

ACCEPTANCE OF MODIFIED LOW GLYCEMIC INDEX DIET FOODS BY  
SEVERELY OBESE MEXICAN OR MEXICAN AMERICAN  
GIRLS AGES 12-19

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF SCIENCES IN THE GRADUATE SCHOOL OF THE  
TEXAS WOMAN'S UNIVERSITY

COLLEGE OF HEALTH SCIENCES

BY

REBECA MATAMOROS, BS

DENTON, TEXAS

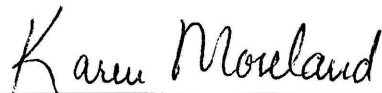
DECEMBER 2009

TEXAS WOMAN'S UNIVERSITY  
DENTON, TEXAS

November 16, 2009

To the Dean of the Graduate School:

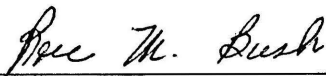
I am submitting herewith a thesis written by Rebeca Matamoros entitled "Acceptance of Modified Low Glycemic Index Diet Foods by Severely Obese Mexican or Mexican American Girls Ages 12-19". I have examined this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science with a major in Nutrition.



Karen Moreland, MS, RD, Major Professor

We have read this thesis and recommend its acceptance:

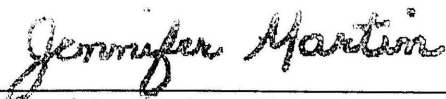






Department Chair

Accepted:



Dean of the Graduate School



## ACKNOWLEDGEMENTS

I would like to thank everyone for their help, support and encouragement through this process. I would like to thank Dr. Wiemann for her time and encouragement through this whole procedure and the Texas Children's team (Kaitlyn Allen and Brittan Clark) for all of their help. I would like to specially acknowledge Karen Moreland, thesis committee chair, for all of her time dedicated to guiding me through this process, and Rose Bush for her constant support. I would also like to thank my family who has inspired me to finish my thesis, specially my husband for being my constant support. Lastly, I would like thank 3 entities, one that I just know exists, God, one that is gone forever, my grandmother and one that is on his way, my son, for being my guiding light through all this process.

## ABSTRACT

REBECA MATAMOROS, BS

ACCEPTANCE OF MODIFIED LOW GLYCEMIC INDEX DIET FOODS BY  
SEVERELY OBESE MEXICAN OR MEXICAN AMERICAN GIRLS AGES 12-19

DECEMBER 2009

One of the most common health problems facing America's youth today is obesity. There are many different approaches being used in order to aid adolescents and children with weight loss. One of these approaches is the modified low glycemic index (LGI) diet. The purpose of this study was to identify the acceptability of incorporating modified LGI diet foods into the diets of Mexican/Mexican-American severely obese adolescent girls ages 12 to 19 years by examining the home, school, after school, and work environments of 20 English speaking only or bilingual families. This was accomplished through qualitative analysis of in-home interviews conducted with the adolescent and her family. Participants' responses were divided among the tenets of the modified LGI and the acceptability also varied greatly across the families interviewed. In conclusion, the modified LGI diet might be acceptable among severely obese Mexican/Mexican American girls if more education is provided to the families.

## TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS .....	iii
ABSTRACT .....	iv
LIST OF TABLES.....	viii
CHAPTER	
I. INTRODUCTION .....	1
Statement of the Problem .....	2
Purpose of the Study.....	3
Research Question .....	3
II. LITERATURE REVIEW .....	4
Obesity.....	4
Definition.....	4
Prevalence.....	4
Co-Morbidities.....	5
Diabetes and Impaired Glucose Tolerance .....	5
Cardiovascular Disease.....	6
Gastrointestinal Conditions .....	7
Mental Health .....	7
Factors Associated With Childhood Obesity.....	8
Skipping Breakfast .....	8
Consumption of Sugar Added Beverages.....	9
Fruits and Vegetables Consumption.....	9
Foods Consumed Away From Home .....	9
Portion Sizes .....	10
Inactivity and Television Watching.....	10
Treatments for Obesity .....	10
Medications for Weight Loss .....	11
Orlistat .....	11
Sibutramine hydrochloride .....	11
Bariatric Surgery.....	12

	Dietary Approaches .....	12
	Balanced Micronutrients.....	12
	High Protein.....	13
	Low Fat.....	13
	Low Glycemic Index .....	14
	Tailored Intervention .....	15
III.	METHODS .....	17
	Design.....	17
	Participants .....	18
	Procedure .....	19
	Data Collection Materials.....	20
	Data Analysis.....	21
IV.	RESULTS .....	23
	Current Food Consumption Patterns .....	23
	Consumption of High-Fat Foods .....	23
	White Flour and Highly Processed Foods .....	36
	Sugary Beverages More Prevalent Than Sugary Foods .....	36
	Excessive Portion Size and Skipping Meals.....	36
	Fruits and Vegetables .....	37
	Acceptability of the Modified LGI Diet .....	37
	Acceptability of Lean Meats.....	38
	Acceptability of Low-Fat Dairy .....	38
	Acceptability of Whole Wheat and Whole Grain Foods.....	39
	Fruits and Vegetables .....	40
	Overall Acceptability – the Deal Breaker.....	41
	Affordability and Access .....	42
	Movements of Change, Knowledge Deficit and Troubleshooting .....	43
	Families Already Making Changes .....	43
	Lack of Knowledge/Awareness.....	44
	Believe Making Right Choice, But Not.....	45
V.	DISCUSSION.....	50
	Discussion of Results.....	50
	Limitations.....	54
VI.	CONCLUSION AND FUTURE RESEARCH .....	55

REFERENCES .....	57
APPENDIXES .....	66
A. Institutional Review Board Approval Letter .....	66
B. Interview Questions .....	68

## LIST OF TABLES

Table	Page
1. Demographic Characteristics of the Sample of 20 Severely Overweight Adolescents and their Families.....	24
2. Current Food Consumption Reported by Adolescents.....	25
3. Acceptability of Foods Included in the Modified LGI.....	46

## CHAPTER I

### INTRODUCTION

One of the most common health problems facing America's youth today is obesity. In children, obesity is defined as body weight equal to or greater than 120% of ideal body weight or a body mass index (BMI) that is greater than that of the age and gender-specific 95<sup>th</sup> percentile. As weight increases so do the risks factors for cardiovascular diseases and Type 2 diabetes mellitus (T2DM). People with T2DM have a greater risk of stroke or heart disease (Best et al., 2005). Being overweight or obese as a child is associated with numerous health problems including: asthma, several forms of cancer, type 2 diabetes, high blood lipids, hypertension, early maturation, orthopedic problems, as well as several psychological problems (Thompson & Story, 2003). As weight increases so do the risk factors for cardiovascular diseases and type 2 diabetes mellitus (T2DM). Hispanics are at significantly elevated risk of both obesity and T2DM (Caballero, 2005).

There are many different approaches being used in order to aid adolescents and children with weight loss. One of these approaches is the low glycemic index diet. Locally, a handful of severely obese patients treated by the Adolescent Medicine Service at Texas Children's Hospital (TCH) have lost weight over a 3-month period while following a modified low glycemic diet (modified to exclude higher fat, higher calorie foods, and include ad lib fruits and vegetables with the exception of those considered

starchy, i.e. potatoes, corn, peas, yucca, etc). The modified low glycemic index (LGI) diet involves the consumption of minimally processed foods. These foods include ad lib fruits and vegetables as specific to the modified LGI diet, lean protein, low fat dairy, and 100% whole grain products. The diet is described as being close to the ground. Persons following the modified LGI diet are instructed to eat natural foods, whole grains, and lean meats. They are also instructed to follow the plate method in order to be able to organize their foods better and control their portions. The plate methods involves having half the plate filled with vegetables, and in the other half one serving of lean meats and one serving of whole wheat carbohydrates. The foods in this diet are low in calories and fat, and high in fiber, which in turn may result in weight loss and higher satiety.

While there is mounting evidence for this type of dietary intervention, it has not yet been used on a minority group such as that of severely obese Mexican American adolescent females, a group that is at particularly high risk for obesity-related diseases. Moreover, it is unclear whether minority populations in general and minority adolescents in particular, would find the foods in this diet acceptable.

#### Statement of the Problem

As previously stated, there is little information available of a clinical trial which has studied the acceptability of the modified LGI diet in a minority group such as Mexican/Mexican-American severely obese adolescents. There is a need to establish if this diet would be acceptable or feasible for this population not only because of the risk of obesity but because of the co-morbidities associated with obesity.



Evidence suggests that for the less acculturated population, inclusion of modified LGI diet foods may be easier to accomplish; however, the evidence is still lacking. As for those individuals who are more acculturated, literature has found that adapting this type of dietary intervention may pose a challenge. The current research study sought to overcome these barriers by finding solutions to make this dietary intervention easier to follow by these individuals.

### Purpose of the Study

The purpose of this study was to identify the acceptability of incorporating modified LGI diet foods into the diets of Mexican/Mexican-American severely obese adolescent girls ages 12 to 19 years by examining the home, school, after school, and work environments of 20 English speaking only or bilingual families. This was accomplished through qualitative analysis of in-home interviews conducted with the adolescent and her family.

### Research Question

This qualitative study was hypothesis generating. The interviews helped in exploring themes associated with the acceptability of the foods involved in the modified LGI diet. This information will help tailor this diet to a specific population of Mexican/Mexican-American adolescent girls. The research question was “Are the foods, portion sizes, and structure of meals that are part of the modified LGI diet acceptable to Mexican/Mexican-American adolescent girls and their families?”

## CHAPTER II

### LITERATURE REVIEW

There have been comprehensive behavioral intervention programs for the treatment of childhood obesity that have delivered effective long term results, but the reported outcomes are largely based on a selected population of younger children with minimal race/ethnic diversity (Kirk, Scott, & Daniels, 2005). Bariatric surgery is now recommended for some severely obese adolescents. Two prescription drugs (Orlistat and Sibutramine Hydrochloride) have been approved for treatment of obesity in adolescents and are recommended as part of a comprehensive treatment program (Kirk et al., 2005).

#### Obesity

##### *Definition*

Severe obesity has been defined by having a body mass index (weight (kg)/height (m)<sup>2</sup>) greater than 40. It is associated with an increase in the ratio for mortality. Obesity is influenced by age, sex, and race. Obesity in childhood usually follows into adulthood creating greater consequences and risks factors for diseases. Being overweight as a child is associated with numerous health problems including: asthma, several forms of cancer, type 2 diabetes, high blood lipids, hypertension, early maturation, orthopedic problems, as well as several psychological problems (Thompson & Story, 2003).

##### *Prevalence*

The prevalence of being overweight among children and adolescents increased

between the years of 1999-2004, and approximately 17% of U.S. children and adolescents are now overweight (defined as at or above the 95% percentile of the sex-specific BMI for age growth charts). In a study where being overweight was defined as at or above the 95th percentile of the sex-specific body mass index (BMI) for age growth charts for children ages 2 through 19, it was found that the prevalence of overweight children among non-Hispanic black and Mexican-American adolescents increased more than 10 percentage points between 1988-1994 and 1999-2000 (Ogden, Flegal, Carroll, & Johnson, 2002). Being either obese or overweight increases the risk for many chronic diseases such as heart disease, type 2 diabetes, certain cancers, and stroke (Khan et al., 2009). It can be concluded that obesity during adolescence can lead to several co-morbidities during adolescence and later on in adulthood.

As weight increases so do the morbidity and mortality risks. For example, the prevalence of Type 2 diabetes has been shown to strongly increase as weight increases (Campbell, 2009). Severe obesity among adults is defined by the National Heart, Lung, and Blood Institute as BMI 35 to 39.9. In comparison to adults there is still no way to categorize children's weight since in the pediatric population BMI increases with age until children reach puberty. However, it is easy to conclude that if obesity and overweight problems are not targeted at a young age, the consequences for America's future health problems will be greater.

### Co-Morbidities

#### *Diabetes and Impaired Glucose Tolerance*

Today, overweight children are being diagnosed with impaired glucose tolerance

and T2 DM, and they are showing early signs of insulin resistance syndrome. Some of the factors identified with having a greater risk for diabetes are increased body fat and abdominal fat, insulin resistance, and early onset of puberty. There is a greater risk of T2DM associated with certain ethnicities (Goran, Ball, & Cruz, 2003).

Impaired glucose tolerance has emerged as a concern for adolescents. In a study by Sinha et al., (2002), impaired glucose tolerance was defined as a 2 hour glucose value >140 mg/dL during an oral glucose tolerance test; 25% of 55 obese children and 21% of 112 obese adolescents had impaired glucose tolerance.

In studies on obesity, insulin resistance, insulin secretion, and  $\beta$ -cell response, it has been shown that Hispanics have a greater fasting and post-challenge insulin and greater insulin resistance than non-Hispanic whites. In another study completed in Corpus Christi, overweight and obese Hispanics had significantly higher levels of fasting insulin (Goran et al., 2003).

Some common factors among adolescents with T2 DM are acanthosis nigricans, obesity, and a positive family history of diabetes. Most of the time, adolescents who have been diagnosed with T2 DM are also obese. T2 DM in adolescents and adults is very similar since the main underlying factor is usually obesity (Steinberger & Daniels, 2003).

### *Cardiovascular Disease*

Being overweight or obese during childhood or adolescence is associated with various risk factors for cardiovascular disease, and is related to the early development of atherosclerotic lesions. In a study by the Pathological Determinants of Atherosclerosis in Youth, which examined the effects of risk factors for adult coronary heart disease on

atherosclerosis, it was reported that obesity is associated with early coronary atherosclerosis in adolescent boys and men. Having abdominal obesity is also associated with having an increase in cardiovascular disease risk. Central adiposity is related to an elevated lipid panel and blood pressure (Goran et al., 2003). Another cardiovascular risk factor associated with obesity is hypertension, which occurs in the majority of overweight children as young as 5 to 19 years of age (Baker et al., 2005).

### *Gastrointestinal Conditions*

In 8% to 33% of the cases of gallstones, a relationship with obesity is seen in children. It is predicted that the eating behaviors of obese and overweight adolescents and children is associated with a four-fold greater risk of developing gallstones (Baker et al., 2005).

Another gastrointestinal impediment related to obesity is non-alcoholic fatty liver disease, which consists of steatosis (increased fat in liver without inflammation) and steatohepatitis (increase liver fat without inflammation). Steatosis is not related to cirrhosis but to elevated aminotransferases that have steatohepatitis with fibrosis or cirrhosis on liver biopsy, in which 40% of those patients progress to liver disease. Ko et al. (2009) found that simple steatosis was present in 22% of obese or overweight children, type 1 nonalcoholic steatohepatitis in 34%, and type 2 nonalcoholic steatohepatitis in 44%.

### *Mental Health*

Being overweight has also been found to be related to developing several mental health problems. Caldwell, Brownell, and Wilfley (1997) found that being overweight

could lead to psychosocial problems such as body dissatisfaction and lower self esteem. Other studies found that being obese in youth can lead to having an altered body image, decrease preference and self-efficacy for physical activity (Kolody & Sallis, 1995). Another study showed that youth who suffer from obesity could also suffer from depression (Sheslow, Hassink, Wallace & DeLancey, 1993). A recent study found that self esteem was negatively influenced with an increasing BMI (Kristjansson, Sigfusdottir, Allegrante, 2008).

### Factors Associated With Childhood Obesity

During the past 30 years the way in which people consume food has changed dramatically. Not only have portion sizes and dietary fat consumption increased but also a relationship has been found between the increase in the consumption of processed foods and high fructose corn syrup with the rapid increase in obesity (Ludwig, Petterson, & Gortmaker, 2001). When there is a presence of sweetened drinks, processed foods, and excess calories in the diet insulin secretion is stimulated and in turn this encourages fat storage and inhibits fat utilization (Schoeller & Buchholtz, 2005).

### *Skipping Breakfast*

The issue of skipping breakfast has been in discussion in recent years. It was found in a study completed by Berkey, Rockett, Gillman, Field, and Colditz (2003) that girls who were of normal weight and ate breakfast 1-2 days/week gained more weight than those who ate breakfast daily. The study also found that girls who never ate breakfast were less likely to do well in school. Therefore, not only has skipping breakfast

been associated with weight gain, but it also has been found to be associated with poor school performance.

### *Consumption of Sugar Added Beverages*

Consumption of sugar added beverages, i.e. sodas and fruit juices, has been associated with weight gain among adolescents, due to the fact that they contribute to the total amount of calories consumed in a day. It was found that girls who drank one serving a day of sugar added beverages during a year gained more weight than those who did not drink sweetened beverages. Also, boys and girls who increased their intake of sugar added beverages by two or more servings a day in one year were more likely to encounter a significant gain in weight (Berkey, Rockett, Field, Gillman, & Colditz, 2004). In another study, a statistically significant difference ( $p < 0.05$ ) was found in the intake of fruit juice between obese and normal youth ( $2.38 \pm 1.42$  servings for obese children,  $1.41 \pm 1.15$  servings for normal weight children,  $p = 0.01$ ). It was concluded that obese children tend to consume a larger amount of fruit juice than normal weight children (Tanasescu, Ferris, Himmelgreen, Roriguez & Perez-Escamilla, 2000).

### *Fruits and Vegetables Consumption*

It is recommended by the American Dietetic Association that people consume 5-9 servings of fruits and vegetables per day. The consumption of fruits and vegetables is one of the main components of the modified low glycemic index diet. In a study by Linde et al. (2006) it was found that the consumption of fruits was related to a lower BMI.

### *Food Consumed Away From Home*

Currently, children tend to consume more fast foods than in previous years likely

due to time or socioeconomic status. A study found that obese children consume higher servings of meat, grains, sugar-sweetened drinks, and potato chips when eating outside the home as compared to non obese children. Therefore, obese children consume higher amounts of calories, fat, and sugar than non obese children (Gillis & Bar-Or, 2003).

### *Portion Sizes*

Portion sizes have increased over the past 20 years. What use to be normal is now small and what use to large is now considered normal. In a study completed in 2007, children reported wanting to consume larger servings of potato chips, French fries, and meats, and smaller portions of vegetables than what is recommended. Also children with lower socioeconomic status and who also reported eating while watching TV and eating at fast food restaurants reported wanting to consume larger portions of French fries and potato chips (Colapinto, Fitzgerald, Taper, & Veugelers, 2007).

### *Inactivity and Television Watching*

Children and adolescents who watch more television than normal might have a tendency to be more inactive likely due to the lack of time because of the time spent watching television (TV). A study found that in girls there is a high relationship between being overweight, spending a high amount of time watching TV, and doing very little vigorous physical activity as compared to boys (Eisenmann, Bartee, Smith, Welk, & Fu, 2008).

### *Treatments for Obesity*

There are many different treatments for obesity that have been used over the past



years. Treatments such as weight loss medications, surgery, and dietary approaches are utilized by the medical community.

### *Medications for Weight Loss*

There are numerous medications that have been developed for the treatment of obesity in adults over the past years. However, there is only one medication that is approved for the use in children, Orlistat. Other weight-loss drugs, including Sibutramine hydrochloride, are not approved for use in children under age 16, but studies in children and teens are ongoing.

*Orlistat.* Orlistat is a medication that acts as an inhibitor of pancreatic and gastric carboxyl ester lipase, which results in decreased absorption of fat and emission of unabsorbed cholesterol and triglycerides. One of the leading causes of obesity is the excess consumption of fat. Past studies have found that a combination of Orlistat and diet demonstrates a significantly greater weight loss and improvement of risk factors associated with obesity (Hanefeld & Sachse, 2002; Lindgärde, 2000). In a study by Whitlock, O'Connor, Williams, Beil, and Lutz , it was found that when Orlistat or Sibutramine hydrochloride was combined with behavioral interventions it could result in small to moderate short-term weight loss in obese adolescents with potential side effects that range in severity (2008).

*Sibutramine hydrochloride.* Sibutramine hydrochloride, also known as Meridia, is a medication classified as an appetite suppressant; it is a serotonin and norepinephrine reuptake inhibitor (Berkowitz et al., 2006). It was found that adult patients who participated in a study and received Sibutramine lost an average of  $10.3 \pm 6.6$  kg,

compared to the patients in the placebo group who lost  $2.4 \pm 2.5$  kg ( $P < 0.001$ ). Also, it has been found that the reduction in the mean body mass index was significantly greater in those participants who were taking Sibutramine ( $3.6 \pm 2.5$  kg/m<sup>2</sup>) than in the placebo group ( $0.9 \pm 0.9$  kg/m<sup>2</sup>;  $P < 0.001$ ) (Godoy-Matos et al., 2005).

### *Bariatric Surgery*

It is common for children to be excluded from receiving bariatric surgery due to the difficulties involved psychologically and cognitively when preparing children for this type of procedure. Occasionally, bariatric surgery is recommended for those adolescents who are morbidly obese, since they seldom respond to nonsurgical therapy (Abu-Abeid, Gavert, Klausner, & Szold, 2003). Currently, at Texas Children's Hospital there is a Bariatric surgery program where adolescents have several goals they must be able to achieve before surgery is approved. The adolescents in this program are followed by a group of professionals composed of dietitians, doctors, nurses, psychologist and social workers.

Bariatric surgery is complicated and stressful on the body; it can also lead to nutritional deficiencies. Adolescents may be at greater risk of developing deficiencies due to the fact that they tend to have poor compliance and longer life span than older adults (Xanthakos & Inge, 2006).

### *Dietary Approaches*

*Balanced Macronutrients.* A balanced macronutrient diet is one that includes all those foods that are part of the Food My Pyramid but restrict the calorie intake. One study found that the adolescents who were on a high protein diet did not receive any

benefit in the treatment of obesity when comparing a balanced macronutrient diet to a high protein diet. A considerable weight loss could be obtained through a diet which was moderately energy restrictive and of normal fat content (Rolland-Cachera et al., 2004).

*High Protein.* It has been found that those diets that are high protein, low carbohydrate, and very low calorie, referred to as the protein sparing modified diet, have several benefits, including greater satiety and fat free mass maintenance. In 2000, Brown, Sothorn, Suskind, Udall, and Blecker (2000) found that a multidisciplinary weight reduction program including a protein sparing modified fast diet, behavior modification, and exercise was effective in lowering LDL, total cholesterol, and triglyceride levels in obese children. Another study found that those individuals who are placed on the protein sparing modified fast diet lose more weight than those who are on a balanced diet but tend to gain the weight back within 1 year (Avenell et al., 2004).

*Low Fat.* Much research has been completed in the past years comparing low fat, low protein, and low carbohydrate diets. In a study done by Hauner (2004) he found that when comparing low fat and low carbohydrate diets, after one year weight loss was similar with both diets. The intake of saturated fat is usually higher when following a low-carbohydrate diet, and therefore there is an increased risk of elevated LDL cholesterol, which can contribute to atherosclerosis. It was concluded by the author that the greater weight loss seen on the low carbohydrate diet was due to the low energy intake. The author also stated that in order to be successful in weight loss, calories must be restricted and not just any specific macronutrient. When other researchers compared a

low glycemic index diet and a low fat diet, it was found that those who followed a low glycemic diet had a significantly larger decrease in BMI than those who followed the low fat diet (Spieth et al., 2000).

*Low Glycemic Index.* Increased consumption of high glycemic index foods (LGI) may increase the risk for obesity, diabetes, and cardiovascular disease (Pawlak, Ebbeling & Ludwig, 2002). Diets high in protein but low or modestly low in carbohydrate intake have resulted in greater weight loss than traditional low-fat diets (Schoeller & Buchholz, 2005).

The glycemic index describes foods by ranking carbohydrates according to their effect on blood glucose levels. Low glycemic index carbohydrates are those that produce only small fluctuations in blood glucose and insulin levels therefore increasing the body's sensitivity to insulin. Ebbeling, Leidig, Sinclair, Hangen, and Ludwig (2003) have suggested that the use of a low glycemic index or minimally processed diet may reduce obesity more effectively as compared to a diet based on the exchange system. In a study by Weker (2006), it was found that children who followed a low calorie, low glycemic index diet decreased their body mass and returned their total cholesterol, LDL cholesterol, and triglycerides levels back to normal. Additionally, epidemiological studies have suggested that the consumption of a low glycemic index/load diet is associated with a reduction in the incidence of Type-2 diabetes (T2DM) and stroke (Schulze et al., 2004). Following both a high-protein and LGI diet increases the loss of body fat, but following a high carbohydrate, LGI diet aids in the reduction of cardiovascular risk factors (McMillan-Price et al., 2006).

A study showed that a LGI diet may reduce abdominal obesity and cholesterol and improved glycemic control in adults enrolled in a cardiac rehabilitation program (LaHaye et al., 2005). In a study done by Fajcsak, Gabor, Kovacs, and Martos it was found that despite no change in body weight when children followed the LGI, there was a significant reduction in percent body fat ( $29.4 \pm 4.2$  vs.  $25.4 \pm 5.3$ ), waist-to-hip Ratio (WHR  $0.87 \pm 0.053$  vs.  $0.86 \pm 0.05$ ), self-reported hunger level ( $4.37 \pm 0.74$  vs.  $1.75 \pm 0.75$ ), and the total number of risk factors (28 vs. 15).

#### Tailored Intervention

As previously stated, there is little information available of a clinical trial which includes the low glycemic index diet in a minority group such as Mexican/Mexican-American severely obese adolescents. There is a need to establish if this diet would be acceptable and feasible for this population not only for obesity co-morbidities, but for other diseases that might be more prevalent in this population. For example, it has been shown that the high intake of rapidly absorbed carbohydrate appears to play an important role in the increased risk for breast cancer in Mexican women (Lajous et al., 2005).

The modified LGI diet involves ad lib fruits and vegetables, lean protein, low fat dairy, and some whole wheat products. A study found that the overall mean fruit and vegetable intake of Hispanics at home was  $1.04 \pm 0.63$  (mean  $\pm$  standard deviation) servings per day which is below what is recommended per day of 5-9 servings per day (Dave, Evans, Saunders, Watkins, & Pfeiffer, 2009). Another research study showed that not only do Hispanics tend to have diets higher in fat and lower in fruits and vegetables, but they usually tend to consume a large amount of soft drinks. Mexican-Americans tend

to have a different diet than those less acculturated. In a study by Neuhouser, Thompson, Coronado, and Solomon (2004), it was seen that on average Hispanics consumed one more serving of fruits and vegetables per day compared to non-Hispanics, but as they acculturated they ate fewer fruits and vegetables and had higher fat diets. It is interesting to note that the modified LGI might be more difficult for those participants who are more acculturated to the American culture. This diet is similar to the diets eaten by people in Mexico. A study comparing two diets where individuals either ate a high glycemic index diet or a low glycemic index diet found that the participants on the low glycemic index diet improved their total cholesterol and LDL cholesterol levels as opposed to those on the high glycemic index diet. The foods that were used in this dietary intervention were Mexican based foods which are considered low glycemic index diet foods (Jimenez-Cruz, Seimandi, & Bacardi-Gascon, 2003).

A culturally specific cholesterol reducing diet program was highly rated and appeared to be effective in changing the diet of a group of participants who had systemic lupus erythematosus, as determined by their food records and body weight (Shah, Cole, Kavanaugh, Adams-Huet, & Lipsky, 2000). Various environmental factors can have been shown to have a larger effect on disadvantaged and minority children than on their advantaged white peers-and thus contribute to disparities in obesity rates.. Therefore, dietary research, recommendations, and interventions should be targeted to each group individually (Kumanyika,& Grier, 2006).

## CHAPTER III

### METHODS

#### Design

This was a qualitative study which sought to identify the acceptability of foods of a modified low glycemic dietary intervention within a Mexican/Mexican-American population. It was part of a larger investigation into the barriers and facilitators of adopting a modified low glycemic diet. Twenty female Mexican/Mexican-American adolescent girls ages 12 to 19 were recruited to participate, along with their families, in a one-time interview at their home. All the interviews were tape-recorded and transcribed.

Qualitative methods were used to explore themes, questions, and statements made by participants in order to understand which foods that are part of this diet were acceptable or unacceptable to this population. Qualitative research is different from quantitative research in that it seeks to describe and classify various cultural, phenomenological, and thematic constructs. It is hypothesis generating rather than hypothesis testing. A qualitative approach was used where 2-3 reviewers would independently read through a few transcripts at a time and identify potential coding categories and key questions that would relate to the acceptability of LGI foods within our study population. These categories would serve as 'codes' for capturing segments of text that describe a specific phenomenon related to our objective. Reviewers would discuss as a group and eliminate/merge any overlapping or redundant codes until an

agreement was reached for categories. This process was repeated until all transcripts had been read and an exhaustive list of categories had been agreed upon by all the reviewers. All transcripts were then coded with the developed categories using the software program Atlas.ti; (Scientific Software Development GmbH); a robust application designed to facilitate qualitative analysis by allowing researchers to systematically code large amounts of textual data. Each category was defined, often pulling directly from the text, according to the concept it was meant to describe. All categories could then be sorted and organized into larger conceptual themes (i.e. codes for high amounts of carbohydrates, saturated fats, or fast food would be subsumed under the theme, 'food consumption'). Themes were meant to describe the overall nature of a concept as it related to our main objective. These themes were then discussed with a third party of researchers, to act as a validity check, until consensus was reached on all major themes.

### Participants

A total of twenty female Mexican/Mexican-American adolescent girls aged 12 to 19 years were recruited to participate, along with their families, in a one-time interview at their homes. Twelve families spoke English as a primary language while the remaining 8 families were interviewed in Spanish. Only 20 families were recruited, as this is a qualitative study, and a smaller sample size using this type of research method is widely accepted (Peel, Douglas, & Lawton, 2009).

Participants that were included in the study must have: (a) been a patient receiving clinical services in the TCH Adolescent Clinic, El Centro de Corazon/Magnolia, community clinics, or one of the TCPAs, or at OGA, or been a



student at Mt. Carmel High School; (b) been greater than or equal to 150% of ideal body weight; (c) been female, between the ages of 12-19 years, and self-identified as Mexican/Mexican-American; and (d) stated they were ready to lose weight using a dietary approach.

Patients were not eligible to participate in this study if they: (a) were using medications that cause weight gain (i.e. Depo Provera, prednisone) as determined by their physician; (b) were diagnosed with specific afflictions known to cause or be associated with obesity, such as Cushing's syndrome, insulinoma, hypothyroidism, hypogonadism, growth hormone deficiency, pseudohypoparathyroidism, Prader-Willi syndrome, Bardet-Biedl syndrome, and Cohen syndrome; (c) had already tried to follow a LGI diet as prescribed by health care providers in the Adolescent Medicine clinic at TCH; and (d) were pregnant or breastfeeding.

#### Procedure

The study was reviewed and approved by the institutional review board at Baylor College of Medicine and at Texas Woman's University (see Appendix A). Informed consent was obtained by all family members participating in the study. All research personnel involved in this project were IRB certified.

Adolescents and their families that qualified were approached and asked for their participation. Potential participants were informed that participation was entirely voluntary and that they had the option of withdrawing at any time. They were reassured that they may refuse to participate and that their refusal would not impact the care they

received at TCH or El Centro de Corazon/Magnolia, community clinics, or one of the TCPAs, or at OGA.

A team of 3 trained research assistants (medicine, nutrition, psychology, or public health graduate students or post-doctoral fellows, a research coordinator, or faculty) traveled to each home. Written informed consent was obtained from parents/guardians and other adults and from the identified adolescent. Parent/guardians also provided written consent for each child who was under 18 years of age and who agreed to participate. Family members who consented to participate were initially interviewed all at one time. Families were asked to describe their food shopping and preparation routines, including any times they eat out of the house. Then the modified low glycemic diet was described in detail. Families were asked which foods they thought they might have difficulty eating, how they thought the diet could be adjusted to fit their preferences and lifestyle, etc. Once the family interview was completed, the adolescent was interviewed separately where she was able to discuss whatever she did not feel comfortable talking about in her family's presence. The entire interview took 90 minutes: 60 minutes with the entire family, and 30 minutes where the adolescent was being interviewed by one researcher, while the family was interviewed by another researcher in different rooms.

Adolescents and families were compensated a combined \$70 for their time.

#### Data Collection Materials

Each target adolescent was asked to record the foods she ate during a 3-day period during the week before the interview. This allowed the researchers to ask specific questions about the acceptability of the modified low glycemic diet relative to what the

adolescent normally ate. Food diaries were discussed during the adolescent interview. Accuracy of measurement was not the aim of this study. There was no attempt to quantify calories and nutrients consumed.

Open-ended questions consistent with a qualitative approach were used to elicit participant reactions to foods associated with the modified LGI diet during both the family and adolescent interviews. Questions were developed by a group of experts composed of medical doctors, dietitians, and psychologists who treat adolescents and reviewed by 3 Mexican-American adolescents see Appendix B.

### Data Analysis

For the current thesis research, a framework analysis approach to analyzing qualitative data (Simovska , 2007) was used. Framework analysis involves 5 distinct stages of analysis. The process began with familiarization, the process of sifting and sorting audio and written data. The next steps were composed of theme identification, identifying key issues, concepts and themes; indexing, a thematic framework was systematically applied to the data; charting, data lifted from original context was rearranged according to appropriate thematic reference; and mapping and interpretation, research notes were reviewed, perceptions, accounts, and experiences were compared and contrasted in the search for patterns and connections in the search for explanation and meaning.

Once the themes were reviewed and confirmed, the content was summarized and compared across all interview groups, including families/adolescents, grouped

accordingly to language of the interviews conducted with the families, and target adolescent age.

## CHAPTER IV

### RESULTS

A total of twenty female Mexican/Mexican American adolescent girls aged 12 to 19 years were recruited to participate, along with their families, in a one-time interview at their home. Of the families twelve spoke English as a primary language and 8 families were interviewed in Spanish. Table 1 describes the demographic characteristic in this study including the parents' level of education and mean age of the adolescents.

Participants' responses were divided among the tenets of the modified LGI which include ad lib fruits and vegetables, lean proteins, low fat dairy products, whole grains, and following appropriate portion sizes based on the plate method. Table 2 shows the different types of foods eaten by the participants. Responses were also divided by the acceptability of these tenets.

#### Current Food Consumption Patterns

##### *Consumption of High-Fat Foods*

All 20 families (including 8 Spanish speaking and 12 English speaking) reported consuming a variety of high-fat foods both inside and outside the home. Nineteen out of 20 families described eating meals out of the home. Typical restaurants included Jack in the Box, McDonalds, IHOP, Taco Bell, and Wendy's, and the most commonly order foods were burger and chicken nugget meals, buffalo wings, taquería meals. Twenty out of 20 families described eating fried foods. For example one family described frying hot

Table 1

*Demographic Characteristics of the Sample of 20 Severely Overweight Adolescents and their Families*

	Parent Interview Conducted in Spanish (N=8)	Parent Interview Conducted in English (N=12)
<hr/>		
Adolescents (N=20)		
Language spoken at home	3 Spanish-only, 5 both	5 English-only, 7 both
Age (mean, median, range)	13.8, 14, 12-15	15.3, 15.5, 12-18
Parents (N=34)		
Mom education level (N=19)	1 high school grad, rest 9 <sup>th</sup> grade or less (missing 1)	4 high school grad, rest 11 <sup>th</sup> grade or less
Dad education level (N=15)	1 college educated, 1 high school grad, remaining 4 8 <sup>th</sup> grade or less (missing 2)	1 MA, 5 high school grad, rest 10 grade or less (missing 3)

*Note. Age = years*

Table 2

*Current Food Consumption Reported by Adolescents*

	High Fat	High Sugar	Refined Flour	Large Portions	Fruits and Veggies
Family 1 ss	chicken nuggets/Tamales (chicken)/Jack in the Box/potato chips/ 2% milk	cake/pancake/soda	cake/pancake/tortillas	maybe a dozen tortillas a day	fruits, vegetables
Family 2 es	sausage/pizza/Jack in the Box/Wendy's/Little Ceasar/cookie/doughnut/french fries/fried potato	doughnut/cookie/powdered/cream real	ramen noodles, cereal/tortillas /rice	2/3 potatoes 1/3 flautas	fruit

Table 2 Continued

Family 3 es	rice krispy	pies/cake	ramen	4	vegetables
	treats/powdered	s/ice	noodles/en	enchiladas	/peas/carr
	donuts/pies/cake	cream/le	chiladas/pi	,rice and	ots/candie
	s/ice cream/2%	monade/s	zza/rice/tor	beans/2	d yams
	milk/strawberry	oda/ tea/	tillas	cups of	
	milk	strawberr		rice a	
		y milk		roni/2nds	
				Rice A	
				Roni	
Family 4 ss	refried	cereal/ari	rice/mac and		brocoli,
	beans/barbacoa/J	zona	cheese/pizza		salad with
	ack in the Box/	tea/choco			turkey,
	pizza/chocolate	late milk			veggie
	milk				salad
Family 5 es	pot	sweets/	pot	2nds on	corn and
	pie/enchilada/las	ice	pie/tortillas	lasagna	green
	agna/pizza/refrie	cream,	/noodles	and	beans,
	d beans with	pop		enchiladas	oranges,ap
	cheese/whole	tarts/pies/			ples,grape
	milk	slurpee/			s



Table 2 Continued

Family 6 es	fried rice/fried	apple	rice/tortas/	3	bananas/sa
	chicken/barbaco	cobbler/b	quesadillas	quesadilla	lads/tomat
	a/fried	utter	/pizza/brea	s/2nds on	oes/onions
	cheese/quesadill	toffee/pu	d	rice and	/cucumber
	as/pizza/Jimmy	dding/cho	w/beans,m	beans,	s
	Dean/McDonald	colate	eat,cheese/	potatoes	
	s and	milk/coke	ramen		
	Chinese/apple	/apple	noodles		
	cobbler/butter	juice			
	toffee/pudding/c				
	hocolate milk/				
	whole milk/2%				
	milk				
Family 7 ss	aguada	vainilla	torta/tortill	3 to 4	cactus/frui
	soup/lasagna/tort	and	a/rice/lasag	cups of	t/salad
	a/Cici's pizza,	chocolate	na/spaghatt	rice	
	chinese	cookies/c	i/		
	food/fries/2%	ookies/N			
	milk/	ERDS/ho			
		rchata			

Table 2 Continued

Family 8 es	chicken tenders/eggs and bacon or sausage, McDonald's(Mc Griddle(eggs, cheese and sausage)/whole milk	cookies/s weet bread/ an	bagels/toas t/ t/	corn
Family 9 es	chicken nuggets/fried chicken/hambur gers/pizza/mac and cheese/sausage biscuit/McDonal ds(burger,fries)/ pecan pie/cake/bunuelo s/frapuc	cookie crisp cereal/pec an pie/cooki es/bunuel os/frapuc chinos/dr pepper/so da/orange juice	pizza/lasagna/mac and chese an	green apples, grapes & strawberri es/broccol i/peas/cor n/lettuce/b anana/bro ccoli with cheese

Table 2 Continued

Family 10	brisket/taco w/	chocolate	rice/chips	2 cups of	lettuce,
ss	egg,bean and	milk/sprit		rice	apples,
	chorizo/Jack in	e/lemona			pears and
	the Box(ceasar	de/soda/			pinneappl
	salad)/pizza/Mx				e
	buffets/Cici/				
	fries/nacho				
	cheese				
	chips/chocolate				
	milk/2% milk				
Family 11	fried	cinammo	pizza/break	2nds on	corn with
ss	steak/hamburger	n toast	fast burger	french	butter/lett
	s/pizza/fried	crunch/or	(white	fries/ 6 oz	uce/tomat
	chicken	ange	bread, ham	of fried	o/onion
	sandwich/McDo	juice/soda	and	steak, 2	
	nalds and	/tea/sunki	cheese)/tor	cups of	
	Cici's/chinese/fri	st/coke/H	tillas/Maru	corn with	
	es/cheetos/whole	iC	chan soups	butter	
	milk				

Table 2 Continued

Family 12	hamburgers/enc	snow	rice/tortilla	1/2	fruit
es	hiladas/pizza/	cones/cak	s/spaghetti/	chicken,	
	whataburger/mc	es and ice	garlic	1/4	
	donalds/jack in	cream/co	bread/rame	potatoes	
	the box(2	ke/tea	n	1/4	
	tacos)/wings/mc		noodles/ma	macaroni/	
	donald's/hambur		caroni and	seconds	
	gers and french		potatoes/cr	on beans,	
	fries/frito		ackers/frito	enchiladas	
	pie/2% milk		pie	and	
				spaghetti	
Family 13	enchiladas/raviol	cakes(	rice/spaghe	seconds	banana/
es	i with	duncan	tti/ravioli/t	on rice	salad with
	cheese/Mcdonal	hines)/co	ortillas	and	fat free
	d's sausage,	okies for		beans/1/2	ranch
	biscuit and hash	snacks		a cake	dressing/p
	brown/Pizza/Jac	(chips			ineapple
	k in the box	ahoy)/can			
	(cheeseburger)/s	dy bar/			
	onic				

Table 2 Continued

Family 14	chicken	cereal(ho	rice/pizza/t	1/2 plate	
es	nuggets/menudo	ney	ortillas	enchiladas/rice and	
	/enchilada/lasga	bunches		beans other half	
	na/pizza/nachos/	of oats,			
	Burger or	honey			
	pizza/fried	combs,			
	chicken/chips/po	frosted			
	p corn	flakes/tea			
	movie/2%	/soda/cho			
	milk/chocolate	chocolate			
	milk or	milk			
	strawberry				
Family 15	gorditas/burritos	shake/ora	tortilla	2 cups of	lettuce
ss	/enchilada/pasta	nge		cereal	and
	salad with	juice/oran			cabbage
	cheese/2% milk	ge mango			with
	or shake/pizza,	juice/soda			lemon,
	Pollo				salad
	Campero/spicy				
	chips				

Table 2 Continued

Family 16	chicken	tres	rice/lasagn	2 slices of	fruits
ss	wings/bacon/tac	leches/ap	a/tortilla	bread, 2	
	os with	ple		pieces of	
	cheese/lasagna/e	juice/horc		lasagna	
	ggs and	hata/pine			
	sausage/seafood	apple			
	sub/fried	juice/sprit			
	shrimp/ fried	e/gatorad			
	oysters/tres	e			
	leches				
Family 17	fried	cookies/le	rice/tortilla	1/2 plate	salads,
es	meat/sausage/chi	monade/c	s	meat 1/2	carrots,
	cken	oke/tea		plate	pickle and
	nuggets/cereal			rice/3	fruit,
	with cheese and			slices of	broccoli
	milk/McDonalds			cheese	with
	chicken				cheese,pea
	nuggets/menudo				rs
	/barbacoa/burrit				
	os/fried rice				

Table 2 Continued

Family 18	fried fish/nachos	frosted	rice/toast/	seconds	oranges,ap
es	with cheese and	flakes/le	tortillas	on	ples and
	sour	monade/i		enchiladas	grapes
	cream/enchilada/	ce		and	
	fritos with chile	tea/coke/c		rice/1/2	
	and cheese/	hocolate		plate	
	pizza/chips with	milk/oran		enchiclad	
	cheese and	ge juice		as, 1/2	
	chili,fritos			plate rice	
Family 19	sausage	smoothie/	rice	3	canned
ss	kolache/Chinese	double		enchiladas	pinneapple,
	(orange chicken	chocolate			battered
	and general tso,	chip			corn,fruit
	rice and egg	frappuchi			as snack
	roll)/pizza with	no/sprite/t			
	ranch/double	ea/coke/p			
	chocolate chip	unch			
	frapucchino/Iho				
	p (appetizer				
	sampler)				

Table 2 Continued

Family 20	Pizza/Olive	pepsi	rice/tortilla	1/2 meat	Fruits
es	Garden (chicken		s/bread	and 1/2	
	strips, fries,		sticks	rice plate	
	salad and bread				
	sticks)				

---

*Note. SS is the abbreviation for Spanish Speaking and ES is the abbreviation for English Speaking.*



dogs, “Well I heat up the hot dog. I boil the weiner and then cut cheese and I put it in. Well I cut the weiner and I put cheese inside, wrap it in a tortilla and I fry it.” Other examples of fried foods included French fries, refried beans, fried cheese, fried chicken, and fried fish. Families also tended to have a diet that consists of many different cheesy foods. Cheese-filled dishes described by participants included enchiladas, pizza, lasagna, and macaroni and cheese, to name a few. One family included foods such as enchiladas, lasagna, pizza, and refried beans with cheese to their daily menu of foods.

For some families, their extended family was their sole source of socialization beyond work or school. Family gatherings were often a source of high calorie foods, and certain foods were seen as holding special meaning. Some of the teens ate at their extended families’ houses where they were provided with high fat foods. For example, the adolescent for family 7 said, “So you go to your aunt’s house with your cousins and you eat cookies and fries. What are the other kind of foods you eat there? Sometimes she has tacos. Sometimes I eat nothing. Fries”.

Adolescents also tended to eat high fat foods when they are out with their friends. For example adolescents described eating pizza with friends or stopping at fast food restaurants with them. One adolescent described ordering the appetizer sampler as a meal for herself when she is out with friends. Foods included in the appetizer sampler are mozzarella sticks, onion rings, and crispy chicken strips.

A total of 17 out of 20 (85%) families described drinking milk. Some families stated that they drank 1% or 2% milk, but other families just described drinking milk.

### *White Flour and Highly Processed Foods*

Simple carbohydrates in the form of white flour or corn tortillas, white bread, and white rice were a staple for 15 out of 20 (75%) families, reflecting culturally-specific foods such as gorditas with beans and potatoes, flautas, tacos, burritos, corn tortillas, and tostadas. When referring to rice, 15 out of 20 families described eating rice as a part of their daily menu. The type of rice consumed varied from family to family. Some families just described rice as rice and others said it was “Mexican rice” or “yellow rice” or even “fried rice”.

### *Sugary Beverages More Prevalent Than Sugary Foods*

All 20 families reported consuming sugary beverages, including sodas, juices, slurpees, frappuccinos, sports drinks, and whole and flavored milk. The consumption of solid sweets was less common, with 14 out of 20 families (70%) (5 families were Spanish speaking only and 9 families were English speaking) naming cake, cookies, Mexican sweet bread, Rice Krispy Treats, ice cream, and doughnuts as examples of desserts or sugar-filled snack foods.

### *Excessive Portion Size and Skipping Meals*

The majority of adolescents/families (17 out of 20 families) reported eating excessive amounts of food at many meals. For example, in the interview with family 18 it was asked, “If you had a dinner plate how much you would say is enchiladas and how much would you say is rice? If you had to guess, is it 50/50 or 75/25.” The mother replied, “It would be the same amount a little bit of rice and two enchiladas. In another interview with family 12 the mother stated, “Half would be chicken and, uh, quarter of a

mashed potatoes, and a quarter of, uh, macaroni. Or if it was enchiladas, it would be half, and it would be one quarter of rice and one quarter of beans.”

A total of 13 of the 20 adolescents (65%) interviewed reported skipping meals, mostly just breakfast but some also reported skipping lunch.

### *Fruits and Vegetables*

Nineteen out of 20 families stated that they ate fruits at home. Ten out of 20 families (50%) said that they ate fruits for snacks. Most of the families that said they ate fruit for snacks; include English speaking (8/10). Other families stated consuming other foods for snacks examples were things like crackers, Cheetos, doughnuts, and chips. For example, the adolescent in family 6 stated the following during the interview:

Interviewer: “Thinking about what Roberta was describing about the kinds of foods that you would want to eat, what would be a good replacement for the saltine crackers?”

Adolescent: “Fruits would be nice. It’s just what’s available. If I definitely had fruit then I would totally replace it for the saltine crackers. Cause I don’t usually eat saltine crackers. They were just there so I ate the saltines.”

### *Acceptability of the Modified LGI Diet*

The acceptability of different aspects of the modified LGI diet – whole wheat/whole grain foods, lean meats, low-fat dairy, fruits/vegetables, and portion control - varied greatly across the families interviewed for this study.

### *Acceptability of Lean Meats*

Barriers to accepting the need to eat lean meats included not knowing how to prepare the foods so that they tasted good. Fifty percent (10 of 20) of the families stated that they either fried their meats, added oils to cook them, or sautéed their meats. The remaining 10 families reported a variety of meat preparation methods. One family stated that they broiled their meats, while 3 families stated they grilled their meats, and 3 other families stated they baked the meats.

### *Acceptability of Low-Fat Dairy*

Eleven of 20 families (55%) stated that changing to low fat dairy would be something hard for them to do or that whole dairy products would be hard to give up, with 3 stating that they had tried doing so and family members refused to drink the lower fat milk. The remaining 8 families did not feel confident they could make or attempt a change to lower fat milk and/or low fat dairy products. In family 14, the mom stated, “I think the milk. I’ve bought it before at the beginning we drank like three gallons of whole milk a week and I started skim milk and it was there all week nobody wanted milk. I went to 2%, but they won’t drink 1% or skim milk it’s too watery.”

Only 2 of the 20 families stated that this change would be easy; both examples specifically related to including 1% milk. For example when family 10 was asked the following question, “What about the milk? What do you think of that?”, the adolescent responded, “Good” and mom followed by saying, “That we can do because we used to drink whole milk now we drink 2% therefore we can drink 1%.”

### *Acceptability of Whole Wheat and Whole Grain Foods*

When asked about the acceptability of changing from white to brown rice, brown rice was also cited as easy to include by four families; likewise it was cited as hard to include by five families. The mom in family 9 responded the following when asked if she thought it would be easy to change to brown rice, “I have. Now, I don’t like it. I don’t think anybody liked it not even my husband. And like I said, he’s a good eater.” In comparison, when the adolescent in family 1 was asked about switching to brown rice and whole wheat tortillas her response was, “Easy”.

Rejecting refined flour products in favor of whole wheat and whole grain products, including whole wheat tortillas, was a barrier for over half of the families (11 out of 20), the highest amount of any food mentioned. However, 8 families thought it would be easy to include whole wheat tortillas and other whole wheat products such as bread or pasta. Overall, whole wheat products, including tortillas, were the most cited food in both the hard to include and easy to include categories. For example, the dad in family 13 stated, “We tried the wheat they just wouldn’t go for it”. The mom in family 10 also stated, “First, we have tried the wheat tortillas before and they are just left in the refrigerator. If they are corn or flour tortillas they get eaten. There isn’t much interest in wheat tortillas”.

Seventeen out of 20 (85%) families described eating beans. It is unknown if the beans were boiled or fried. Most families described just eating beans and did not specify if these were boiled or fried. Only one family specifically said that their beans were fried.

### *Fruits and Vegetables*

Nineteen out of 20 (95%) families stated that they ate either fruits or vegetables or both at their home. Carrots and fruit tied as the second most “easy to include” type of food that is part of the modified LGI (n=6 carrots, n=6 fruit). Three families cited lettuce as an acceptable vegetable, though it was always listed together with carrots, reflecting a common Mexican meal accompaniment of shredded lettuce and/or carrots.

When asked if they could eat half a plate of fruits and vegetables, 8 families replied, “not hard,” and 5 stated it would be “easy”. Four families said it would be difficult to do so. For example when asked “How hard would it be to eat the half plate of veggies and fruit?” the adolescent in family 2 stated “I don’t think it would be that hard because if I’m still hungry, I could eat more vegetables or fruits.” In response to the same question family 10 stated:

Mom: “It will not be hard for me.”

Interviewer: “How about you?”

Adolescent: “A little.”

Interviewer: “It will be hard because you don’t like it.”

Adolescent: “Yes because I don’t like it.”

Interviewer: “Because you have not tried them.”

Adolescent: “I have tried them but they don’t catch my attention.”

Some families also stated that they did not realize that fruits and vegetables were acceptable weight loss foods.

### *Overall Acceptability – the Deal Breaker*

Immediately post-intervention the families were asked the following question in order to capture their initial reactions to the diet: “What do you think of the foods I have just shown you?”

The initial reaction for fifty percent of the families was positive and did not include any statement of hesitation or skepticism. One mother said, “It’s reasonable;” many said the foods were “fine” or “good,” and several families and adolescents said directly that they could follow the diet.

The remaining fifty percent gave the following responses: initially positive statements but with hesitation or concerns (4/20), totally negative responses (4/20), or discrepancies between the mother’s and adolescent’s reactions (2/20).

Four out of the 20 families (20%) responded with general positivism then immediately stated a concern, perhaps indicating less acceptability than the initial positive reaction implied. Families said that the foods “looked good” but then immediately stated a barrier to following the diet, usually a food that would be difficult for them to add or give up, such as soda. One family expressed predetermined resignation, even though they stated that they liked the diet: the mother in family 6 stated, “I like it. I wish we could stick to something like that. That would be nice. It really would”.

Four out of the 20 families (20%) responded negatively, either directly stating they could not follow the diet, listing barriers, or becoming defensive. One adolescent (family 3) reacted particularly to portion size by stating, “All of it sounded good and then

you said the size of a deck of cards and everything went out the window”. Other barriers included having to eat “different food” and missing high-calorie foods. Families expressed defensiveness by stating that they do not eat or buy a certain unhealthy food. The father in family 7 stated that, while he and his wife want to comply, his 14-year-old daughter “makes them buy” unhealthy food.

In 2 families, the mother said it would be easy, while the adolescent said it would be hard or expressed hesitation. Family 15 stated:

Mom: “Very good.”

Interviewer: “Will it be easy for you?”

Mom: “Yes, she likes wheat bread.”

Interviewer: “Do you think it will be easy or hard?”

Adol: “It is hard.”

Interviewer: “Why?”

Adol: “Because I like chips.”

### *Affordability and Access*

While 75% (12 of 16) families responded that they could afford the foods on this diet, the remaining 25% (4 of 16) reported that it would be expensive. Some of the reasons given included; it costs too much to be on a diet (referring to Sugar Busters), lean meats are more expensive, and filler foods are more affordable.

All of the families (100%) reported that they could find the fruits and vegetables required for this diet. A couple of families did voice an interest in knowing what to buy and how to prepare it.



## Movements of Change, Knowledge Deficit and Troubleshooting

We also captured the impact of the intervention on the participants' awareness: did the intervention achieve its goal of educating families on correct/incorrect foods? Did families display a shift in knowledge? Were families able to extrapolate on their own and troubleshoot problem foods in the new context of the modified LGI diet? For example in the interview with family 9 it is shown how mom starts developing her own way of adapting the diet to her daily living:

Interviewer: "As long as they were ones you liked. It doesn't sound like you eat a whole lot of seconds, but would it be hard to eat just one serving of meat or potato or rice?"

Mom: "Probably because I think our portions are a lot bigger than the average."

Interviewer: "What we're trying to do with this diet is fill up a plate of food so you have a whole plate of food but we're balancing out the low calorie things, fruits and vegetables, with the higher calorie things, the meat and potatoes."

Mom: "Yeah, actually, that gives me an idea. If I included a salad at every dinner that would take up a good portion and then just putting things that everybody likes. Of course, they generally like it plain but everybody likes something. My husband likes tomatoes, onions and I like tomatoes, cucumbers. Fixing that is an idea."

### *Families Already Making Changes*

Some families stated that they were already making some of the changes being discussed in the study. These families stated that they were either trying some whole

wheat products, drinking lower in fat milk, or cutting down on their portion sizes. For example, the dad in family 13 stated, “We cut down on a lot of tortilla eating because before it was kind of like you know Hispanics they use tortillas kind of like you use a fork. We cut down and you know use a fork more. We do more corn then the regular we are trying to do changes”.

### *Lack of Knowledge/Awareness*

In order to note the participants’ starting point or preexisting knowledge base, we captured passages that displayed a range of familiarity with the correct foods. These yielded three notable patterns of awareness:

1. Participants displayed a lack of awareness of the correct foods. For example the adolescent in family 17 stated: “Well, see we weren’t going to drink like a coke or something, it would be sprite. And not coke.” Another example was when the dad in family 13 stated, “We tried switching them to skim milk, but they wouldn’t go for that either. I don’t know if it is any better then the 2%.”
2. Participants were aware of correct/incorrect foods due to previous nutritional intervention or knowledge but had not taken significant action to implement that knowledge. The adolescent in family 3 stated, “Remember you’ve got that 1% and it tasted like whole milk and we were fascinated and never bought it again. It tasted good. It was that kid’s vitamin, kid’s iron.”
3. Participants were aware of correct/incorrect foods due to previous nutritional intervention or knowledge, had taken action, and then relapsed. For example, the mom in family 2 said, “Well, you know I was going to Weight Watchers and I

was weighing like 315 pounds. And I lost 80 pounds and I gained some of that back. And the last couple of months have been really strange and weird and really hard for me to get motivated. But she went a little while with me and she had lost some weight over a year ago. But ever since then we don't drink regular cokes. So we cut out some stuff and I tried to limit. Right now it's like I'm not limiting anything. We're bringing in all kinds of garbage. But there are other times when I do cook and we have vegetables. The stuff I'm telling you right now has been pretty much the pattern over the past two, three months."

*Believe Making Right Choice, But Not*

Some of these families appeared to have wrong information when it came to foods. For example some families thought they were making a healthier choice by drinking Sprite as opposed to dark-colored sodas. For example, the mom in family 5 stated, "They have Kool-aid because I can measure how much sugar goes into it".

Table 3 summarizes the acceptability of the tenets of the modified LGI. It divides the responses of the families and adolescents by the foods they thought would be hard to include in their diet and the foods they thought would be easy to include in their diets.

Table 3

*Acceptability of Foods Included in the Modified LGI*

	Hard to include	Easy to include
	N= 20 Coded	N=12 Coded N=8 Not coded (3, 4, 7, 8, 9, 11, 14, 16)
Family 1 (age15)	veggies  {4: say they can do it all}	whole wheat tortillas, brown rice,  other whole wheat products like pancakes, diet soda
Family 2 (age 15)	whole wheat	fruits/veg;  snacks listed by RA "Light yogurt, string cheese, bean enchiladas. Apple or celeries with peanut butter. Tuna salad." Mom: "That's good";  baked chicken instead of fried
Family 3 (age 17)	portions  {4: portions}	---
Family 4 (age 15)	wheat tortillas and wheat  bread, making time  {4: popcorn, fruits}	---  {4: Bananas and grapes, but only if washed & set out; yogurt}

Table 3 Continued

Family 5 (age 18)	low fat dairy, popcorn, meat(quasi-vegetarian) {4: meat}	fruit, whole wheat pasta, diet soda, crystal light
Family 6 (age 14)	fruit, diet soda	vegetables, brown rice
Family 7 (age 14)	whole wheat (say haven't tried yet), then say nothing would be hard {4:say tried ww but went back to Mexican bread; portions}	popcorn (not coded specifically but mentions it in 5b)
Family 8 (age 18)	low fat dairy, veggies, brown rice	---
Family 9 (age 17)	whole wheat tortillas, brown rice, seafood, low fat milk	---
Family 10 (age 14)	whole wheat	taco with eggs, fruit salad, 1% milk
Family 11 (age 14)	whole wheat bread, low fat milk {4: same}	---

Table 3 Continued

Family 12 (age 16)	diet coke	low-fat ranch dressing  {4: fruit-apples, grapes, peaches, strawberries, bananas}
Family 13 (age 13)	salad, wheat tortillas (dad), veggies, low fat milk	wheat products (adolescent)
Family 14 (age 13)	fruits, low fat milk, whole wheat tortillas	popcorn (not coded specifically but mentions it in 5a), salads (not coded but mentioned in 5e)  {4: Broccoli, carrots}
Family 15 (age 13)	whole wheat, veggies	lettuce, carrots
Family 16 (age 12)	low fat milk  {4: same; brown rice}	lettuce, carrots (not coded but mentioned 5e)
Family 17 (age 18)	diet coke, low fat milk	whole wheat bread, tortillas,  brown  rice, yogurt, diet lemonade, bran cereal with raisins
Family 18 (age 12)	whole wheat tortillas , veggies  {4: veggies}	diet soda, diet lemonade, fruit,  lettuce, carrots, 1% milk, brown rice, maybe whole wheat tortillas  if they can find them, different

Table 3 Continued

		cereal, less cheese/low fat cheese and chicken when making enchiladas
Family 19 (age 13)	veggies, brown rice, grilled/baked chicken instead of fried	carrots, fish
Family 20 (age 12)	fish, brown rice (but hasn't tried it), broccoli-veggies,	crystal light, chicken, fruits: apple, orange, banana, grapes, popcorn, different cereal  {4: wheat tortillas, carrots}
Totals	N= 5 whole wheat tortillas  N= 6 other whole wheat products  N= 7 low fat dairy  N=6 veggies  N=5 brown rice  N=3 diet soda	N=6 carrots  N=6 fruit  N=4 wheat tortillas  N=4 whole wheat products  N=4 brown rice  N=3 lettuce  N=3 diet soda  N=2 veggies (general)  N=1 low fat dairy

## CHAPTER V

### DISCUSSION

#### Discussion of Results

Analysis of the foods commonly eaten by adolescents and their families revealed multiple sources of calories that are inconsistent with a modified low glycemic index dietary plan, including consumption of high-fat and calorie-dense foods, white flour and highly processed foods, high sugar beverages, and excessive portion sizes. Consistent with the literature we found that the adolescent participants in the study were consuming large amounts of processed foods, fat, larger portion sizes and high fructose corn syrup (Ludwig, Petterson, & Gortmaker, 2001). Adolescents today are consuming high fat foods at home, at school, and at fast food restaurants which increases their daily calorie intake in turn increasing their weight. The caloric density of such foods and beverages is the main factor driving obesity in this population.

Overall, whole wheat products, including tortillas, were the most cited food in both the hard to include and easy to include categories, indicating that there is no universal barrier to whole wheat products within this population. This factor can actually work in a positive way towards the acceptability of the modified LGI. One of the main tenets of the modified LGI is that all grain must be whole wheat. If families could start by trying products such as bread and tortillas that were whole wheat, eventually this could lead to a majority of their products becoming whole wheat. A way to help families make



a smooth transition into whole grain products would be to suggest to make their home made tortillas using half white flour and half whole wheat flour for about a month, and then the next month add more whole wheat flour and less white flour, until eventually all of the tortillas are made out of whole wheat flour.

Other foods that families typically described as part of their diet were rice and beans. It is unknown if the beans were boiled or fried. Most families described just eating beans and did not specify if these were boiled or fried. Only one family specifically said that their beans were fried. In order for these types of food to be acceptable in the modified LGI families would have to boil the beans instead of frying them and make sure they stay within the appropriate portion size.

It was found that nineteen out of 20 families were eating many meals at fast food restaurants where their choices were almost always foods that are high in fat or sugar. Eating out can be much more expensive for a family than making meals at home. It would be important to educate these families because some of them have a limited income and complain that eating healthy is too expensive. Showing families a comparison of how much one meal cost at home for a family of four compared to eating out at a fast food restaurant would be a way to educate them. Families could also be educated on the fact that eating out is not only expensive but also the foods are nutrient-poor. An idea would be to provide families with books that show the calorie and fat content of foods at fast food restaurants in order for them to be able to make the healthier choice when eating out. One adolescent described ordering the appetizer sampler as a meal when she was out with friends, which include high calorie, high fat foods that are

meant to be shared. Explaining to families how following an modified LGI diet not only helps with weight loss but also helps with maintaining a good health could make it easier for families to be complaint with the diet as stated in the literature (Weker, 2006).

Skipping breakfast or other meals was also found to be a factor with these adolescents, which can lead to excessive portion sizes throughout the day. Excessive portion sizes were consistently prevalent in these participants. The literature has shown how skipping breakfast leads to higher consumption of calories later in the day which can lead to weight gain (Berkey, Rockett, Gillman, Field, & Colditz, 2003). It is important to note that education is needed on portion sizes. In an interview with family 12, the mother stated, “Half would be chicken and, uh, quarter of a mashed potatoes, and a quarter of, uh, macaroni. Or if it was enchiladas, it would be half, and it would be one quarter of rice and one quarter of beans.” Again this statement shows the serving size for carbohydrate and protein is excessive and above what is recommended by the modified LGI diet.

Throughout the years the portions at restaurants have gotten larger which in turn can lead some people to believe that these extreme portions are acceptable or worst what is recommended. Educators should then also provide families with the appropriate portion sizes of foods. An idea would be to show families that using something that they have with them daily, such as their hand, could help them determine an acceptable portion size. Telling families that the size of a small fist is what is recommended for starches and the size of a small palm is what is recommended for protein could be helpful.

Many of these families had misconstrued ideas about which foods were healthy or unhealthy. For example, some families thought that Sprite was better than Coca Cola or

that frying something in olive oil was healthy. Lack of nutritional knowledge is wide spread. It is important to note that some health care educators forget that what might be common knowledge for them might be alien to someone else. Thorough education is the key to success when following a diet. A person would not want to continue following a diet if they did not see immediate results and did not know the benefits of the diet thoroughly. Educating families on the modified LGI diet would be extremely important so that families could implement this diet.

Some of the ways that a health educator could educate families on the modified LGI would be by providing families with pictorial comparisons of foods. For example, the educator could show the families the amount of calories in a regular can of soda compared to zero calories in a diet soda. Another idea would be to ask families if they know the amount of calories in a king size bag of M&Ms (500 kcals) and educate them on the fact that in order to eat 500 kcals worth of apples they would have to eat about 5 apples. Families would be interested in knowing that eating 5 apples at once is harder than eating a bag of M&Ms because of the water and the fiber in the fruit.

Education of families and adolescents could also take place in a classroom. If families were in a group, a discussion might arise in which they could all help each other come up with ideas to make their meals more acceptable with the modified LGI. Also, an educational session where families would be taught about affordable food choices when grocery shopping or out at restaurants would be beneficial. Showing families how they could choose healthy foods at restaurants that cost the same as their unhealthy

counterparts would help them understand that their choices are not cost based but mostly based on what is familiar to them or what they like to eat would be helpful.

Education to these families could also be done in form of a recipe book that would be targeted towards Mexican and/or Mexican Americans. These recipes would have to be culturally appropriate and in both English and Spanish in order for families to find them beneficial and easy to follow as seen in a previous study done by Shan, Cole, Kavanaugh, Adam-Huet, and Lipsky (2000).

### Limitations

This study had several limitations. One of the limitations was the small number of adolescents interviewed during the study. A larger amount of adolescents would need to be interviewed in order to get a better understanding of what adolescents are currently consuming and what they would be willing to change. Another limitation might be that the interviews were done in person. Even though these interviews were done by trained professionals, adolescents might have a difficult time answering questions to adults or strangers. One solution could be to provide adolescents and their families with the interview questions and allow them to answer them on their own. Lastly, this study was a qualitative study where themes were deduced by team members which could create some bias. Themes were also looked at by others in order to reduce bias but this can still leave a window for some themes to be biased.

## CHAPTER VI

### CONCLUSION AND FUTURE RESEARCH

In conclusion, this study provided rich detail of the diet of 20 Mexican/Mexican American families with severely obese adolescents girls ages 12 through 19. It is evident that a low glycemic index diet might aid those people who are seeking weight loss. From the research available we can deduce that people who are obese are at higher risk of developing several different diseases such cardiovascular diseases, T2 DM, asthma, and others. The research shows that there is a need for a tailored intervention especially for certain cultures. Therefore, adjusting foods in diets to make them similar to the foods consumed might make it easier for people to change to a new diet.

The diets of these families demonstrate that they tend to choose foods that are high in fat, sugar, and calories. In the future, health care educators should utilize this research in order to be able to provide families with a more culturally appropriate diet. Knowing exactly what foods these families choose helps health care educators develop a plan in that is acceptable in the modified LGI diet but also acceptable to the families culturally.

Health care educators can use this research in order to understand how important food are to these families and how some foods that they might think are easy to live without is the one thing that will turn an adolescent away from following the diet.

From the research we can deduce that families need to be thoroughly educated and must feel a connection to the educator in order make appropriate diet changes. Health care educators should take time to get to know the family dynamics before suggesting any changes that might turn the families away from the diet.

Future research is needed to determine the impact of the modified LGI diet once it is initiated. Research also is needed to evaluate the effectiveness of the modified LGI diet for weight loss in severely obese adolescent girls.

## REFERENCES

- Abu-Abeid, S., Gavert, N., Klausner, J. M., & Szold, A. (2003). Bariatric surgery in adolescence. *Journal of Pediatric Surgery*, 38, 1379-1382.
- Avenell, A., Brown, T. J., McGee, M. A., Campbell, M. K., Grant, A. M., Broom, J. et al. (2004). What are the long-term benefits of weight reducing diets in adults? A systematic review of randomized controlled trials. *Journal of Human Nutrition and Dietetics*, 17, 317-335.
- Baker, S., Barlow, S., Cochran, W., Fuchs, G., Klish, W., Krebs, N. et al. (2005). Overweight children and adolescents: a clinical report of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. *Journal of Pediatric Gastroenterology Nutrition*, 40, 533-543.
- Berkey, C. S., Rockett, H. R., Gillman, M. W., Field, A. E., & Colditz, G. A. (2003). Longitudinal study of skipping breakfast and weight change in adolescents. *International Journal of Obesity Related Metabolic Disorders*, 27, 1258-1266.
- Berkey, C. S., Rockett, H. R., Field, A. E., Gillman, M. W., & Colditz, G. A. (2004). Sugar-added beverages and adolescent weight change. *Obesity Research*, 12, 778-788.

- Berkowitz, R. I., Fujioka, K., Daniels, S. R., Hoppin, A. G., Owen, S., Perry, A. C. et al. (2006). Effects of sibutramine treatment in obese adolescents: a randomized trial. *Annals of Internal Medicine*, 145, 81-90.
- Best, L. G., Zhang, Y., Lee, E. T., Yeh, J. L., Cowan, L., Palmieri, V. et al. (2005). C-reactive protein as a predictor of cardiovascular risk in a population with a high prevalence of diabetes: the Strong Heart Study. *Circulation*, 112, 1289-1295.
- Brown, R., Sothorn, M., Suskind, R., Udall, J., & Blecker, U. (2000). Racial differences in the lipid profiles of obese children and adolescents before and after significant weight loss. *Clinical Pediatrics(Phila)*, 39, 427-431.
- Caballero, A. E. (2005). Diabetes in the Hispanic or Latino population: genes, environment, culture, and more. *Current Diabetes Reports*, 5, 217-225.
- Caldwell, M. B., Brownell, K. D., & Wilfley, D. E. (1997). Relationship of weight, body dissatisfaction, and self-esteem in African American and white female dieters. *International Journal of Eating Disorders*, 22, 127-130.
- Campbell, R. K. (2009). Type 2 diabetes: where we are today: an overview of disease burden, current treatments, and treatment strategies. *Journal of American Pharmacist Association(2003.)*, 49 Suppl 1, S3-S9.



- Colapinto, C. K., Fitzgerald, A., Taper, L. J., & Veugelers, P. J. (2007). Children's preference for large portions: prevalence, determinants, and consequences. *Journal of American Dietetics Association, 107*, 1183-1190.
- Dave, J. M., Evans, A. E., Saunders, R. P., Watkins, K. W., & Pfeiffer, K. A. (2009). Associations among food insecurity, acculturation, demographic factors, and fruit and vegetable intake at home in Hispanic children. *Journal of American Dietetics Association, 109*, 697-701.
- Ebbeling, C. B., Leidig, M. M., Sinclair, K. B., Hangen, J. P., & Ludwig, D. S. (2003). A reduced-glycemic load diet in the treatment of adolescent obesity. *Archives of Pediatric Adolescent Medicine, 157*, 773-779.
- Eisenmann, J. C., Bartee, R. T., Smith, D. T., Welk, G. J., & Fu, Q. (2008). Combined influence of physical activity and television viewing on the risk of overweight in US youth. *International Journal of Obesity (Lond), 32*, 613-618.
- Fajcsak, Z., Gabor, A., Kovacs, V., & Martos, E. (2008). The effects of 6-week low glycemic load diet based on low glycemic index foods in overweight/obese children--pilot study. *Journal of the American College of Nutrition, 27*, 12-21.
- Gillis, L. J., & Bar-Or, O. (2003). Food away from home, sugar-sweetened drink consumption and juvenile obesity. *Journal of the American College of Nutrition, 22*, 539-545.

Godoy-Matos, A., Carraro, L., Vieira, A., Oliveira, J., Guedes, E. P., Mattos, L. et al.

(2005). Treatment of obese adolescents with sibutramine: a randomized, double-blind, controlled study. *Journal of Clinical Endocrinology and Metabolism*, 90, 1460-1465.

Goran, M. I., Ball, G. D., & Cruz, M. L. (2003). Obesity and risk of type 2 diabetes and cardiovascular disease in children and adolescents. *Journal of Clinical Endocrinology and Metabolism*, 88, 1417-1427.

Hanefeld, M., & Sachse, G. (2002). The effects of orlistat on body weight and glycaemic control in overweight patients with type 2 diabetes: a randomized, placebo-controlled trial. *Diabetes Obesity and Metabolism*, 4, 415-423.

Hauner, H. (2004). Low-carbohydrate or low-fat diet for weight loss--which is better?. *MMW, Fortschritte de Medizin*, 146, 33-5, 37.

Jimenez-Cruz, A., Seimandi-Mora, H., & Bacardi-Gascon, M. (2003). Effect of low glycemic index diets in hyperlipidemia. *Nutricion Hospitalaria*, 18, 331-335.

Khan, L. K., Sobush, K., Keener, D., Goodman, K., Lowry, A., Kakietek, J. et al. (2009). Recommended community strategies and measurements to prevent obesity in the United States. *MMWR Recommendations and Reports*, 58, 1-26.

Kirk, S., Scott, B. J., & Daniels, S. R. (2005). Pediatric obesity epidemic: treatment options. *Journal of American Dietetic Association*, 105, S44-S51.

- Ko, J. S., Yoon, J. M., Yang, H. R., Myung, J. K., Kim, H. R., Kang, G. H. et al. (2009). Clinical and histological features of nonalcoholic fatty liver disease in children. *Digestive Diseases and Sciences*, 54, 2225-2230.
- Kolody, B., & Sallis, J. F. (1995). A prospective study of ponderosity, body image, self-concept, and psychological variables in children. *Journal of Developmental and Behavioral Pediatrics*, 16, 1-5.
- Kristjansson, A. L., Sigfusdottir, I. D., & Allegrante, J. P. (2008). Health Behavior and Academic Achievement Among Adolescents: The Relative Contribution of Dietary Habits, Physical Activity, Body Mass Index, and Self-Esteem. *Health Education and Behavior*.
- Kumanyika, S., & Grier, S. (2006). Targeting interventions for ethnic minority and low-income populations. *The Future of Children*, 16, 187-207.
- LaHaye, S. A., Hollett, P. M., Vyselaar, J. R., Shalchi, M., Lahey, K. A., & Day, A. G. (2005). Comparison between a low glycemic load diet and a Canada Food Guide diet in cardiac rehabilitation patients in Ontario. *The Canadian Journal of Cardiology*, 21, 489-494.
- Lajous, M., Willett, W., Lazcano-Ponce, E., Sanchez-Zamorano, L. M., Hernandez-Avila, M., & Romieu, I. (2005). Glycemic load, glycemic index, and the risk of breast cancer among Mexican women. *Cancer Causes Control*, 16, 1165-1169.

- Linde, J. A., Utter, J., Jeffery, R. W., Sherwood, N. E., Pronk, N. P., & Boyle, R. G. (2006). Specific food intake, fat and fiber intake, and behavioral correlates of BMI among overweight and obese members of a managed care organization. *International Journal of Behavioral Nutrition and Physical Activity*, 3, 42.
- Lindgarde, F. (2000). The effect of orlistat on body weight and coronary heart disease risk profile in obese patients: the Swedish Multimorbidity Study. *Journal of Internal Medicine*, 248, 245-254.
- Ludwig, D. S., Peterson, K. E., & Gortmaker, S. L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet*, 357, 505-508.
- McMillan-Price, J., Petocz, P., Atkinson, F., O'Neill, K., Samman, S., Steinbeck, K. et al. (2006). Comparison of 4 diets of varying glycemic load on weight loss and cardiovascular risk reduction in overweight and obese young adults: a randomized controlled trial. *Archives of Internal Medicine*, 166, 1466-1475.
- Neuhouser, M. L., Thompson, B., Coronado, G. D., & Solomon, C. C. (2004). Higher fat intake and lower fruit and vegetables intakes are associated with greater acculturation among Mexicans living in Washington State. *Journal of American Dietetics Association*, 104, 51-57.
- Ogden, C. L., Flegal, K. M., Carroll, M. D., & Johnson, C. L. (2002). Prevalence and trends in overweight among US children and adolescents, 1999-2000. *Journal of*

*the American Medical Association, 288, 1728-1732.*

- Pawlak, D. B., Ebbeling, C. B., & Ludwig, D. S. (2002). Should obese patients be counselled to follow a low-glycaemic index diet? Yes. *Obesity Reviews, 3*, 235-243.
- Peel, E., Douglas, M., & Lawton, J. (2007). Self monitoring of blood glucose in type 2 diabetes: longitudinal qualitative study of patients' perspectives. *British Medical Journal, 335*, 493.
- Rolland-Cachera, M. F., Thibault, H., Souberbielle, J. C., Soulie, D., Carbonel, P., Deheeger, M. et al. (2004). Massive obesity in adolescents: dietary interventions and behaviours associated with weight regain at 2 y follow-up. *International Journal of Obesity Related Metabolic Disorders, 28*, 514-519.
- Schoeller, D. A., & Buchholz, A. C. (2005). Energetics of obesity and weight control: does diet composition matter? *Journal of the American Dietetic Association, 105*, S24-S28.
- Schulze, M. B., Liu, S., Rimm, E. B., Manson, J. E., Willett, W. C., & Hu, F. B. (2004). Glycemic index, glycemic load, and dietary fiber intake and incidence of type 2 diabetes in younger and middle-aged women. *American Journal of Clinical Nutrition, 80*, 348-356.

Shah, M., Coyle, Y., Kavanaugh, A., Adams-Huet, B., & Lipsky, P. E. (2000).

Development and initial evaluation of a culturally sensitive cholesterol-lowering diet program for Mexican and African American patients with systemic lupus erythematosus. *Arthritis Care and Research*, 13, 205-212.

Sheslow, D., Hassink, S., Wallace, W., & DeLancey, E. (1993). The relationship between self-esteem and depression in obese children. *Annals of the New York Academy of Science*, 699, 289-291.

Simovska, V. (2007). The changing meanings of participation in school-based health education and health promotion: the participants' voices. *Health Education Research*, 22, 864-878.

Sinha, R., Fisch, G., Teague, B., Tamborlane, W. V., Banyas, B., Allen, K. et al. (2002). Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. *New England Journal of Medicine*, 346, 802-810.

Spieth, L. E., Harnish, J. D., Lenders, C. M., Raezer, L. B., Pereira, M. A., Hangen, S. J. et al. (2000). A low-glycemic index diet in the treatment of pediatric obesity. *Archives of Pediatric Adolescent Medicine*, 154, 947-951.

Steinberger, J., & Daniels, S. R. (2003). Obesity, insulin resistance, diabetes, and cardiovascular risk in children: an American Heart Association scientific statement from the Atherosclerosis, Hypertension, and Obesity in the Young Committee (Council on Cardiovascular Disease in the Young) and the Diabetes

Committee (Council on Nutrition, Physical Activity, and Metabolism).

*Circulation*, 107, 1448-1453.

Tanasescu, M., Ferris, A. M., Himmelgreen, D. A., Rodriguez, N., & Perez-Escamilla, R. (2000). Biobehavioral factors are associated with obesity in Puerto Rican children. *The Journal of Nutrition*, 130, 1734-1742.

Thompson, L. S., & Story, M. (2003). Perceptions of overweight and obesity in their community: findings from focus groups with urban, African-American caretakers of preschool children. *Journal of National Black Nurses Association*, 14, 28-37.

Weker, H. (2006). Simple obesity in children. A study on the role of nutritional factors. *Med Weiku Rozwoj*, 10, 3-191.

Whitlock, E. A., O'Connor, E. P., Williams, S. B., Beil, T. L., & Lutz, K. W. (2008). Effectiveness of weight management programs in children and adolescents. *Evidence Report - Technology Assessment (Full.Rep.)*, 1-308.

Xanthakos, S. A., & Inge, T. H. (2006). Nutritional consequences of bariatric surgery. *Current Opinion in Clinical Nutrition & Metabolic Care*, 9, 489-496.

## APPENDIX A

### Institutional Review Board Approval Letter





**The Graduate School**  
P.O. Box 425649, Denton, TX 76204-5649  
940-898-3415 FAX 940-898-3412

DENTON DALLAS HOUSTON

0448374

October 28, 2009

Rebeca Matamoros  
3505 Sage Road #710  
Houston, TX 77056

Dear Ms. Matamoros:

I have received and approved the prospectus entitled *Acceptance of Low Glycemic Index Diet Foods by Severely Obese Mexican or Mexican American Girls Ages 12-19* for your Thesis research project.

Best wishes to you in the research and writing of your project.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Ruth A. Johnson", written over the "Sincerely yours," text.

Ruth A. Johnson, Ph.D.  
Associate Dean of the Graduate  
School

cc: Dr. Karen Moreland, Nutrition and Food Sciences,  
Houston Dr. Chandan Prasad. Chair. Nutrition and Food  
Sciences

APPENDIX B

Interview Questions

Interview Questions related to the acceptability of foods in the  
Modified Low Glycemic Index Diet

*Questions asked to the family together:*

1. Where is the nearest grocery store or market?
2. Who buys the groceries?
3. How many times per week do you shop for groceries?
4. How do people in your family decide what they are going to eat?
5. Who cooks the food? Does everyone eat all the meals you cook? Is it okay for someone not to eat what you cook?
6. What are some of your family's favorite foods?
7. Please describe to us some of the meals your family eats during the week?
  - a. Who eats together at breakfast? At dinnertime?
  - b. Are separate meals prepared for different people? (if yes, describe)
  - c. What food is served?
    - i. How is it prepared? (we need detail here that would tell us about the amount of fats, whole grains, dairy, etc they are consuming. Look at breakfast and dinner.)
    - ii. Describe a typical plate of food at dinnertime. (Go to cupboard and pull down plate and describe what goes on it. How large are the

iii. portion sizes? Are there separate bread and butter and salad plates?)

Could also ask "When you serve dinner, what does it look like?)

d. After you give everyone their first serving of dinner, what happens to the rest of the food? Is it put on the table or in the kitchen?

e. Do people usually have seconds? What do they have seconds on?

f. What liquid is served with the meal? Do the kids and parents all drink this?

If not, what do they drink?

g. Are desserts served? How often? What kinds? How are they made?

h. Are weekend meals any different than weekday meals? Please describe.

8. What kinds of snack foods are available to eat throughout the day? What are your family rules about eating snacks, if any?

9. Does anyone in the family pack a lunch? Who packs the lunch? What is put in it?

10. How many times do you eat out or grab take out or order pizza each week?

Where do you usually eat out or grab take out? Does the whole family eat this food?

*After the diet was described the following questions were asked:*

1. What do you think about the list of foods I have just shown you?

2. Which of these foods would be hard to include in your diet?

3. Which foods that you normally eat would it be difficult to live without?

(Emphasize no added sugar, low fat)

4. How hard would it be to eat just one serving of meat and potato?

5. How hard would it be to eat half a plate of fruits and vegetables?

6. Do you think you can afford to eat the foods on this diet?
7. Do you think you could find all the fruits and vegetables you would need to eat this way?
8. What ways do you think you could make the foods you enjoy fit within this diet?
9. How would you take \_\_\_\_\_ (favorite food) and make it fit within this diet?

*The following questions were asked in the absence of the adolescent to the rest of the family:*

1. In what ways do you think it would be hard for your daughter/sister to follow this diet?
2. In what ways do you think it would be easy for your daughter/sister to follow this diet?
3. Do you think the entire family would want to go on this diet? Do you think anyone else in your family would want to go on this diet? Who? Why or why not?
4. How do the people in your family show support to each other? (*probe*: in what ways do you show support)
  - a. In what ways will it be hard for the family to be supportive of your daughter/sister?

In what ways will it be easy for the family to be supportive of your daughter/sister?

*The following questions were asked to the adolescent in absence of the family:*

1. Do you usually get seconds on food? Probes: Do you ask for seconds? Is it difficult to say “no” to seconds on food? Are seconds expected?

2. Is it okay not to eat the food cooked for you?
3. Do you have to eat all the food that is given to you? Probe/clarification: Do you have to clean your plate?
4. Looking at your 3-day food diary, what would be hard to change? Probes: what would be hard to give up? What would be easy to give up?
5. Have you ever tried to eat healthier? Probe: What have you done?
6. Have you ever tried to lose weight before? Probes: What did you do? Have you ever tried to eat differently in order to lose weight? How many times have you tried to eat differently in order to lose weight? Were you able to keep it off?