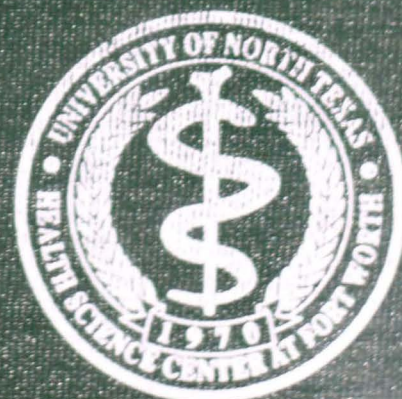




Ohagi, Emeka J., Rural vs. Urban Residents and Obesity in Texas. Master of Public Health (Health Informatics), May 2005, 52pp., 3 tables, bibliography, 90 titles.

Obesity in the United States has been described as an epidemic and Texas has been identified as one of the most obese states in the country. The purpose of this study is to examine obesity among Texas adults in order to determine if there are differences in obesity levels based on residence, and to explore the influence of other demographic, socioeconomic, health and behavioral factors on the distribution of obesity.

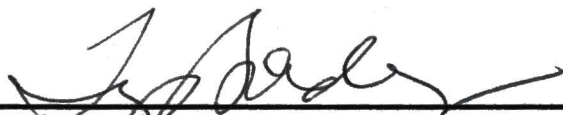
Results indicate that urban and suburban dwellers are less likely than rural dwellers to be obese (adj. OR=0.64; 0.68, respectively). However, residents of frontier communities have slightly higher odds of obesity (adj. OR=1.09) than rural residents. Age was found to be an important factor in obesity.

It is hoped that these and other results will facilitate appropriate channeling of public health response.

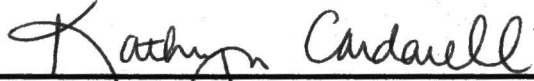
RURAL VS. URBAN RESIDENTS AND OBESITY IN TEXAS

Emeka J. Ohagi, BSc., MSc., PhD

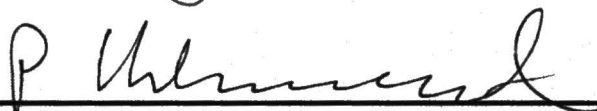
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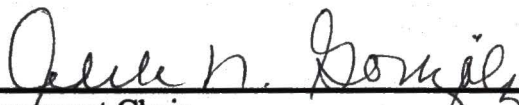
Major Professor



Committee Member



Committee Member



Department Chair



Dean, School of Public Health

RURAL VS. URBAN RESIDENCE AND OBESITY IN TEXAS

Thesis

Presented to the School of Public Health

**University of North Texas
Health Science Center at Fort Worth**

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for the Degree of

Master of Public Health

By

Emeka J. Ohagi, BSc, MSc, PhD

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CHAPTER I

INTRODUCTION AND STATEMENT OF PROBLEM

Introduction

Obesity is defined as an excessively high amount of body fat or adipose tissue in relation to lean body mass (CDC, 2004a). It has become an issue of public health concern (Mokdad et al, 2001) and its incidence is expected to rise (Nemmarkommula et al, 2003). It exposes individuals to an increased risk for chronic disease morbidity and mortality which, in turn, places a burden on the healthcare system and economy (Allison et al., 1999; Finkelstein et al, 2003; McGinnis and Foege, 1993; Sanchez, 2003; Sturm, 2002; TDH, 2003; THI, 2004; Wolf, 2002).

The state of Texas has been identified as one of the more obese states in the United States with over 24% of the adult population obese (TDH, 2004). Data collected through the CDC's Behavioral Risk Factor Surveillance System (BRFSS) indicate that 63% of Texas adults were overweight or obese in 2002 (CDC, 2004b). The same data set revealed variations along racial and ethnic lines: 22% of non-Hispanic white adults, 42% of non-Hispanic black adults and 30% of Hispanic adults in Texas are obese. This research project examines the Texas BRFSS data with the main objective of exploring differences in obesity between frontier, rural, suburban, and urban residents in Texas in order to identify those groups in greatest need of public health intervention. In response

to the note of caution from Phillips and McLeroy (2004) regarding the error of classifying all rural areas as the same, our analysis explores the differences in obesity levels that exist across various residential categories (urban, suburban, rural, and frontier communities).

It also examines the relationships between obesity and other variables such as income, race and ethnicity, and mental health. Descriptive statistics and logistic regression analyses were carried out on the BRFSS data set.

Research Problem

According to statistics from CDC's Behavioral Risk Factor Surveillance System in 2002, obesity rates among Texas adults increased by 100% between 1990 and 2002 (CDC, 2004). The growing rate of obesity has generated a great deal of concern among researchers and policy makers alike and has been considered an 'epidemic' (TDH, 2003). A statewide effort to prevent obesity (The Texas Strategic Plan for Obesity Prevention) is a direct response to the foregoing.

This research project examines the Texas BRFSS data with the aim of exploring differences in obesity between frontier, rural, suburban, and urban residents in Texas.

Objectives of Study

Specific objectives were to:

1. Examine the relationship between obesity and residence. The latter includes four residential categories: urban, suburban, rural and frontier.

2. Assess the association between obesity and demographic variables such as age, gender, and race.
3. Explore the relationship between obesity and socioeconomic variables.

Research Hypothesis

1. Rural dwellers are more likely than their urban counterparts to be obese than normal weight.
2. Rural dwellers are more likely than frontier residents to be obese than normal weight.

Significance of Study

There seems to be disagreement regarding the relationship between obesity and residence. Obesity literature generally indicates that rural dwellers are at greater risk of obesity (Lopez, 2004; Ramsey, 2002), but some researchers disagree (Ewing et al., 2003; Flegal, 2002). This research project is necessary in order to facilitate intra-state comparisons of findings to ensure proper design and evaluation of intervention programs. It will also shed some light on the issue of disparities and serve as a reference point for future researchers in this area of study.

CHAPTER II

BACKGROUND AND LITERATURE REVIEW

Definitions

Body Mass Index (BMI)

Body Mass Index is a measure of weight relative to height. For adults over age 20, BMI falls under one of the following categories:

Table 1: Body Mass Index (BMI) categories adopted by the Centers for Disease Control and Prevention (CDC).

BMI	WEIGHT STATUS
Below 18.5	Underweight
18.5-24.9	Normal
25.0-29.9	Overweight
30.0 and above	Obese

Source: <http://www.cdc.gov/nccdphp/dnpa/obesity/bmi.htm>

BMI is calculated using the following formula:

$$\text{BMI} = \left(\frac{\text{weight in pounds}}{(\text{height in inches}) \times (\text{height in inches})} \right) \times 703$$

(CDC, 2004)

According to the National Center for Chronic Disease Prevention and Health Promotion of the CDC (Centers for Disease Control and Prevention), overweight refers to increased body weight in relation to height when compared to some standard of acceptable or desirable weight (CDC, 2004). Based on the BMI table above (table 1), this

category includes adults whose BMI lies between 25.0 and 29.9. Overweight may not necessarily be a result of increased body fat but can also result from an increase in lean muscle. Desirable body weights can be derived by comparing actual heights and weights to a representative sample of the population.

Obesity

Obesity is “an excessively high amount of body fat or adipose tissue in relation to lean body mass” (CDC, 2004a). Obesity is characterized by a BMI of 30.0 and above. The distribution and size of the adipose fats in the body are considered in this concept and can be estimated by skinfold measures, waist-to-hip circumference ratios, or techniques such as ultrasound, computed tomography, or magnetic resonance imaging (CDC, 2004a). In the context of this study, we concentrated on two weight categories: normal and obese. The latter includes the moderately obese and severely obese categories. The morbidly obese category includes people with a BMI of 40 and above.

Urban and Rural Areas

The United States Census Bureau defines urban areas as all territory, population, and housing units located within an urbanized area (UA) or an urban cluster (UC). This includes core census block groups or blocks with population density of at least 1,000 persons per square mile and surrounding census blocks with an overall density of at least 500 persons per square mile (U.S. Census Bureau, 2001). In general terms, rural areas can be regarded as those areas that are sparsely populated and are also devoid of the influence of large cities and towns. However, the Census Bureau defines them as all

territory, population, and housing units located outside of urban areas and urban clusters. This classification includes both place and non-place territory. Therefore, rural areas can be found within geographic entities such as census tracts, counties, metropolitan areas, and the area outside metropolitan areas (U.S. Census Bureau, 2001). The Centers for Medicare and Medicaid Services adopted a definition of 'rural areas' that includes any zip code with fewer than 1,000 persons per square mile (Mueller et al., 2004).

For the purposes of this study, counties were categorized as metropolitan-central city, metropolitan-suburban, and non-metropolitan. Metropolitan-central city is defined as an urban core county with 50,000 or more residents while metropolitan-suburban is a metropolitan county adjacent to a metropolitan county. The rest of the counties are considered rural, with the most rural being frontier counties. Frontier counties are those rural counties with fewer than 7 persons per square mile (Borders, 2003; Heck et al., 2004).

Review of Relevant Literature

Introduction

More than half of Americans are either overweight or obese (Finkelstein et al., 2003) and Texas is not an exception to the rule. Its levels have been on the rise for over two decades and show no apparent signs of reversal (Flegal et al., 1998, 2002; Galuska et al., 1996; Mokdad et al., 1999, 2001). Obesity is associated with a wide range of chronic diseases ranging from cardiovascular diseases and various forms of diabetes to cancer and is linked to 280,000 deaths in the United States each year, making it second only to

cigarette smoking as a cause of death (McGinnis and Foege, 1993; Sanchez, 2003; TDH, 2003; THI, 2004). Adults that are considered overweight and obese, apart from being at increased risk for morbidity and mortality associated with many acute and chronic medical conditions (Pi-Sunyer, 1993; Texas Department of Health, 2003), are also prone to low self-esteem and depression (Strauss, 2000).

Risk Factors for Obesity

Obesity has been associated with several factors such as genetics, nutritional status, socioeconomic status, environmental issues, and even mental health status. These are described in more detail below.

Demographic Factors

Childhood obesity has been found to be strongly associated with adult obesity (Dietz, 1998; Epstein et al, 1987; Guo et al, 1994; Whitaker, 1997; Zemel et al., 2002). However, this relationship cannot be solely explained genetically. Although genes play an important role in determining how individuals metabolize calories, lifestyle may play the dominant role (Barash, et al., 2000; CDC, 2002; Eckel, 1998).

Obesity has been correlated with other factors such as age, gender, race and ethnicity. A Texas statewide obesity task force report submitted to the Texas Department of Health indicates that Mexican Americans and non-Hispanic black children have a higher prevalence of obesity compared to whites (Urrutia-Rojas et al., 2002). Burke et al. (1992) in their analysis of data from the CARDIA study found that black women had significantly higher age-adjusted mean body mass index and subscapular skinfold

thickness than white women. They also found that obesity had different associations with age and education across racial groups. While they found a positive relationship between age and obesity in black women, there was a negative relationship between education and body size in white women. Wardle et al. (2002) found that higher educational attainment and socioeconomic status were associated with a lower risk of obesity in both men and women but high occupational status yielded lower risk of obesity for women only.

Behavioral Factors

Behavioral factors cannot be discounted in the process of identifying the causes of obesity. The culture of eating outside the home (Clauson, 1999) and associated high calorie intake, coupled with a gross lack of physical activity, have been identified as leading causes of obesity (Bryan, et al., 2003; NSWHealth, 2005).

Part of the blame has gone to the business community whose quest for more profit has propelled them to aggressively encourage individuals to overeat. There are indications that the proportion of fat in our diet has decreased, but the amount of calories consumed is on the rise. Young and Nestle (2002) conducted a study of marketplace foods to identify historical changes in size of portions and compared them with federal standards. They found that portions have continued to grow in parallel with increasing body weights. Jeffrey et al. (1998) blames this on the “supersizing of menu items” in our restaurants, especially those that sell fast foods. Not only do these companies make larger portions available, they use large sizes as selling points for the products by adopting terms such as “Double Gulp” and “Supersize” (Young and Nestle, 2002). Food assistance

programs supported by government and school lunch programs have also been blamed for the spike in obesity levels (Besharov, 2005; Chapman et al., 1995; O'Beirne, 2003).

The above factors are also strengthened by the increasing tendency towards a sedentary lifestyle that is characteristic of modern societies (Wessel et al., 2004).

Television viewing has been identified as a risk factor for obesity among both men and women (Tucker and Bagwell, 1991; Tucker and Friedman, 1989). In both studies, it was found that the number of hours of television viewing is directly related to the risk of obesity. The lack of physical activity has become part of our culture (DHHS, 2004) and can also be attributable to the nature of the economy and the stage of technological development characterized by information and computer based production (Macionis, 2004). Countries in the post industrial stage depend mostly on information technology to carry out business and perform daily activities. This arrangement reduces physical contact as well as movement. The increased tendency to interact with computers and telephone systems makes physical activity unattractive and consequently increases the tendency to become obese.

Environmental Factors

The lack of physical activity found in many communities can be partially attributable to environmental factors. Urban sprawl has been blamed for the high rate of obesity in our society. Lopez (2004) defined urban sprawl as an overall pattern of development across a metropolitan area where large percentages of the population live in lower density residential areas. Urban sprawl is usually characterized by poor street patterns, lack of pedestrian amenities and difficult to access destinations. Residents are

compelled to be automobile dependent because of poor access to facilities, employment dispersion and low population density due to leapfrog-type development. Older neighborhoods are more likely to have sidewalks, denser interconnected streets, and a mix of business and residential units. This arrangement may encourage residents to walk long distances as opposed to depending on automobiles (Berrigan, 2002; Ewing, 2003). Education has been found to be positively associated with minutes of walking and physical activity.

Examining the relationship between obesity and residential patterns, Ramsey and Lee (2002) found that, among rural women, obesity and poor overall health are closely related. Greenberg (1987) found more obesity and hypertension among rural dwellers. Tai-Seale and Chandler (2003) confirm this view by reporting that childhood and adult obesity appear to be higher in rural than urban areas. These findings were associated with inadequate access to nutrition education, exercise facilities, prevention and treatment facilities, and proper healthcare. This predisposition is occasioned by the demographic composition of rural societies where rural dwellers are, on average, older; less educated, and have lower income than urban residents. In addition, age, education and income have a strong association with obesity in the rural settings (Tai-Seale and Chandler, 2003).

Rural dwellers may be more likely than urban dwellers to lead active lives and subscribe to relatively healthier eating habits. Urban dwellers, on the other hand, are more likely to suffer from one of the major consequences of urban sprawl – tendencies of being less physically active and in turn being overweight or obese (Ewing et al, 2003; Flegal, 2002; Stein, 2004). Lopez (2004) supports this perspective by reporting a positive

association between urban sprawl and obesity. However, there seems to be a disagreement with this view. Several studies have reported a reversal of the trend and point to an increasing proportion of rural residents battling the problem as a result of poor access to reliable nutrition and weight loss information (Ramsey and Glenn, 2002), as well as poor access to healthcare (Larson and Fleishman, 2003). Literature also suggests that suburban residents are more likely than both rural and urban residents to have better access to information and medical care and are more likely to stay physically active and therefore less likely to be obese (NCHS, 2003; 2004).

Socioeconomic Determinants of Obesity

Another area of the obesity phenomenon that has received considerable attention is the relationship between obesity and socioeconomic status (SES). Sobal (1991) found that in traditional societies, there is a direct relationship between socioeconomic status and fatness, while the contrary is the case in modern societies, especially among adult women. However, a mixed pattern was observed among other age/gender groups. Goode (1999) found a strong association between obesity and socioeconomic factors such as income and education. Drewnoski and Specter (2004), after an extensive review of literature, seem to think that obesity rates are significantly higher among the most disadvantaged groups in society. However, Sobal reasons that the relationship between obesity and SES can be likened to a cycle. According to him, socioeconomic status affects obesity through variables such as education, income and occupation that influence the lifestyles of individuals. On the other hand, obesity may affect socioeconomic status by introducing prejudice and discrimination that in turn limit the opportunities for better

socioeconomic status. Everson et al., (2002) reasoned that socioeconomic factors determine the share of the burden of disease in the population and that their effects persist across the life course.

Psychosocial Factors for Obesity

Some research suggest that there exists an association between obesity and mental health due to the tendency for depressed people to console themselves with 'comfort foods' which in turn generate a metabolic syndrome that results in excess weight (Harvard Health Publications, 2004). Research has also shown that overweight and obese persons face several dimensions of discrimination (Rothblum, et al., 1988) and, sometimes isolation from peers, colleagues, superiors, employers, and even from healthcare practitioners (Decker, 1987; Klassen et al., 1993; Pingitoire et al., 1994; Puhl and Brownell, 2001). Studies have also shown that the effect of discrimination persists over a long period (Kessler, 1999). Their lives are often times reshaped by the response of the general population and could have adverse economic outcomes thereby placing them in a lower socioeconomic position (Loh, 1993; Register and Williams, 1990). A store employee in a 24-hour Wal-Mart Super Center has observed a pattern of off-peak shopping behavior among many excessively obese individuals. This suggests that the obese individuals feel more comfortable to shop when there are fewer customers in the store. Carpenter et al. (2000) explored the relationship between obesity and DSM-IV major depressive disorder, suicide ideation and suicide attempts and found an association between body weight and major depression, suicide attempts and suicide ideation. In another study, Hill and Williams (1998) found that the heaviest women did not differ on

measures of mental health but expressed the greatest dissatisfaction with their body weight, shape and appearance, and had the lowest self-esteem. Myers and Rosen (1999) found that stigmatization is a common experience for the obese but they seek ways to cope with it. In a study carried out among school children, Schwimmer et al., (2003) found that obese children rated themselves very low in quality of life scores as a result of their inability to participate in sporting activities, keep up with school work and get along with others. Doll et al., (2000) found that overweight and obesity are associated with poor levels of subjective health status.

The above leaves us with the possibility of a vicious cycle of obesity and depression whereby an overweight individual experiences some form of discrimination which in turn generates deeper depression and in turn plunges that individual into more serious overeating. The latter then causes the individual to become excessively obese, thereby leading to an even more extensive discrimination and isolation.

The Healthcare Costs of Obesity

Several studies have associated obesity with increased use of health care services as well as increased costs (Puhl and Brownell, 2001). The number of medical diagnoses and the use of health care resources have been found to increase with BMI (Sansone, et al., 1998). In addition, BMI has been associated with high inpatient and outpatient costs (Quesenberry, et al., 1998). Obese persons use medical care services more frequently than non-obese people and tend to pay higher prices for these services (Fontaine and Bartlett, 2000).

Treatment of obesity-related ailments has placed a burden on the healthcare system and the economy by tasking available resources (Finkelstein et al., 2003; Sturm, 2002; Wolf and Colditz, 1998). According to Wolf and Colditz (1998), there was an increase in the number of physician appointments attributed to obesity between 1988 and 1994, and a total of 62.6 million physician visits related to obesity. More money is being spent on the associated ailments now than in years past (Dietz, 1998) because obese individuals are at increased risk of developing severe chronic illnesses.

Policy Issues

Over the years, there has been an obvious reluctance on the part of individuals, the health care community and even policy makers to consider obesity a medical condition (Puhl and Brownell, 2001). This has been evident in the discrimination identified in the area of medical coverage for certain weight-loss procedures such as surgery. Martin et al., (1998) reasoned that despite considerable evidence of cost-savings through some methods of weight loss, the health care insurance system does not reimburse the costs of surgical treatments even though diseases with less supported treatments are compensated. Insurance companies specifically excluded obesity treatment for coverage thereby leading the service providers to list comorbid disorders as reason for treatment in order to receive reimbursement for their services.

The Internal Revenue Service (IRS) in 1998 excluded weight loss programs as a medical deduction regardless of doctors' recommendation. This move from the IRS met with the response from the American Obesity Association (AOA) and nine other interest groups that filed petitions in 1999 for a ruling allowing the costs of obesity treatment to

be deducted as a medical deduction (AOA, 2000; AOA, 2005). Revisions were made in 2000 to include weight-loss costs as part of taxpayer's deductions provided the program is geared towards the treatment of a certain ailment (Puhl and Brownell, 2001).

However, there has been considerable progress over the past few years. In 2002, the IRS announced a new ruling (IRS Ruling 202-19) stating that "Obesity is medically accepted to be a disease in its own right" (AOA, 2005). This means that treatment specifically for obesity can now be claimed as a medical deduction because obesity is considered to be a disease (Anderson, 2002). In 2004, the United States Department of Health and Human Services secretary, Tommy Thompson, announced a new Medicare obesity coverage policy that would remove barriers to Medicare coverage of anti-obesity interventions (Tovino, 2004). The Centers for Disease Control and Prevention (CDC) has also introduced several initiatives targeting the diverse population of the United States (CDC, 2004c).

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY:

Research Design

The study design is a cross-sectional analysis of secondary data for the state of Texas originally collected through the Behavioral Risk Factor Surveillance System (BRFSS). It analyzed obesity in Texas in relation to variables such as age, gender, race/ethnicity, residence, education, mental health, and income. A total of 5078 subjects included in the Texas BRFSS survey constitute the sample of analysis.

Data Sources

The data were obtained from the Behavioral Risk Factor Surveillance System (BRFSS). This is a system that collects and stores data on health-related behaviors of adults. The Centers for Disease Control and Prevention (CDC) designed the Behavioral Risk Factor Surveillance System (BRFSS) to facilitate behavioral data collection at the state level to supplement the efforts of the National Center for Health Statistics (CDC, 2004). The health departments of all states collect behavior data by means of telephone surveys using a standard questionnaire designed by the CDC in order to maintain uniformity and to facilitate interstate comparison. The data sets are invaluable for planning, initiating, supporting and evaluating health promotion and disease prevention

programs. According to the CDC, the state and local health departments rely on BRFSS data to:

- Determine high-priority health issues and identify populations at highest risk for illness, disability, and death by analyzing data according to respondents' age, sex, education, income, and race/ethnicity.
- Develop strategic plans and targeted prevention programs.
- Examine trends in behaviors over time to monitor the effectiveness of public health programs and progress in meeting prevention goals.
- Support community policies that promote health and prevent disease—for example, by educating the public, the health community, and policy makers about disease prevention. (CDC National Center for Chronic Disease Prevention and Health Promotion, 2004).

While the standardized nature of the instrument will ensure content validity and facilitate inter-state comparisons, the BRFSS also ensures versatility because it allows states to add questions specific to their particular needs (NCCDP, 2004). All data used in our analyses were weighted using CDC's BRFSS weighting formula.

Data Analysis

Statistical analyses included descriptive as well as multivariate analyses of selected variables and were carried out using the SPSS software. Frequency tables and cross-tabulations were generated to determine the distribution of variables. Unadjusted comparisons of the percentages were conducted for obese individuals and those with normal weight across the urban and rural regions using the Chi-Square test. Univariate and multivariate logistic regression analyses were employed to compute the standard and adjusted odds of obesity against selected variables.

Dependent Variable

The dependent variable for this study is OBESITY. The subjects' obesity status was determined by regrouping Body Mass Index data based on the standard BMI specifications from the Centers for Disease Control and Prevention (CDC). For purposes of comparison, the 'Overweight' and 'Underweight' categories were eliminated leaving two main categories of interest - 'Normal' and 'Obese'. The former served as the comparison group and comprised individuals with BMI between 18.5 and 24.9. The latter included those with BMI of 30 and above, including moderately obese and severely obese individuals. In the analysis, Normal was coded as '0' while Obese was coded as '1'.

Independent Variables

The independent variables were separated into three different groups: demographic, socioeconomic, and mental health and behavioral variables.

Demographic Variables

The demographic variables include: gender, age, race/ethnicity, marital status, residence, and the number of children living in the home. For the *Gender* variable, males were coded as '1' and female as '2'. Females were used as the comparison group. *Age* was recoded into six different categories thus: 18-24 =1; 25-34 =2; 35-44 =3; 45-54 =4; 55-64 =5; 65+ =6. Age group '1' which is also the youngest age group (18-24) was chosen as the comparison group for the analysis. *Race/Ethnicity* categories were collapsed into four main categories: White (1); Black (2); Hispanic (3); and Other (4). The 'Other' category represents an aggregate of Asian, Native Hawaiian or other Pacific

Islander, American Indian, Alaska Native and others. Marital status was limited to two categories: Not married (0) and Married (1). Unmarried subjects constituted our comparison category in the analysis. Residence was coded into three major categories: Metropolitan (1); Suburban (2); and Rural (3). This variable was later recoded to include a fourth group (Frontier) for purposes of comparison with the rest of the rural residents. The rural category served as a reference category in our analysis.

Socioeconomic Variables

Socioeconomic variables include income, education, and employment status. Household income was introduced in the analysis as 'Income in Dollars' per annum and has five different categories:

- 1: <\$25,000
- 2: \$25,000 - \$39,999
- 3: \$40,000 - \$54,999
- 4: \$55,000 - \$74,999
- 5: \$75,000+

The first category (<\$25,000) was used as the comparison group. Four categories were created for Education: < High School (1); High School Graduate (2); Some College (3); and College Graduate (4). In our analysis, the first category, representing the lowest level of education (<High School) was used as the comparison group. For our third socioeconomic variable, employment status, we created only two categories: Unemployed (0) and Employed (1). The unemployed were used as the reference group.

Mental Health and Behavioral Variables

The two variables in this group are Mental Health and Physical Activity. The former was coded into two categories: Good Mental Health (0) which is our comparison group; and Poor Mental Health (1). This variable was derived from subjects' answers to questions regarding the number of days in the past 30 days that they considered their mental health as not being good. Those respondents that had 14 or more days were coded as having poor mental health.

Physical Activity variable was derived from responses to questions relating to their involvement in either vigorous or moderate activities that increase the heartbeat; the duration (in minutes) of involvement in those activities; and how many days a week they were involved in it. Physical activity in this variable includes work-related and non work-related activities such as walking, biking, and gardening. Individuals who satisfied physical activities recommendations were compared against those who did not.

CHAPTER IV

RESULTS

Frequency Distribution of Survey Subjects

With regard to the dependent variable, preliminary results displayed in table 2 below show the distribution of survey respondents by Body Mass Index (BMI). Results shown in table 2 indicate that 36% of the study population is considered to have normal body weight. About 36.6% and 25% are classified as overweight and obese, respectively.

It was found that over half (56.2%) of the respondents are under 45 years of age. This indicates a substantial number of active individuals who are still in their critical labor force years. About 14% of the sample is 65 years or older. Males constitute 51% of the population while females account for 49%. Over 60% of the subjects are white; about 27% are Hispanic; Blacks and other categories accounted for 8% and 4%, respectively.

As table 2 shows, more than half (57.6%) of those surveyed either have some college education or are college graduates. A little over 15% of the subjects have less than high school education. More than half of the study population (61.3%) is married and the remaining 39% is not. The latter category includes those that have never been married and those that were previously married but became single again for any reason.

Table 2: Frequency Distribution of Survey Respondents: Texas BRFSS Survey 2003

Population Characteristic	Percent of Total Population (%)	Percent Obese in each Category (%)
Demographic Variables		
Body Mass Index		
Underweight	2.0	
Normal	36.0	
Overweight	36.6	
Obese	25.0	
Missing	0.4	
Residence		
Metropolitan	61.4	37.6
Suburban	21.8	37.6
Rural	15.3	47.5
Frontier	1.6	48.4
Age in years		
18-24	14.8	16.0
25-34	20.1	36.7
35-44	21.3	49.4
45-54	18.1	50.2
55-64	12.0	53.6
65+	13.7	31.0
Gender		
Male	51.0	42.7
Female	49.0	36.4
Marital Status		
Not Married	38.7	34.0
Married	61.3	43.1
Race/Ethnicity		
White	61.1	36.4
Black	8.4	55.9
Hispanic	26.8	44.8
Other	3.7	17.8

Number of children in household		
None	53.9	38.9
1-2	34.2	39.0
3-4	10.5	41.2
5+	1.5	50.5

Socioeconomic Variables		
Education		
<High School	15.2	42.2
Hi Sch. Grad.	27.3	43.0
Some College	27.4	42.2
College Grad	30.2	32.1
Employment Status		
Unemployed	61.3	41.6
Employed	38.7	36.0
Income in Dollars		
Less than \$25,000	11.3	45.9
\$25,000 thru \$39,999	17.0	39.4
\$40,000 thru \$54,999	12.3	42.2
\$55,000 thru \$74,999	14.2	42.8
\$75,000+	35.0	37.8
System Missing	10.2	

Mental Health and Behavioral Variables		
Mental Health		
Good Mental Health	90.2	38.4
Poor Mental Health	9.8	47.5
Physical Activity		
No physical activity	15.5	49.9
Some physical activity	37.8	42.8
Missing	46.7	

Only 39% of the population is employed. Cross-tabulation analysis of employment status and income indicates that over 77% of those in the highest income bracket (\$75,000.00+) claim to be unemployed. This means that a good number of them are either retired or are earning money through returns on prior investments. A large percentage of these people have been found to reside in the suburbs and most of them are college graduates.

Table 2 indicates that over 60% of the respondents live in metropolitan areas; about 22% live in the suburbs; and 15% and 2% live in rural and frontier communities, respectively. About 45% of suburban residents have an annual income of at least \$75,000.00. We also found that almost 60% of the respondents within that highest income bracket live in the suburbs. Our cross-tabulation analysis also revealed that whites are less likely than other racial/ethnic categories to reside in metropolitan areas. About 54% of whites live in the metropolitan areas as opposed to 72%, 74% and 69% of Blacks, Hispanics and Other categories, respectively. On the other hand, whites are more likely than other categories to reside in suburban and rural areas. About 66% of those with less than high school education live in metropolitan areas, representing a higher proportion than other categories. They also are the least represented in the suburbs where college graduates are the most prominent.

Regarding mental health and physical activity, preliminary results show that about 10% of subjects reported poor mental health. Qualifying conditions for poor mental health include, but are not limited to, several forms of depression, and mental disorders. About 38% of the respondents met physical activity recommendations, 16% did not meet

recommendations, and 47% had missing physical activity values. There is no information in the dataset regarding the reasons for the missing data. This variable was thus excluded from the multivariate logistic regression analysis.

Frequency Distribution of Obesity in Study Population

This section presents the preliminary distribution of obesity among the survey population as indicated by the cross tabulation of variables. Though we cannot reach conclusions based on these results, they point us towards variables of interest for the purpose of further statistical analysis.

Demographic Variables

Results of the crosstabulation demonstrate the importance of demographic variables in the study of obesity as a phenomenon. They show that obesity increased with age up to age 64, after which obesity declined sharply. Overall, men were found to have a greater tendency for obesity than women. This result is in line with the findings from other studies that show this relationship as reflective of the effect of gender and race. Married people were found to have higher odds of obesity than the unmarried.

The number of children in the household seemed to make a difference also. Results show that the greater the number of children in the household, the greater the tendency for obesity. Race/ethnicity presented an interesting set of results. They show that blacks have the greatest tendency for obesity (55.9%) compared to all other racial/ethnic categories (Whites, 36.4%; Hispanic, 44.8%; and Others, 17.8%).

Socioeconomic Variables

Education is one of the prominent determinants of socioeconomic status and we did not ignore its potential influence on obesity. At this stage of our analysis, we found that obesity is the lowest among college graduates but there is no remarkable difference in obesity levels among the other educational categories (<high school; high school graduates; and some college).

With regard to income, individuals within the lowest income bracket (<\$25,000) are the most likely to be obese, while those in the highest income bracket are the least likely. This analysis does not show a consistent association between income and obesity. Among the remaining three income categories (\$25,000-\$39,999; \$40,000-\$54,999; and \$55,000-\$74,999), those that earn between \$25,000 and \$39,999 are the least likely (39.4) to be obese. In addition, we found that unemployed people are more likely (41.6%) to be obese than those who are actively employed (36%).

Logistic Regression Analyses

We subjected our dependent variable (obesity) and independent variables to univariate and multivariate logistic regression analyses in order to determine the nature of relationships between them and the statistical significance of those relationships. The standard and adjusted odds ratios (OR) were generated and are presented in table 3 below. 95% confidence intervals (CI) were calculated for corresponding odds ratios (OR).

Obesity and Demographic Variables

Residence is the primary independent variable as stated in the study objectives and hypotheses in the first chapter of this report. Results from univariate logistic regression, as shown in table 3, indicate that frontier residents are almost ($OR=1.11$) as likely as rural residents to be obese and both categories are more likely than metropolitan and suburban residents to be obese. Before the adjustment, metropolitan and suburban residents had lower odds of being obese ($OR=0.66$) than rural residents. When we adjusted for all the other variables (age, gender, marital status, race/ethnicity, number of children in household, income, education, employment status, and mental health), we found that frontier residents' odds of obesity declined slightly (adj. $OR=1.09$), bringing their obesity level closer to the rural levels. However, table 3 shows that the odds of obesity increased slightly for suburban residents (adj. $OR=0.68$) while metropolitan residents became the least likely to be obese (adj. $OR=0.64$). This supports our first hypothesis stating that rural residents are more likely than their metropolitan counterparts to be obese. It also corroborates the findings of previous studies that were reviewed in chapter 2. Literature indicates that rural dwellers are more likely than urban residents to be obese (Greenberg, 1987; Tai-Seale and Chandler, 2003).

Table 3: Characteristics of Subjects and Odds Ratios (OR) from Univariate and Multivariate Logistic Regression**Analyses: Texas BRFSS Survey 2003**

Population Characteristic	Percent of Total Pop.	Percent Obese in each Category	Odds Ratio (OR)	95% CI		Adjusted Odds Ratio	95% CI (Adj.)	
				Lower	Upper		Lower	Upper
Demographic Variables								
Residence								
Metropolitan	61.4	37.6	0.66	0.66	0.67	0.64	0.64	0.64
Suburban	21.8	37.6	0.66	0.66	0.67	0.68	0.67	0.68
Rural	15.3	47.6	1.00			1.00		
Frontier	1.6	48.4	1.11	0.63	1.94	1.09	1.08	1.11
Age in years								
18-24	14.8	16.0	1.00			1.00		
25-34	20.1	36.7	3.05	3.04	3.07	3.59	3.57	3.61
35-44	21.3	49.4	5.14	5.12	5.17	6.55	6.50	6.59
45-54	18.1	50.2	5.32	5.29	5.35	6.78	6.74	6.83
55-64	12.0	53.6	6.09	6.05	6.12	7.23	7.18	7.28
65+	13.7	31.0	2.36	2.35	2.38	3.16	3.14	3.19
Gender								
Male	51.0	42.7	1.31	1.30	1.31	1.57	1.56	1.57
Female	49.0	36.4	1.00			1.00		
Race/Ethnicity								
White	61.1	36.4	1.00			1.00		
Black	8.4	55.9	2.22	2.20	2.23	2.56	2.54	2.57
Hispanic	26.8	44.8	1.42	1.41	1.42	1.60	1.59	1.60
Other	3.7	17.8	0.38	0.37	0.38	0.38	0.37	0.38

Marital Status								
Not Married	38.7	34.0	1.00			1.00		
Married	61.3	43.1	1.47	1.47	1.48	1.31	1.3	1.31
Number of children in household								
None	53.9	38.9	1.00			1.00		
1-2	34.2	39.0	1.00	1.00	1.01	0.85	0.85	0.85
3-4	10.5	41.2	1.10	1.10	1.11	0.87	0.87	0.88
5+	1.5	50.5	1.60	1.58	1.62	1.00	0.99	1.02
Socioeconomic Variables								
Education								
<High School	15.2	42.2	1.00			1.00		
Hi Sch Grad	27.3	43.0	1.03	1.03	1.04	1.19	1.19	1.20
Some College	27.4	42.2	0.99	0.99	1.00	1.25	1.25	1.26
College Grad	30.2	32.1	0.65	0.64	0.65	0.65	0.64	0.65
Employment Status								
Unemployed	61.3	41.6	1.00			1.00		
Employed	38.7	36.0	0.79	0.79	0.79	0.87	0.87	0.87
Income in Dollars								
Less than \$25,000	11.3	45.9	1.00			1.00		
\$25,000 thru \$39,999	17.0	39.4	0.77	0.77	0.77	0.73	0.72	0.73
\$40,000 thru \$54,999	12.3	42.2	0.86	0.86	0.87	0.79	0.78	0.79
\$55,000 thru \$74,999	14.2	42.8	0.88	0.88	0.89	0.77	0.77	0.78
\$75,000+	35.0	37.8	0.72	0.71	0.72	0.64	0.64	0.64
System Missing	10.2							

Mental Health and Behavioral Variables								
Physical Activity								
No physical activity	15.5	49.9	1.00					
Some physical activity	37.8	42.8	1.26	1.26	1.26	*	*	*
Missing	46.7							
Mental Health								
Good Mental Health	90.2	38.4	1.00			1.00		
Poor Mental Health	9.8	47.5	1.45	1.45	1.46	1.37	1.36	1.37

Adjusted for age, gender, race/ethnicity, residence, and marital status, number of children under 18 in household, income, education, employment status, and mental health.

Regression analyses results show age to be a risk factor for obesity until age 64. Individuals between 25 and 34 years of age are at least three times ($OR=3.05$) as likely as the immediate younger category (18-24: comparison group) to be obese. Those in the next two age categories (35-44 and 45-54) are 5.14 and 5.32 times as likely as the reference category (18-24) to be obese while those in the 55-64 age category are over six times ($OR=6.09$) as likely as the reference category to be obese. For those 65 and older, the likelihood of obesity is about 2.36 times that of the comparison group indicating a sharp decrease in the senior years. When we adjusted for the effect of other variables, the odds of obesity increased for all age groups. Age remained a risk factor for obesity but with a higher likelihood. The fifth age group (55-64) became over 7 times as likely as the comparison group to be obese. The odds of obesity for the seniors increased from 2.36 to 3.16.

The univariate logistic regression analysis results show a modest difference in the odds of obesity between men and women ($OR=1.31$). In other words, men were found to be 1.3 times as likely as women (reference category) to be obese. The multivariate logistic regression analysis yielded greater odds of obesity for the males (adj. $OR=1.57$) making males more than one and half times as likely as females to be obese. This result can be explained from the perspective of past studies that have found white males more likely to be obese than white females. The study population in this research is predominantly white (61.1%).

With regard to race and ethnicity, results of univariate analysis indicate that blacks are more than twice as likely as whites to be obese ($OR=2.22$); and Hispanics are

1.4 times as likely as whites to be obese. The 'Other' racial/ethnic category are the least likely to be obese, with an odds ratio of 0.4. When adjusted for all other variables, it was found that the odds of obesity for blacks increased to 2.56 making blacks more than two and half times as likely as whites to be obese. Hispanics became 1.6 times as likely as whites to be obese, while the odds of obesity remained the same ($OR=0.38$; adj. $OR=0.38$) for the 'Other' category (Native Hawaiian, American Indians, Alaska Natives and other Pacific Islanders). From the results discussed above, being black is a risk factor for obesity while being a Native Hawaiian, American Indian or Pacific Islander is a protective factor.

Married individuals are one and half times ($OR=1.47$) as likely as the unmarried to be obese. Multivariate regression analysis yielded a lower adjusted odds for obesity (adj. $OR=1.31$) making married people 1.3 times as likely as the unmarried to be obese. The higher odds ratio from the univariate analysis could be reflective of the effect of other variables. However, being married is a risk factor for obesity overall.

Results shown on table 3 indicate that subjects with at least one child and up to four children under 18 in their home are as likely as the reference category to be obese. Respondents without a child under age 18 living in their home were used as the comparison category. Those who have at least 5 children living in their home are over one and half times ($OR=1.60$) as likely as the reference group to be obese. The multivariate logistic regression analysis produced lower adjusted odds ratios for all three categories making those with one to two children 0.85 times (adj. $OR=0.85$) as likely and those who have none to be obese. The subjects with at least three children and up to four

children living in their home became 0.87 times as likely as the comparison group to be obese. Table 3 shows that those individuals with at least five (5) children in their home were found as likely as the comparison group to be obese (adj. OR=1.00).

Obesity and Socioeconomic Variables

Logistic regression results show that college education is a protective factor against obesity. Individuals with a high school diploma are as likely as the comparison group (people with less than high school education) to be obese. The odds of obesity are slightly lower (OR=0.99) for individuals with some college education but this result is not statistically significant. College graduates have the lowest odds (OR=0.65) of being obese. After adjusting for other variables, the results showed increased odds for high school graduates (adj. OR=1.19) and people with some college education. They stayed the same for college graduates (adj. OR=0.65), indicating that college education is a protective factor for obesity (see table 3).

Results from logistic regression analyses indicate that people that are employed are approximately 0.8 times (OR=0.79) as likely as the unemployed to be obese. Though the association between these two variables was statistically significant, it is important to determine if there were other factors influencing this relationship. We adjusted for other variables and found slightly higher odds (adj. OR=0.87) indicating that the employed are approximately 0.9 times as likely as the unemployed to be obese. This makes employment a protective factor (Table 3).

Income is one of the determinants of socioeconomic status. Logistic regression results show high income as a protective factor against obesity. Odds of obesity were on

an upward trend until the highest income bracket. The individuals who earn at least \$75,000 per year are the least likely to be obese with an odds ratio of 0.72, showing that they are 0.7 times as likely to be obese as those who earn less than \$25,000 a year. The multivariate logistic regression analysis yielded lower adjusted odds ratios for each of the four categories but the lowest odds of obesity are for the highest income category (OR=0.64). From these results, income below \$25,000 is a risk factor for obesity while belonging to the highest income category is a protective factor.

Obesity and Mental Health and Behavioral Variables

Regarding mental health, those subjects that report poor mental health are approximately one and half times (OR=1.45) as likely as those with good mental health to be obese. After adjusting for other factors, as shown in table 3, we found lower odds of obesity (adj. OR=1.37) but still higher than the comparison group. This indicates that poor mental health is a risk factor for obesity and supports the viewpoint of the Harvard research group which suggests that individuals that are depressed have a tendency to seek solace in 'comfort foods' (HHP, 2004).

Results of univariate logistic regression analyses indicate that people who reported engaging in some form of physical activity are 1.26 times as likely as those who do not to be obese. This result is bound to generate some curiosity that has the potential of triggering further research. We could not put this finding to further test as a result of the high number of missing values for this question. For the latter reason, we did not include the variable in the multivariate logistic regression analysis. Preliminary frequency tables showed that frontier residents are the least likely to engage in any form of physical

activity. Univariate logistic regression analysis was conducted using physical activity as a dependent variable. Results from the univariate analysis indicate that metropolitan residents are slightly as likely as rural residents to be obese (OR=1.12). Suburban residents on the other hand, are 1.16 times as likely as rural residents (OR=1.16). Frontier residents are the least likely to engage in physical activity (OR=0.82).

CHAPTER V

DISCUSSION

Obesity has generated a significant amount of interest and response from researchers and policy makers in recent years. The state of Texas launched a Strategic Plan for prevention of obesity and has several other programs including the Nutrition and Physical Activity Program to Prevent Obesity and other Chronic Diseases (CDC 2004; TDH, 2003). These are efforts to encourage physical activity and healthy nutrition among children as well as adults. The same concern is not unrelated to the United States Health and Human Services Department's decision to revise the Medicare coverage policy aimed at removing the barriers to covering anti-obesity interventions (DHHS, 2004).

Following from the stated research hypotheses, rural dwellers were found to be at greater odds of obesity than metropolitan and suburban residents. This confirms the findings of earlier studies (NHIS, 2003) and sheds some light on the need for policy makers to consider programs tailored to the particular needs of the rural populations. This emphasis should also put into consideration the characteristics of the individuals to be targeted by these policy attempts. Our findings indicate that males are more likely to be obese than females across boards. This is line with findings from other studies such as the 2003 National Health Interview Survey conducted by the CDC. Results from this national

survey showed that white males are more likely than white females to be obese. From table 2, it was found that over 60% of the study population is white. This justifies the pattern of obesity distribution found in the results. The National survey also found that black females are more likely than black males to be obese. The effect of this fact did not significantly affect the outcome of our analysis given that blacks constitute only 8.4% of the study population. Education was found significant and results show that people with less than a high school education have a greater tendency to be obese than other categories. Therefore, obesity control efforts would better serve the purpose of public health if special consideration is given to the identified segments of the population that have greater odds of obesity. Obesity levels are slightly higher among frontier residents than rural residents; therefore, both areas deserve appropriate attention. The challenge for policy makers, however, will be to come up with an appropriate economic justification for spending large sums of money in sparsely populated frontier communities.

In the process of fashioning policy for rural dwellers, concerns exist regarding the implementation and monitoring of the activities. Rural communities are different in nature from metropolitan communities and require a unique set of skills, knowledge and techniques which may vary from society to society. Global variations also exist. The researcher happens to have lived in a different part of the world with a different concept of the rural that can be considered totally different from what we have in the United States. In most developing countries, rural can simply be described as 'what the urban area is not'. They are often characterized by neglect by the government and lacking basic social infrastructure. In most cases, these areas hold the majority of the population and

living standards have, for the most part, stagnated or even deteriorated (Ohagi, 1995; Ohagi, et al., 1998; Olatunbosun, 1975). In Nigeria, for example, there was no deliberate and coordinated rural development program until 1986, and even after this period, rural development was conceived as a process of mobilizing unused land and labor to finance capital formation in other sectors (Igbozurike, 1991). This pattern produced an ironical situation where a nation with a basically rural population thrived on an urban-based economy (Adepoju, 1986; Fadayomi, 1988) making rural-urban migration a way of life (Makinwa, 1981) as well as a survival strategy (Prasad and Sardana, 1989).

This study also found age to be an important predictor of obesity in all environments. Analyzed data indicate that the odds of obesity increased with age until age 64. We also are aware from review of relevant literature that there have been several programs at the national (CDC, 2002) and state level (Sanchez, 2003; TDH, 2003) targeting school children by encouraging better nutrition and more physical activity. The idea behind those programs is to nip the problem at the bud given that adult obesity has been found to be strongly associated with childhood obesity (Zimmel, et al., 2002). As logical as these attempts sound, the public health system should not lose sight of the need to encourage healthy behavior among adults. The latter has the potential to drastically reduce the incidence of several obesity-related chronic conditions that place a great burden on the healthcare system and the economy (Sturm, 2002; THI, 2004). The recent decision to expand Medicare coverage to include obesity-related treatment is a step in the right direction. However, given the fact that age risk for obesity starts a lot earlier than the retirement age, it is logical that the health insurance providers be encouraged to

expand their current coverage to include more weight loss programs that encourage healthy nutrition and physical activity. This step has the potential of reducing the incidence of several chronic conditions and thereby producing a healthier people. It also has the potential to convert into savings for the insurance corporations.

Race and ethnicity have been critical determinants of obesity. Literature suggests that blacks and Hispanics have a greater tendency to be obese than whites and other racial/ethnic groups (Urrutia-Rojas et al., 2002). Results from our analyses confirm this assertion. When we exposed this variable to other demographic variables such as age, we found that white males are at greater risk of obesity than white females. However, black and Hispanic females have higher obesity levels than their male counterparts. Among Native Hawaiians, Pacific Islanders and Native Alaskans, men are slightly more likely to be obese than women. These results call for well articulated efforts designed to reach the most susceptible populations in specific types of communities. The public health system needs to take into consideration the sociocultural characteristics of those who belong to these segments of the population in order to come up with an appropriate mix of programs and an agenda that will be effective and acceptable. Culture-specific health education and health promotion programs would not be out of place as a starting point.

Data Limitations

Given that the BRFSS database only contains data for adults, our analysis will exclude a very substantial segment of the Texas population -young people under 18 years

of age. Literature indicates that obesity in adult ages has been strongly associated with childhood obesity (Guo et al., 1994).

In addition, the data set will not allow for spatial identification of obesity clusters because data regarding the location of residence are not publicly released as part of the BRFSS data. There also are concerns that BMI might not be the best measure of obesity given physical differences in body size and skin fold based on race and ethnicity (Burke et al., 1992). These biologically determined differences make Blacks and Hispanics more likely to be labeled as obese. In other words, two individuals can have the same body mass index but a different percent body fat (CDC, 2004).

There also is the concern about reliability of BRFSS data given that they are self-reported (Nelson, 1996). Some literature suggests variations in obesity levels associated with socioeconomic characteristics such as educational level (Mackenbach et al., 1996). With regard to overweight and obesity, there is the tendency for people to underreport weight and over-report height (Rowland, 1990). It is yet uncertain if there are urban/rural differences in the patterns of discrepancy.

In our analysis, obese individuals were classified into one category without differentiating between the moderately obese, severely obese, and morbidly obese individuals. This leaves room for further inquiry into a different dimension of obesity research.

CHAPTER VI

CONCLUSION

Obesity has been identified as a growing problem in the United States and Texas has been prominent on the list of the most obese states in the United States. The increasing incidence of obesity has drawn unprecedented attention to this from different disciplines and especially from the public health system. The social and economic costs of obesity have also been outlined earlier in the review of literature. Issues of concern include the health implications for obese individuals resulting from the association between obesity and several chronic diseases. There also is concern regarding the increasing burden of obesity on the healthcare system.

Results from our study clearly indicate that in the state of Texas, obesity rates are higher in the rural areas than the metropolitan and suburban areas. They also show that frontier residents are slightly more likely to be obese than other rural dwellers, though the results are not statistically significant. The differences were significant in the adjusted analyses. These results tend to suggest that there are factors in the rural environment that predispose rural residents to obesity. Obesity in the rural areas has been attributed to the lack of access to adequate health and nutritional information and unavailability of facilities that encourage physical activity.

Age was identified as one of the critical predictors of obesity in Texas. We found that age is a risk factor for obesity up to age 64. This makes age 65 or older a protective factor. The significance of this result is that it provides public health policy makers with valuable information to build a profile of the obese population in Texas and consequently serve as a resource for deliberate policy formulation. There has been considerable policy emphasis on childhood obesity which has been closely associated with adult obesity. However, there is a need for anti-obesity policy directed towards Texas adults, especially those residing in rural communities among who obesity is more commonplace. Given that there are programs aimed at curbing childhood obesity, policies geared towards building a healthier adult population have the potential for reducing the incidence of disease and the maximization of human capital for the state of Texas.

Gender was also identified as a predictor for obesity indicating that being male is a risk factor for obesity, especially in the rural communities. This is not unrelated to the fact that women are more likely to engage in some form of physical activity with weight-loss in mind. Suburban females have the lowest obesity rates across the board. This is not unrelated to a greater tendency among suburban women to desire good body image coupled with the likely availability of resources (finance and infrastructure) necessary for physical activity. The suburbs also are more likely to have the advantage of carefully planned communities that make provision for safe walking, jogging, or biking. Public health policy steps for the suburbs should include plans to encourage males to participate in some form of physical activity.

This study identifies the vulnerable populations with regard to obesity in Texas. It is intended to serve as a resource for future research and to add to the growing obesity literature, especially for the state of Texas. We have tried to explore the associations that exist among obesity predictors. The most important objective of this study is to guide public health policy. It is hoped that the information gathered in the process of this research and the results generated will become part of the body of tools that will be employed by public health policy makers in the process of finding a lasting solution to the epidemic of obesity in Texas.

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