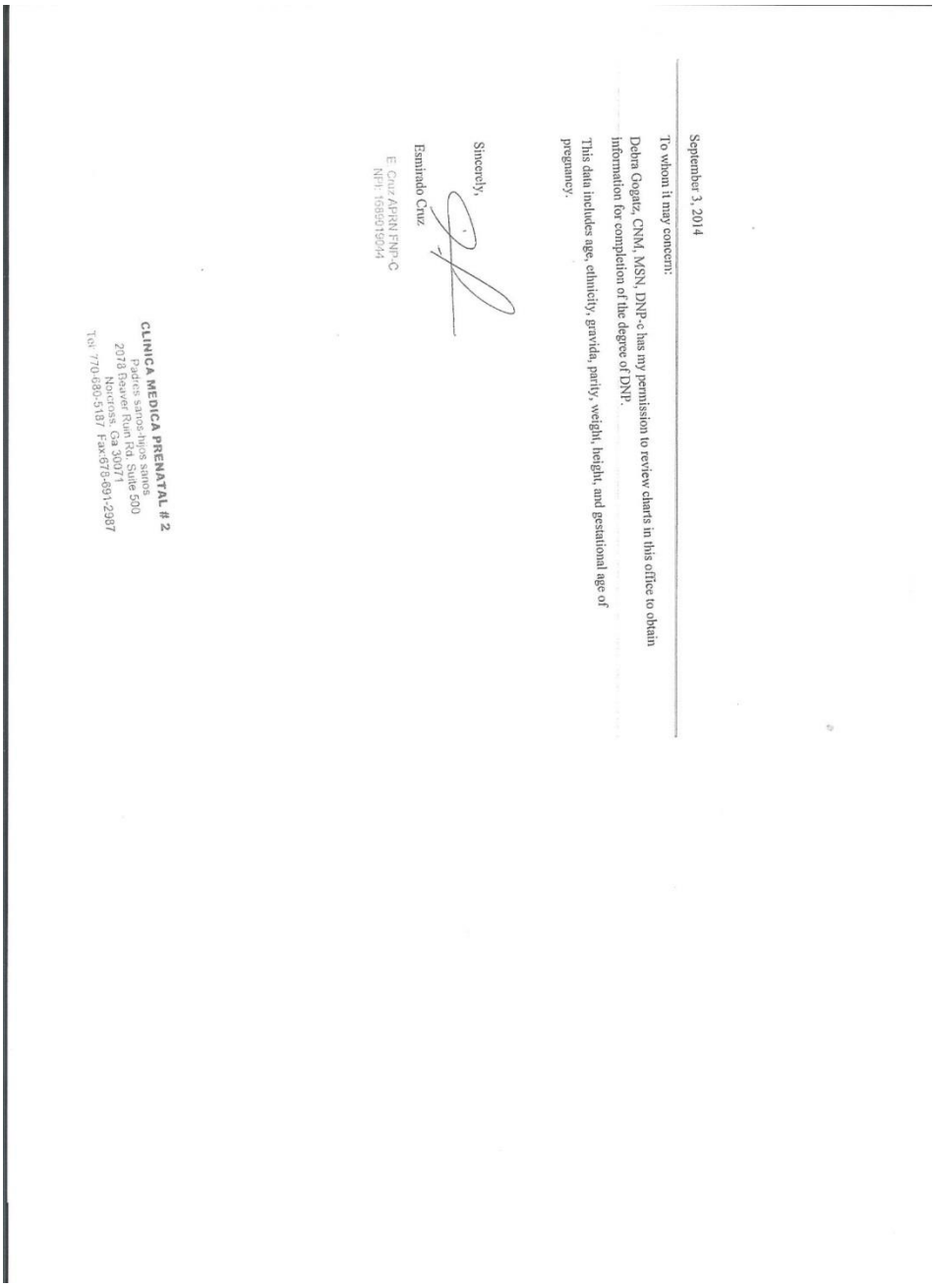
Do not hesitate to contact me should you require additional information regarding this consent. Cordially,

Gregory E. Lang, PhD

Executive Director

Appendix O

Agency Letter of Support Clinica Medica



September 3, 2014

To whom it may concern:

Debra Gogatz, CNM, MSN, DNP-c has my permission to review charts in this office to obtain information for completion of the degree of DNP.

This data includes age, ethnicity, gravida, parity, weight, height, and gestational age of pregnancy.

Sincerely,

Esmindo Cruz

E. Cruz APRN FNP-C
NPI: 1568919044

CLINICA MEDICA PRENATAL # 2
Padres santos hijos santos
2078 Beaver Ruin Rd. Suite 500
Norcross, Ga 30071
Tel: 770-680-5187 Fax:678-891-2987