

# **Contributing Factors for Obesity in the U.S. – Part II**

New Mexico

Supercomputing Challenge

Final Report

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## Contributing Factors for Obesity in the U.S. – Part II

The purpose of this project is to determine which factors will contribute most to obesity in the United States, specifically in New Mexico. These include: ethnicity, education, income, work hours, family history, diet and nutrition, alcohol consumption, tobacco use, location, proximity to the nearest recreational facility, and physical activity. Determining which factors affect New Mexican's the most will help them to better understand the causes of obesity and take action to reverse its affects.

Numerous participants were asked to complete a 5 minute survey asking questions about the factors stated above. Once the surveys were collected, the BMI from each survey was calculated using a specific formula. The information gathered from the surveys was recorded and separated according to weight classes defined as: normal weight, overweight, and obese. In the case of age in connection to BMI, the data was displayed through scatter plots. Data was also analyzed using a multiple linear regression model, analyzed by Statistical Analysis Software (SAS). The program determines the factors that best predict BMI using a backward elimination process, which eliminates factors with the highest P-value determining significance to BMI. Results showed that the remaining factors with a P-value of less than or equal to 0.1, which included eating out per week, family history of obesity, gender, income, highest level of education, and location of residence, were significant in predicting BMI. Therefore, alternative  $H_1$  was rejected and null hypothesis  $H_0$ 1 was accepted, and alternative hypothesis  $H_2$  and null hypothesis  $H_0$ 2 were neither accepted nor rejected.

## Introduction

### Purpose:

The purpose of this project is to determine which factors will contribute most to obesity in the United States, and specifically in New Mexico. Determining which factors affect New Mexican's the most will help them to better understand the causes of obesity and take action to reverse its affects.

### Question:

Is there a correlation between the BMI of an individual and each of the factors stated in the survey?

These factors include: ethnicity, education, income, work hours, family history, diet and nutrition, alcohol consumption, tobacco use, location, proximity to the nearest recreational facility, and physical activity. More specifically, which of these factors will have the greatest percentage of impact on New Mexicans?

### Background:

In the United States the percentage of obesity has dramatically increased in the past twenty years. For example, one in every three adults is obese, and two in every three adults are overweight (The Health Care Center). There are many factors which contribute to obesity, but why does this matter? Obesity is one of the most preventable diseases which contribute to many different health problems. If obesity rates were to decrease in the future, many health problems would also decrease, saving many lives. The goal of this study is to identify if environmental factors, such as age, gender, ethnicity, level of education, economic status, work hours, family history of obesity, diet, physical activity, alcohol and tobacco consumption, place of residence, and proximity to a recreational facility are major causes of obesity. Also to discover how these factors affect the lifestyles of Americans today, specifically the lifestyles of New Mexicans.

Even though the knowledge about the dangers of obesity and efforts to reduce them has increased, the problem still seems to get worse. The CDC's Behavioral Risk Factor and Surveillance System has shown that there has been a dramatic increase in obesity in the United States. In 1985 only 8 states had an obesity percentage of 10 – 14 %, which was then the highest obesity level. It is alarming to compare this to 2008 where there is only one state in the 15% - 19% range, 26 states in the 25% - 29% range, and 6 states in the 30% or greater range.

New Mexico was included as one of the 26 states in the 25% - 29% range (United States). Some other disturbing statistics show that obesity is affecting children and teens at an alarming rate. In the past twenty years, the percentage of children who are overweight has doubled and the percentage of adolescents who are obese has tripled (A.D.A.M.).

Obesity can also be called corpulence. It is defined as an excess amount of fat caused by the consumption of more calories than the body needs. These extra calories are then stored as fat, which is called adipose tissue. Adipose tissue is defined simply as fat or body fat (The New Encyclopedia Britannica). Another definition for obesity is having a Body Mass Index (BMI) of 30 or greater (United States). Adults that are overweight have a BMI greater than 25 but less than 30. Adults that are morbidly obese have a BMI greater than 40. An adult having a BMI of less than 25 but greater than 18.5 is classified as having a normal weight, and an adult having a BMI of less than 18.5 is considered underweight (A.D.A.M.). Body Mass Index is defined as a measure of an adult's weight in relation to his or her height, specifically the adult's weight in kilograms divided by the square of his or her height in meters (United States). Although it does not calculate the exact percentage of body fat, BMI can be used to estimate the healthy body weight of a person based on their height.

There are three main ways from which obesity is a result of: Eating more food than the body can use, drinking too much alcohol, and not getting enough exercise (A.D.A.M.). However there are many other factors which contribute to obesity. These include: age, race, ethnicity, gender, education, economic status, regional differences, disabilities, hereditary traits, and nutrition (The New Mexico Department of Health). Race and Ethnicity are key factors for obesity in the United States. African Americans have a 51 percent higher prevalence of obesity and Hispanics have a 21 percent higher prevalence of obesity compared to whites (United States). This can be because of cultural aspects and also regional differences, since foods for these two cultures are usually higher in fat. Because of the large population of Hispanics that reside in New Mexico, these statistics are especially important. Hereditary traits can also affect obesity by influencing the weight-related processes in the body such as metabolism or fat storage; however, these effects must also be separated from environmental causes.

The most influential factor of obesity is lack of physical activity and nutrition. These two directly affect a person's weight and are most often the main cause to this deadly disease. In New Mexico alone, less than one quarter of adults eat five or more servings of vegetable and fruit servings daily (University of New Mexico Prevention Research Center). The majority of New Mexicans eat a variety of corn products and fried foods, which are high in fat. They include beans, corn tortillas, sopapillas, tamales, chili rellenos, and many other foods. Because these foods are part of the local culture, many people do not realize just how unhealthy they can be. To add to this moderately unhealthy diet, only half of adults in New Mexico perform the minimum amount of recommended physical activity. One quarter of the population is not physically active at all (University of New Mexico Prevention Research Center). By partaking in physical activity, the body burns calories and fat, therefore causing the body to lose weight. It is recommended that a person should get at least one hour of exercise a day. This can be anything from walking, running, or partaking in a sport. If every person started exercising frequently and eating a nutritious diet, the obesity rates in New Mexico would gradually decrease year by year.

Other factors that can influence obesity levels are education level and economic status, or income. Based on scientific research, a person's level of education does affect their obesity level to some degree(Sørensen). This does not necessarily indicate that people with lower education levels will undoubtedly become obese, but that there is a possible correlation between the two. Also based on previous research is the fact that having a lower income affects obesity rates as well (Science News). Lower income neighborhoods are one example of this. In urban areas, this is especially true. Many people may not have the opportunity to exercise at a recreational facility, or have the stores to shop for healthier foods. As a result, obesity rates increase.

Alcohol and cigarette consumption may affect obesity rates as well. Most types of alcoholic beverages contain a high number of calories. Drinking alcohol on a daily basis is known to be beneficial in some cases, however, if too much is consumed, weight gain is probable. Smoking may also be related to obesity. Cigarettes contain over 400 harmful chemicals, including nicotine, carbon monoxide, tar, and acetone (Johnson). Combined with alcohol, these two factors may have a significant effect on obesity rates.

The last factors that may have an effect on obesity are place of residence and proximity to a recreational facility. In urban areas, recreational facilities are much more common than in rural areas. There is a greater population, and therefore, more opportunities. Also because of high traffic and more available sources of public transportation, people in urban areas tend to walk more than those in rural areas. In rural areas, many of the same opportunities and facilities are not common because of a smaller population. People tend to drive their cars more, since public transportation is not as readily available. As a result, residents from rural areas might tend to have higher obesity rates than those that live in an urban area.

Many health problems can arise from obesity. These include diseases of the heart, mind, skeletal structure, blood and veins, kidneys, lungs, and liver. The top ten most dangerous obesity caused diseases are: heart disease, type 2 Diabetes, Dyslipidemia, Polycystic Ovary Syndrome, Sleep Apnea, Arthritis, Blount's Disease, respiratory problems, liver damage, and stroke (Top 10 Dangerous Diseases Caused by Fast Food Obesity). Other diseases include hypertension, certain cancers including breast and colon, depression, osteoarthritis, cardiovascular disease, heart failure, high blood pressure, high cholesterol, deep vein thrombosis, and pulmonary embolism. Other health problems associated with excess weight include: menstrual disorders, infertility, pregnancy complications, birth defects, poor mobility, low back pain, and joint pain (Top 10 Dangerous Diseases Caused by Fast Food Obesity). Obesity can cause or is a major factor in the occurrence of these diseases and health problems. By reducing the current obesity trends, these health risks will also decrease, making America healthier.

Although obesity is a growing problem in current times, there are ways to increase weight loss. One of the easiest ways to lose weight is by combining a nutritional diet and physical activity as part of an everyday lifestyle. When dieting, the goal is to learn how to make healthy eating choices, control portion sizes, and make new, healthier ways to prepare food. Exercise is also an important part of the weight loss process. At least 30 minutes of exercise a day is needed to stay healthy. Besides aiding in weight loss, exercise also helps control some diseases caused by obesity, including heart disease, high blood pressure, diabetes, osteoporosis, and certain types of cancers (A.D.A.M.). Besides diet and exercise, other methods

such as surgery and over the counter medication can be used to aid weight loss. Surgeries including gastric bypass surgery can be used for morbidly obese people who cannot lose weight any other way. Most over the counter medications do not work. Some can even be dangerous. Candidates who took the medication had some weight loss progress, but generally gained all the weight back when they stopped taking it. Unless a permanent lifestyle change is made, medication is not a very effective way to lose weight on most people (A.D.A.M.). Out of all these methods, good nutrition and physical activity is the easiest and healthiest way to lose weight.

With obesity becoming a major epidemic in the United States today, it is important to know the factors which contribute to it. There have been previous studies to show that environmental factors do influence weight. As previously mentioned, these factors can range all the way from age and gender, to physical activity and nutrition. Knowing which factors contribute most to obesity can be extremely beneficial to not only obese people, but to others as well. If these factors are known, then obesity may be prevented in the long run.

## Hypothesis

H<sub>0</sub>1: The correlation between obesity and diet, and obesity and physical activity will not be the strongest.

H<sub>0</sub>2: The correlation between obesity and location, and obesity and proximity to a recreational facility will not be the weakest.

H<sub>1</sub>1: The correlation between obesity and diet, and obesity and physical activity will be the strongest.

H<sub>1</sub>2: The correlation between obesity and location, and obesity and proximity to a recreational facility will be the weakest.

## Materials and Methods

**Subjects** – Participants will be of the age 18 and older in the state of New Mexico. They may be of any gender, and of any racial or ethnic composition. There is no discrimination in this study and the more diverse the subject the better. There is no limitation to anyone who may not participate in the study, except for age. The only populations who might be vulnerable would



be those who are overweight, because of the emotional response. However, since the survey is completely anonymous and voluntary the subject may choose not to participate at any time.

**Recruitment** – Subjects will be found in public places and selected at random. They will be approached by a researcher and asked if they would like to participate in a study trying to determine the contributing factors to obesity in New Mexico residents.

**Methods** – Participants will be asked to fill out a survey asking about the following personal information: age, gender, height, weight, ethnicity, education, income, work hours, family history of obesity, diet, consumption of alcoholic beverages and tobacco, physical activity, location, and proximity to the nearest recreational facility. To completely fill out a survey it takes approximately 5 minutes.

**Risks** – The risks and potential discomforts are mainly emotional and psychological. The only risk is that a subject filling out the survey may be uncomfortable with the information that is being asked. Someone may be uncomfortable giving out such personal information; however, the surveys will be completely anonymous. There will be no name given, and only after, when doing data analysis will the surveys be given identification numbers. The surveys are also voluntary, and if in any way a subject is uncomfortable they may choose not to participate. At the beginning of the actual survey it is stated that the survey is voluntary, and that the subject may choose not to answer any question.

**Benefits** – Benefits of this project are more to society. The information gathered from this study will be used to help other New Mexicans by raising awareness of the major contributing factors to obesity in their state. Each subject will receive a small piece of candy as a thanks for giving their time to help with the project.

**Protection of Privacy** – There will be no identifiable information collected in this survey. Data will be completely anonymous and confidential. Data will be anonymous because at no time will the subject be asked of any names, numbers, or any other type of identifiable information. Once the survey is filled out, it will be placed into a folder with the others collected on that day. Then, after research is done and the surveys are being looked over for analysis, they will be given an ID number that will not relate to either the order or date that the survey was given. The ID number will only be used to make sure that data is not analyzed twice.

**Informed Consent Process** – The student researcher will approach the subject, give a general overview of the project and its purpose. They will be asked if they would like to participate, and if they say yes the project will be explained in further detail. If the subject wishes to continue, they will be given a copy of the complete *Sample Informed Consent Form* so that they may review the information and sign the consent form. At the top of the actual survey they are

reminded again that it is anonymous and that they may stop at any time or not answer any question if they prefer not to.

**Population Size** – Up to the current period of time, 162 surveys were collected for data analysis. The total number of surveys collected for each weight class was as follows: 2 underweight , 75 normal, 52 overweight, 28 obese, and 24 morbidly obese.

## Contributing Factors for Obesity in the U.S. – Part II

Age: \_\_\_\_\_ Gender: \_\_\_\_\_ Height: \_\_\_\_\_ Weight: \_\_\_\_\_

Instructions: Please be as truthful as possible. All information given is completely anonymous, however if you prefer not to answer any question, it is not mandatory. Thank you again for helping us in our science project!

Please circle the answer that best describes you personally.

For official use only:

Id number: \_\_\_\_\_

BMI: \_\_\_\_\_

- 1) What is your ethnicity?
  - a. Hispanic/Latino
  - b. Caucasian (non Hispanic)
  - c. African American (non Hispanic)
  - d. Native American
  - e. Asian
  - f. Native Hawaiian/Pacific Islander
  - g. Multiracial
  - h. Other
  
- 2) What is your highest level of education?
  - a. Less than high school
  - b. High school graduate/GED
  - c. Business/technical school or certificate Program
  - d. Some college, no degree or certificate
  - e. Associate's degree (2 years)
  - f. Bachelor's degree (4 years)
  - g. Masters degree (1 or 2 of study)
  - h. Doctorate or Professional Degree
  
- 3) Please estimate your total income, or the income of those you are dependent upon before taxes last year.
  - a. \$20,000 or less
  - b. About \$20,000 to \$30,000
  - c. About \$30,000 to \$40,000
  - d. About \$40,000 to \$60,000
  - e. About \$60,000 to \$100,000
  - f. \$100,000 or above
  
- 4) Approximately how many hours a week do you work?
  - a. None
  - b. 1 – 10
  - c. 11 – 20
  - d. 21 – 30
  - e. 31 – 40
  - f. 41 or more
  
- 5) Do you have a family history of obesity?
  - a. Yes
  - b. No
  
- 6) If you answered yes for question 5 please rate on a scale of 1 – 10 (1 being the lowest and 10 being the highest) how much you think this family history affects your personal health habits.
  
- 7) How healthy do you eat?
  - a. Very healthy

- b. Moderately healthy
- c. Not healthy
- d. Very unhealthy

8) Approximately how many servings of each of the following food groups do you get a day?

Please circle the most accurate answer.

Fruits	A) 0	B) 1	C) 2	D) 3	E) 4	F) 5 or more
Vegetables	A) 0	B) 1	C) 2	D) 3 or 4	E) 5	F) 6 or more
Proteins (beans, eggs, meat & fish)	A) 0	B) 1	C) 2	D) 3	E) 4 or more	
Dairy products	A) 0	B) 1	C) 2	D) 3	E) 4 or more	
Grains and carbohydrates	A) 0	B) 1-3	C) 4-5	D) 6 – 8	E) 9 – 11	F) 12 or more
Fatty or fried food	A) 0	B) 1	C) 2	D) 3	E) 4 or more	

9) How many times a week do you eat out?

- a. Never
- b. 1 – 2 times
- c. 3 – 4 times
- d. 5 – 7 times
- e. 8 or more

10) Approximately how many alcoholic beverages do you consume on a weekly basis?

- a. None
- b. 1 – 2 drinks
- c. 3 – 5 drinks
- d. 6 – 8 drinks
- e. 9 or more

11) Approximately how many cigarettes do you smoke daily?

- a. I don't smoke
- b. 1 – 3
- c. 4 – 8
- d. 9 – 12
- e. 13 or more

12) Approximately how many times a week do you perform some type of physical activity? For example: walking, running, weight lifting, swimming, ect.

- a. None
- b. 1 – 2 times
- c. 3 – 4 times
- d. 5 – 6 times
- e. 7 or more

13) How would you describe the area where you live?

- a. Rural
- b. Urban

14) How close to your place of residence is the nearest recreational facility? This includes: gyms, walking trails, parks, sports facilities, aquatic centers, ect.

- a. Within 1 or 2 miles
- b. 3 to 6 miles
- c. 7 to 15 miles
- d. 16 to 30 miles
- e. 31 miles or more

### Variables:

Independent – BMI, age, gender, height and weight of subjects, ethnicity, level of education, income, work hours (per week), family history of obesity, diet, alcohol and tobacco consumption, physical activity, location (rural or urban), and proximity to the nearest recreational facility.

Dependent – Percentage of answers for each weight class (normal weight subjects, overweight subjects, and obese subjects).

Constant – State, survey questions, formula for BMI calculation, range of weight classes.

### Data Analysis:

Once the surveys are collected, the BMI for each subject will be calculated using the following formulas, and located on the upper right hand corner of each survey.

#### **BMI Formulas:**

Metric Units:

$$\text{BMI} = \text{Weight (kg)} / \text{Height (m)}^2$$

English units:

$$\text{BMI} = \text{Weight (lbs)} / (\text{Height (in)}^2) \times 703$$

Each survey will also be given an identification number, in no particular order, also located at the upper right hand corner of the page. The information gathered from the surveys will be recorded and separated according to weight classes. The weight classes are defined as: normal (18.5 – 24.9), overweight (25 – 29.9), and obese (30 or greater). For each weight class, each of the factors previously mentioned will be analyzed separately. In the special case of age in connection to the BMI, the data will be displayed through scatter plots. For all other factors, the data will be displayed using pie graphs. For example: for the ethnicity factor, the data will be organized into the three different weight classes. After they have been separated, percentages for each answer will be found. These pie graphs will be used to give a visual representation of the data.

Data will also be analyzed using a multiple linear regression model, analyzed by Statistical Analysis Software (SAS). The program determines the factors that best predict BMI using a backward elimination process. The program eliminated the factors with the highest P-value in order to determine their significance to BMI.

```

PROC IMPORT OUT= WORK.Base
      DATAFILE= "H:\Personal\Science Project2.xlsx"
      DBMS=EXCEL REPLACE;
      SHEET="Master";
      GETNAMES=YES;
      MIXED=YES;
      USEDATE=YES;
      SCANTIME=YES;
RUN;

data base2;
  set base;
  i+1;
  if i<=162;
  if M_or_F ='M' then sex=0;
  if M_or_F ='F' then sex=1;
  if Highest_Level_of_Edu IN ('A' 'B' 'C' 'D') then Highest_Level = 0;
  if Highest_Level_of_Edu IN ('E' 'F' 'G' 'H') then Highest_Level = 1;
  if Income IN ('A' 'B' 'C') then Income_ = 0;
  if Income IN ('D' 'E' 'F') then Income_ = 1;
  if Work_Hours_per_Week IN ('A' 'B' 'C') then Work_Hours= 0;
  if Work_Hours_per_Week IN ('D' 'E' 'F') then Work_Hours = 1;
  if Family_History_of_Obesity = 'N' then Family_History = 0;
  if Family_History_of_Obesity = 'Y' then Family_History = 1;
  if Opinion_of_Diet IN ('A' 'B') then Opinion = 0;
  if Opinion_of_Diet IN ('C' 'D') then Opinion = 1;
  if Fruits_per_Day IN ('A' 'B' 'C') then Fruits= 0;
  if Fruits_per_Day IN ('D' 'E' 'F') then Fruits= 1;
  if Vegetables_per_Day IN ('A' 'B' 'C') then Vegetables = 0;
  if Vegetables_per_Day IN ('D' 'E' 'F') then Vegetables = 1;
  if Proteins_per_Day IN ('A' 'B' 'C') then Proteins = 0;
  if Proteins_per_Day IN ('D' 'E') then Proteins= 1;
  if Dairy_Products_per_Day IN ('A' 'B' 'C') then Dairy = 0;
  if Dairy_Products_per_Day IN ('D' 'E') then Dairy = 1;
  if Grains__Carbs_per_Day IN ('A' 'B' 'C') then Grains = 0;
  if Grains__Carbs_per_Day IN ('D' 'E' 'F') then Grains = 1;
  if Fatty__Fried_Food_per_Day IN ('A' 'B' 'C') then Fatty = 0;
  if Fatty__Fried_Food_per_Day IN ('D' 'E') then Fatty = 1;
  if Eat_Out_Times_per_Week IN ('A' 'B' 'C') then Eat_Out = 0;
  if Eat_Out_Times_per_Week IN ('D' 'E') then Eat_Out = 1;
  if Alcoholic_Beverages_per_Week IN ('A' 'B' 'C') then Alcohol = 0;
  if Alcoholic_Beverages_per_Week IN ('D' 'E') then Alcohol = 1;
  if Smoke_ IN ('A' 'B') then Smok = 0;
  if Smoke_ IN ('C' 'D' 'E') then Smok = 1;
  if Physical_Activity_per_Week IN ('A' 'B' 'C') then Physical = 0;
  if Physical_Activity_per_Week IN ('D' 'E') then Physical = 1;
  if Rural_or_Urban_ IN ('R' ) then Rural = 0;
  if Rural_or_Urban_ IN ('U') then Rural = 1;
  if Proximity_to_Nearest_Rec_Facili IN ('A' 'B' 'C') then Proximity =0;
  if Proximity_to_Nearest_Rec_Facili IN ('D' 'E') then Proximity= 1;
  keep ID__ bmi age sex highest_level income_ work_hours family_history
  opinion fruits vegetables proteins dairy grains fatty eat_out alcohol smok
  physical rural
  proximity;
run;

PROC REG DATA=BASE2 OUTEST=first;
      MODEL BMI=age sex highest_level income_ work_hours family_history
  opinion fruits vegetables proteins dairy grains fatty eat_out alcohol smok
  physical rural

```

```

proximity / selection=backward;
RUN;
QUIT;

```

The REG Procedure  
Model: MODEL1  
Dependent Variable: BMI BMI

<b>Number of Observations Read</b>	162
<b>Number of Observations Used</b>	147
<b>Number of Observations with Missing Values</b>	15

Backward Elimination: Step 0

All Variables Entered: R-Square = 0.2834 and C(p) = 20.0000

<b>Analysis of Variance</b>					
<b>Source</b>	<b>DF</b>	<b>Sum of Squares</b>	<b>Mean Square</b>	<b>F Value</b>	<b>Pr &gt; F</b>
<b>Model</b>	19	964.76143	50.77692	2.64	0.0007
<b>Error</b>	127	2439.35829	19.20755		
<b>Corrected Total</b>	146	3404.11973			

<b>Variable</b>	<b>Parameter Estimate</b>	<b>Standard Error</b>	<b>Type II SS</b>	<b>F Value</b>	<b>Pr &gt; F</b>
<b>Intercept</b>	20.70242	1.47300	3794.11773	197.53	<.0001
<b>Age</b>	0.03137	0.02540	29.30230	1.53	0.2191
<b>sex</b>	-1.64010	0.83900	73.39924	3.82	0.0528
<b>Highest_Level</b>	1.43034	0.82770	57.35960	2.99	0.0864
<b>Income_</b>	1.76466	0.90684	72.73379	3.79	0.0539
<b>Work_Hours</b>	1.05854	0.93191	24.78175	1.29	0.2581
<b>Family_History</b>	2.57557	0.87491	166.45124	8.67	0.0039
<b>Opinion</b>	1.40171	1.04007	34.88742	1.82	0.1801

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Fruits	-0.32919	1.11081	1.68690	0.09	0.7674
Vegetables	0.11559	0.91510	0.30645	0.02	0.8997
Proteins	1.07133	0.82839	32.12565	1.67	0.1983
Dairy	0.28653	0.95057	1.74525	0.09	0.7636
Grains	0.80829	0.90254	15.40534	0.80	0.3722
Fatty	0.08155	1.23305	0.08402	0.00	0.9474
Eat_Out	3.89652	1.80302	89.70704	4.67	0.0326
Alcohol	0.11753	1.23126	0.17501	0.01	0.9241
Smok	1.25183	1.92779	8.09930	0.42	0.5173
Physical	-0.43956	0.90433	4.53797	0.24	0.6278
Rural	1.18346	0.77234	45.09798	2.35	0.1279
Proximity	0.56289	1.62965	2.29157	0.12	0.7304

Bounds on condition number: 1.5203, 457.7

Backward Elimination: Step 1

Variable Fatty Removed: R-Square = 0.2834 and C(p) = 18.0044

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	18	964.67742	53.59319	2.81	0.0004
Error	128	2439.44231	19.05814		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.69617	1.46423	3807.51685	199.78	<.0001



Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Age	0.03120	0.02517	29.28161	1.54	0.2174
sex	-1.63344	0.82969	73.86845	3.88	0.0511
Highest_Level	1.44154	0.80702	60.80880	3.19	0.0764
Income_	1.76603	0.90307	72.88429	3.82	0.0527
Work_Hours	1.05940	0.92819	24.82695	1.30	0.2559
Family_History	2.58165	0.86668	169.10631	8.87	0.0035
Opinion	1.41544	1.01519	37.04818	1.94	0.1657
Fruits	-0.31735	1.09200	1.60953	0.08	0.7718
Vegetables	0.11574	0.91153	0.30729	0.02	0.8992
Proteins	1.07811	0.81883	33.03849	1.73	0.1903
Dairy	0.28565	0.94677	1.73482	0.09	0.7634
Grains	0.81045	0.89843	15.50843	0.81	0.3687
Eat_Out	3.89694	1.79598	89.72750	4.71	0.0319
Alcohol	0.12826	1.21578	0.21210	0.01	0.9161
Smok	1.24507	1.91757	8.03460	0.42	0.5173
Physical	-0.44033	0.90073	4.55457	0.24	0.6258
Rural	1.18450	0.76917	45.19642	2.37	0.1260
Proximity	0.55606	1.62004	2.24530	0.12	0.7320

Bounds on condition number: 1.5196, 407.88

Backward Elimination: Step 2

Variable Alcohol Removed: R-Square = 0.2833 and C(p) = 16.0154

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	17	964.46532	56.73325	3.00	0.0002
Error	129	2439.65441	18.91205		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.71592	1.44663	3878.18975	205.06	<.0001
Age	0.03108	0.02505	29.11671	1.54	0.2169
sex	-1.64539	0.81876	76.37650	4.04	0.0466
Highest_Level	1.45154	0.79836	62.51780	3.31	0.0714
Income_	1.77225	0.89768	73.71229	3.90	0.0505
Work_Hours	1.05209	0.92205	24.62280	1.30	0.2560
Family_History	2.58515	0.86272	169.81440	8.98	0.0033
Opinion	1.42518	1.00709	37.87384	2.00	0.1594
Fruits	-0.32085	1.08731	1.64678	0.09	0.7684
Vegetables	0.11819	0.90774	0.32059	0.02	0.8966
Proteins	1.08111	0.81519	33.26323	1.76	0.1871
Dairy	0.28955	0.94241	1.78523	0.09	0.7592
Grains	0.80092	0.89044	15.30051	0.81	0.3701
Eat_Out	3.91624	1.77978	91.56831	4.84	0.0296
Smok	1.25429	1.90822	8.17105	0.43	0.5122
Physical	-0.44910	0.89344	4.77848	0.25	0.6161
Rural	1.18349	0.76616	45.12615	2.39	0.1249
Proximity	0.55777	1.61374	2.25938	0.12	0.7302

Bounds on condition number: 1.5131, 364.46

Backward Elimination: Step 3

Variable Vegetables Removed: R-Square = 0.2832 and C(p) = 14.0321

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	16	964.14472	60.25905	3.21	0.0001
Error	130	2439.97500	18.76904		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.73103	1.43651	3909.02156	208.27	<.0001
Age	0.03101	0.02495	28.99441	1.54	0.2161
sex	-1.62625	0.80241	77.09420	4.11	0.0447
Highest_Level	1.44753	0.79474	62.26565	3.32	0.0708
Income_	1.77566	0.89390	74.05970	3.95	0.0491
Work_Hours	1.04548	0.91716	24.38821	1.30	0.2564
Family_History	2.59277	0.85747	171.60409	9.14	0.0030
Opinion	1.41588	1.00075	37.57014	2.00	0.1595
Fruits	-0.29771	1.06862	1.45673	0.08	0.7810
Proteins	1.09788	0.80189	35.18203	1.87	0.1733
Dairy	0.27352	0.93080	1.62071	0.09	0.7693
Grains	0.80968	0.88453	15.72668	0.84	0.3617
Eat_Out	3.91451	1.77299	91.49264	4.87	0.0290
Smok	1.25767	1.90081	8.21673	0.44	0.5094
Physical	-0.44584	0.88971	4.71305	0.25	0.6171

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Rural	1.18158	0.76312	44.99750	2.40	0.1240
Proximity	0.55694	1.60761	2.25270	0.12	0.7296

Bounds on condition number: 1.5118, 321.88

Backward Elimination: Step 4

Variable Fruits Removed: R-Square = 0.2828 and C(p) = 12.1079

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	15	962.68800	64.17920	3.44	<.0001
Error	131	2441.43173	18.63688		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.68905	1.42354	3936.52585	211.22	<.0001
Age	0.03121	0.02485	29.38666	1.58	0.2115
sex	-1.62635	0.79958	77.10383	4.14	0.0440
Highest_Level	1.45771	0.79110	63.27832	3.40	0.0676
Income_	1.75417	0.88743	72.82028	3.91	0.0502
Work_Hours	1.05927	0.91260	25.10921	1.35	0.2479
Family_History	2.61738	0.84990	176.75354	9.48	0.0025
Opinion	1.45525	0.98723	40.49602	2.17	0.1429
Proteins	1.08066	0.79669	34.29065	1.84	0.1773
Dairy	0.26504	0.92702	1.52336	0.08	0.7754
Grains	0.79334	0.87947	15.16508	0.81	0.3687

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Eat_Out	3.95888	1.75959	94.33955	5.06	0.0261
Smok	1.33344	1.87462	9.42953	0.51	0.4782
Physical	-0.50896	0.85734	6.56790	0.35	0.5538
Rural	1.17345	0.75987	44.44507	2.38	0.1249
Proximity	0.58142	1.59955	2.46236	0.13	0.7168

Bounds on condition number: 1.5005, 280.58

Backward Elimination: Step 5

Variable Dairy Removed: R-Square = 0.2824 and C(p) = 10.1873

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	14	961.16464	68.65462	3.71	<.0001
Error	132	2442.95509	18.50724		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.73256	1.41045	3998.80925	216.07	<.0001
Age	0.03116	0.02477	29.30439	1.58	0.2105
sex	-1.60195	0.79224	75.66953	4.09	0.0452
Highest_Level	1.46082	0.78827	63.56071	3.43	0.0661
Income_	1.72628	0.87898	71.38567	3.86	0.0516
Work_Hours	1.03988	0.90690	24.33250	1.31	0.2536
Family_History	2.61444	0.84688	176.38349	9.53	0.0025
Opinion	1.41913	0.97570	39.15183	2.12	0.1482

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Proteins	1.14563	0.76093	41.95111	2.27	0.1346
Grains	0.85613	0.84864	18.83531	1.02	0.3149
Eat_Out	3.94548	1.75284	93.76852	5.07	0.0260
Smok	1.40839	1.84973	10.72928	0.58	0.4478
Physical	-0.53929	0.84779	7.48865	0.40	0.5258
Rural	1.19201	0.75445	46.19977	2.50	0.1165
Proximity	0.58137	1.59398	2.46198	0.13	0.7159

Bounds on condition number: 1.4824, 239.3

Backward Elimination: Step 6

Variable Proximity Removed: R-Square = 0.2816 and C(p) = 8.3154

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	13	958.70266	73.74636	4.01	<.0001
Error	133	2445.41707	18.38659		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.78448	1.39867	4060.20659	220.82	<.0001
Age	0.03165	0.02465	30.30701	1.65	0.2014
sex	-1.58904	0.78887	74.60417	4.06	0.0460
Highest_Level	1.47955	0.78403	65.47871	3.56	0.0613
Income_	1.73760	0.87556	72.41481	3.94	0.0493

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Work_Hours	1.04653	0.90376	24.65471	1.34	0.2489
Family_History	2.57901	0.83854	173.92359	9.46	0.0026
Opinion	1.38513	0.96807	37.64208	2.05	0.1548
Proteins	1.12709	0.75675	40.78632	2.22	0.1388
Grains	0.82920	0.84266	17.80380	0.97	0.3269
Eat_Out	3.92542	1.74626	92.90901	5.05	0.0262
Smok	1.38792	1.84284	10.42925	0.57	0.4527
Physical	-0.51159	0.84162	6.79364	0.37	0.5443
Rural	1.12387	0.72857	43.75166	2.38	0.1253

Bounds on condition number: 1.4806, 205.37

Backward Elimination: Step 7

Variable Physical Removed: R-Square = 0.2796 and C(p) = 6.6691

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	951.90901	79.32575	4.33	<.0001
Error	134	2452.21071	18.30008		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.69524	1.38767	4070.25627	222.42	<.0001
Age	0.03145	0.02459	29.92887	1.64	0.2032
sex	-1.56709	0.78619	72.70943	3.97	0.0483

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Highest_Level	1.52939	0.77789	70.73843	3.87	0.0514
Income_	1.74718	0.87336	73.23975	4.00	0.0475
Work_Hours	1.01703	0.90033	23.35162	1.28	0.2607
Family_History	2.52805	0.83237	168.80550	9.22	0.0029
Opinion	1.47272	0.95503	43.51714	2.38	0.1254
Proteins	1.02978	0.73788	35.64243	1.95	0.1651
Grains	0.75819	0.83256	15.17673	0.83	0.3641
Eat_Out	3.88833	1.74108	91.27310	4.99	0.0272
Smok	1.26934	1.82817	8.82209	0.48	0.4887
Rural	1.11583	0.72673	43.14187	2.36	0.1270

Bounds on condition number: 1.4801, 173.94

Backward Elimination: Step 8

Variable Smok Removed: R-Square = 0.2770 and C(p) = 5.1284

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	943.08692	85.73517	4.70	<.0001
Error	135	2461.03281	18.22987		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	20.80740	1.37559	4171.01168	228.80	<.0001
Age	0.02966	0.02441	26.91425	1.48	0.2265



Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
sex	-1.60281	0.78299	76.38912	4.19	0.0426
Highest_Level	1.48544	0.77382	67.17598	3.68	0.0570
Income_	1.79843	0.86856	78.15780	4.29	0.0403
Work_Hours	1.02878	0.89844	23.90315	1.31	0.2542
Family_History	2.49790	0.82964	165.25358	9.06	0.0031
Opinion	1.52051	0.95072	46.62941	2.56	0.1121
Proteins	0.99505	0.73477	33.43241	1.83	0.1779
Grains	0.79548	0.82923	16.77594	0.92	0.3391
Eat_Out	3.78319	1.73115	87.06235	4.78	0.0306
Rural	1.14448	0.72416	45.53273	2.50	0.1164

Bounds on condition number: 1.4695, 147.11

Backward Elimination: Step 9

Variable Grains Removed: R-Square = 0.2721 and C(p) = 4.0018

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	926.31098	92.63110	5.08	<.0001
Error	136	2477.80874	18.21918		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	21.25031	1.29541	4902.81808	269.10	<.0001
Age	0.02762	0.02431	23.52755	1.29	0.2578

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
sex	-1.77251	0.76253	98.44555	5.40	0.0216
Highest_Level	1.45586	0.77298	64.62996	3.55	0.0618
Income_	1.76864	0.86775	75.68632	4.15	0.0435
Work_Hours	0.88925	0.88633	18.33954	1.01	0.3175
Family_History	2.59303	0.82346	180.66003	9.92	0.0020
Opinion	1.47292	0.94914	43.87588	2.41	0.1230
Proteins	1.03960	0.73309	36.63943	2.01	0.1584
Eat_Out	3.71194	1.72905	83.96824	4.61	0.0336
Rural	1.26004	0.71386	56.76337	3.12	0.0798

Bounds on condition number: 1.4676, 120.27

Backward Elimination: Step 10

Variable Work\_Hours Removed: R-Square = 0.2667 and C(p) = 2.9567

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	907.97144	100.88572	5.54	<.0001
Error	137	2496.14829	18.22006		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	21.56141	1.25778	5354.18447	293.86	<.0001
Age	0.03107	0.02406	30.38475	1.67	0.1987
sex	-1.84686	0.75893	107.89731	5.92	0.0162

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Highest_Level	1.63085	0.75306	85.45062	4.69	0.0321
Income_	2.00357	0.83558	104.75687	5.75	0.0178
Family_History	2.75105	0.80827	211.07271	11.58	0.0009
Opinion	1.47268	0.94917	43.86119	2.41	0.1231
Proteins	0.95113	0.72778	31.11924	1.71	0.1934
Eat_Out	3.72491	1.72904	84.56122	4.64	0.0330
Rural	1.22571	0.71306	53.83586	2.95	0.0879

Bounds on condition number: 1.3608, 93.602

Backward Elimination: Step 11

Variable Age Removed: R-Square = 0.2578 and C(p) = 2.5386

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	877.58669	109.69834	5.99	<.0001
Error	138	2526.53304	18.30821		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	22.41028	1.07494	7957.46153	434.64	<.0001
sex	-1.93380	0.75777	119.23237	6.51	0.0118
Highest_Level	1.75775	0.74843	100.98579	5.52	0.0203
Income_	2.40275	0.77818	174.54398	9.53	0.0024
Family_History	2.73370	0.81011	208.47643	11.39	0.0010

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Opinion	1.65553	0.94081	56.69124	3.10	0.0807
Proteins	0.86303	0.72633	25.84816	1.41	0.2368
Eat_Out	3.38340	1.71283	71.43728	3.90	0.0502
Rural	1.24774	0.71458	55.82055	3.05	0.0830

Bounds on condition number: 1.1745, 70.422

Backward Elimination: Step 12

Variable Proteins Removed: R-Square = 0.2502 and C(p) = 1.8843

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	851.73853	121.67693	6.63	<.0001
Error	139	2552.38120	18.36245		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	22.96530	0.96957	10302	561.03	<.0001
sex	-2.10742	0.74465	147.07298	8.01	0.0053
Highest_Level	1.76578	0.74951	101.91865	5.55	0.0199
Income_	2.33351	0.77714	165.55790	9.02	0.0032
Family_History	2.75215	0.81116	211.37820	11.51	0.0009
Opinion	1.49511	0.93245	47.20885	2.57	0.1111
Eat_Out	3.36810	1.71531	70.79693	3.86	0.0516
Rural	1.23877	0.71560	55.02712	3.00	0.0857

Bounds on condition number: 1.1679, 53.748

Backward Elimination: Step 13

Variable Opinion Removed: R-Square = 0.2363 and C(p) = 2.3421

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	804.52968	134.08828	7.22	<.0001
Error	140	2599.59005	18.56850		
Corrected Total	146	3404.11973			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	23.46993	0.92220	12027	647.69	<.0001
sex	-2.42396	0.72202	209.28142	11.27	0.0010
Highest_Level	1.75027	0.75364	100.15294	5.39	0.0217
Income_	2.21963	0.77822	151.05437	8.13	0.0050
Family_History	2.81370	0.81479	221.43442	11.93	0.0007
Eat_Out	3.84935	1.69830	95.39416	5.14	0.0249
Rural	1.24662	0.71958	55.72930	3.00	0.0854

Bounds on condition number: 1.1582, 38.55

All variables left in the model are significant at the 0.1000 level.

Summary of Backward Elimination								
Step	Variable Removed	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	Fatty		18	0.0000	0.2834	18.0044	0.00	0.9474

Summary of Backward Elimination								
Step	Variable Removed	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
2	Alcohol		17	0.0001	0.2833	16.0154	0.01	0.9161
3	Vegetables		16	0.0001	0.2832	14.0321	0.02	0.8966
4	Fruits		15	0.0004	0.2828	12.1079	0.08	0.7810
5	Dairy		14	0.0004	0.2824	10.1873	0.08	0.7754
6	Proximity		13	0.0007	0.2816	8.3154	0.13	0.7159
7	Physical		12	0.0020	0.2796	6.6691	0.37	0.5443
8	Smok		11	0.0026	0.2770	5.1284	0.48	0.4887
9	Grains		10	0.0049	0.2721	4.0018	0.92	0.3391
10	Work_Hours		9	0.0054	0.2667	2.9567	1.01	0.3175
11	Age	Age	8	0.0089	0.2578	2.5386	1.67	0.1987
12	Proteins		7	0.0076	0.2502	1.8843	1.41	0.2368
13	Opinion		6	0.0139	0.2363	2.3421	2.57	0.1111

**Table Index**

Header #	Factor
1	Age
2	Gender
3	Ethnicity
4	Highest Level of Education
5	Income
6	Work Hours
7	Family History of Obesity
8	Opinion of Diet
9	Fruit Servings per Day
10	Vegetable Servings per Day
11	Protein Servings per Day
12	Dairy Servings Per Day
13	Grains and Carbohydrates Servings per Day
14	Fatty and Fried Food Servings per Day
15	Eating Out per Week
16	Alcohol Consumption per Week
17	Cigarette Smoking per Day
18	Physical Activity per Week
19	Location Classification (Rural or Urban)
20	Proximity to Nearest Recreational Facility

# Master Data Table

<i>ID</i>																					
<b>#</b>	<b>BMI</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
1	34	25	M	A	F	A	C	Y	B	A	C	E	B	D	D	C	D	A	B	R	A
2	28.4	33	M	A	F	E	F	N	B	D	C	D	C	C	D	B	D	A	D	R	C
3	22.4	18	M	A	B	B	B	N	B	D	D	D	D	B	C	B	A	A	C	R	C
4	19.6	18	F	G	D	E	B	N	B	D	C	C	D	D	A	B	A	A	C	R	A
5	26.6	25	F	B	G	B	D	N	B	C	C	D	C	B	C	C	B	A	B	U	A
6	20.0	23	F	G	F	B	E	Y	B	A	C	C	D	D	A	B	A	A	C	R	A
7	27.4	57	M	A	H	F	E	N	B	A	B	D	B	B	B	B	D	A	C	R	B
8	22.7	51	F	E	C	F	E	Y	B	B	E	C	C	C	A	A	A	A	D	R	A
9	23.7	50	M	A	F	E	F	N	B	C	C	C	C	C	B	B	C	A	C	R	D
10	23.9	79	M	B	G	A	B	N	A	D	D		D	D		B	A	A	C	R	A
11	31.1	50	F	A	F	D	E	N	B	B	B	C	C	C	B	C	A	A	A	U	A
12	24.7	18	M	A	B	A	B	Y	B	D	B	B	C	B	B	B	A	A	D	R	C
13	22.9	20	M	B	D	A	A	N	C	B	B	D	D	D	C	C	A	C	D	U	A
14	23.7	48	M	B	F	E	F	Y	C	A	B	C	C	B	B	C	E	A	B	R	B
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25	30.1	54	M	A	G	E	F	N	B	C	C	D	C	D	C	C	B	A	C	R	A
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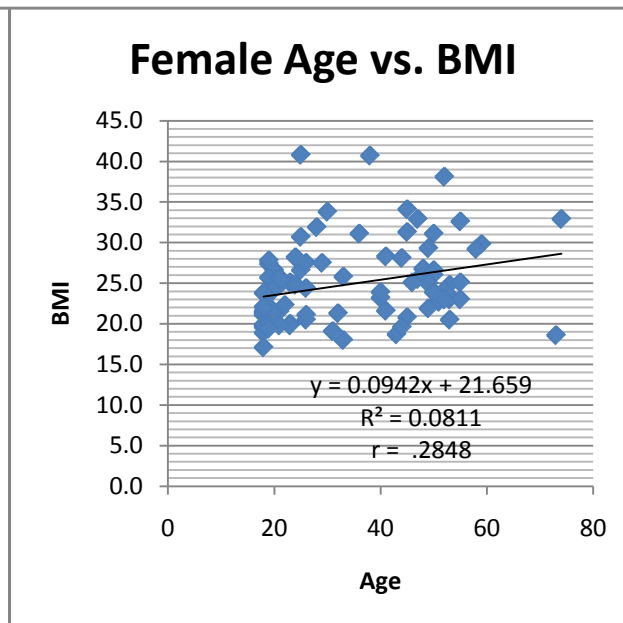
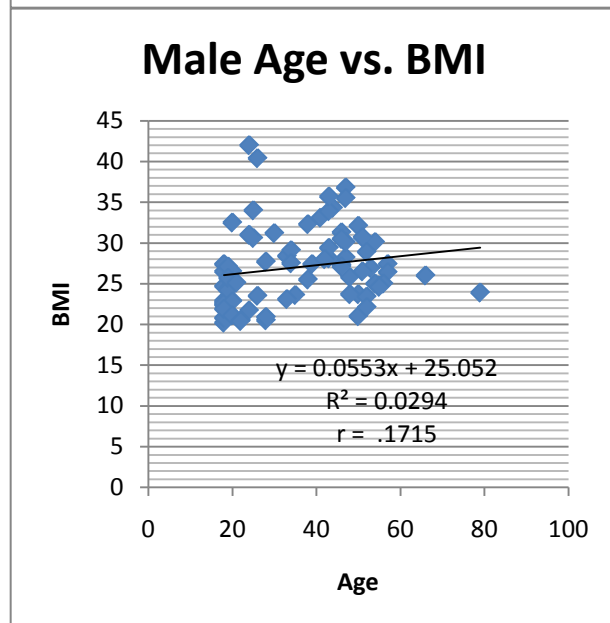
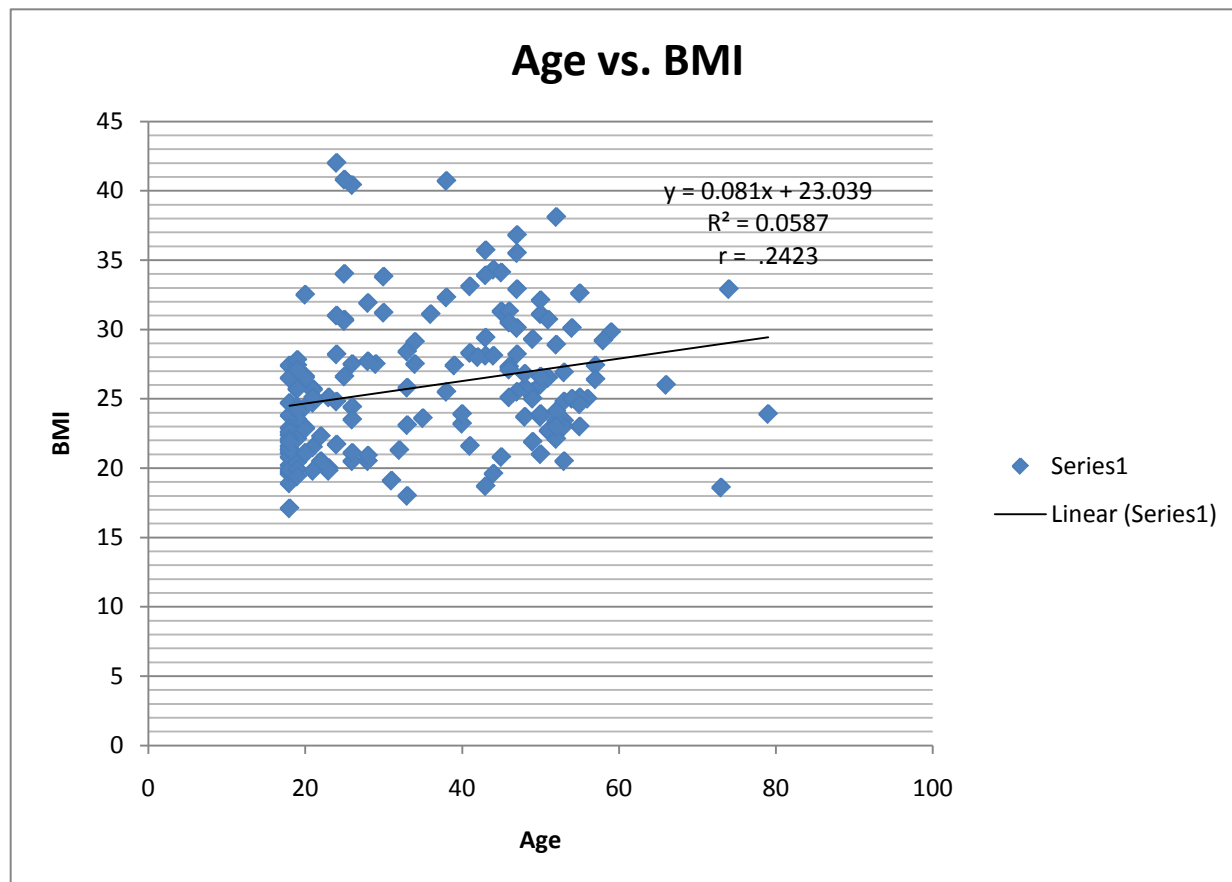
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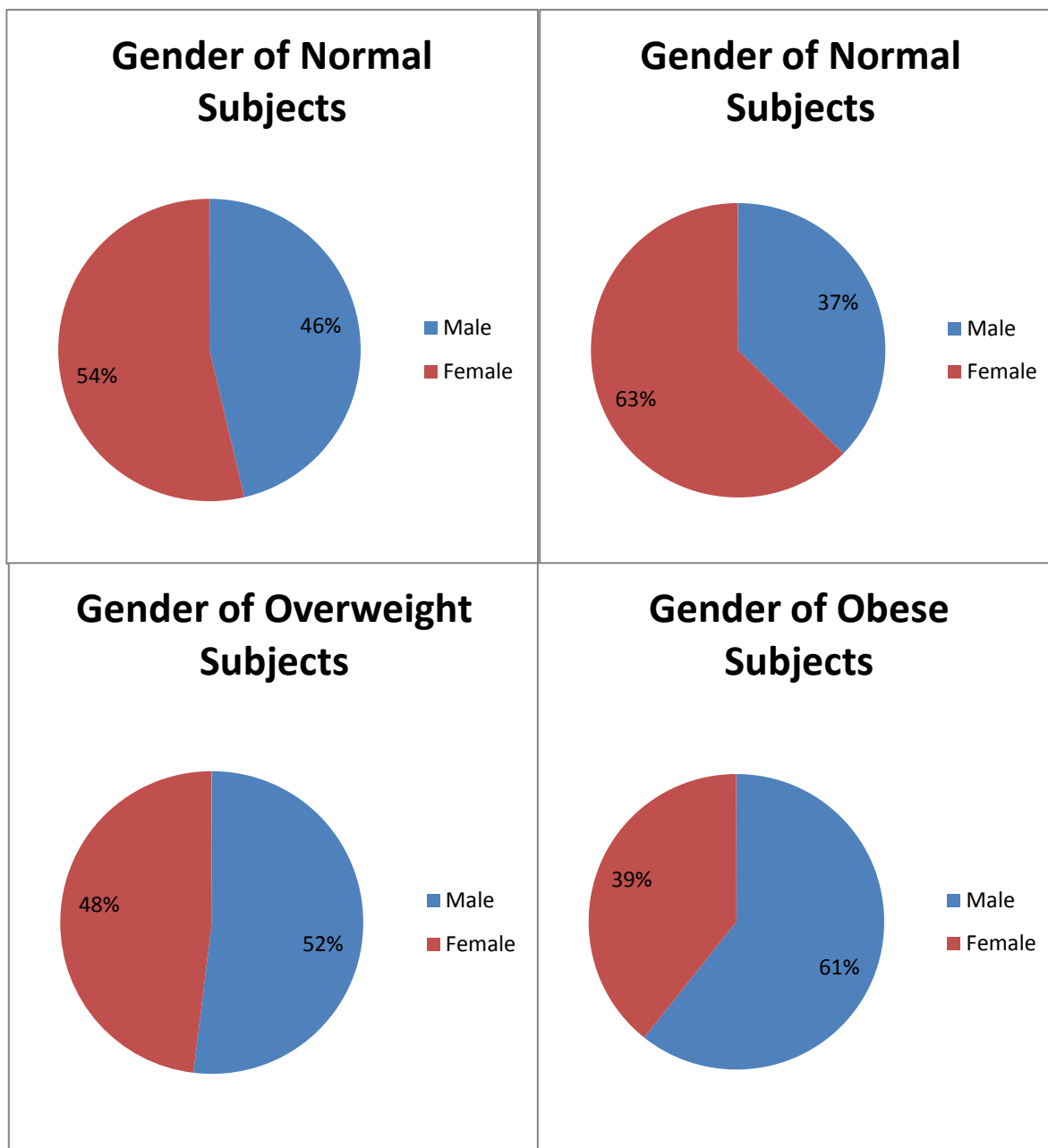
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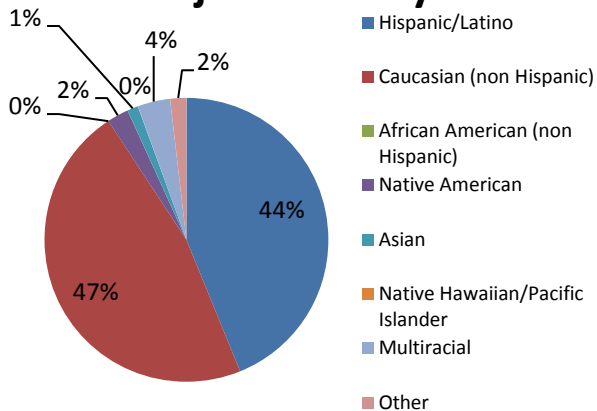
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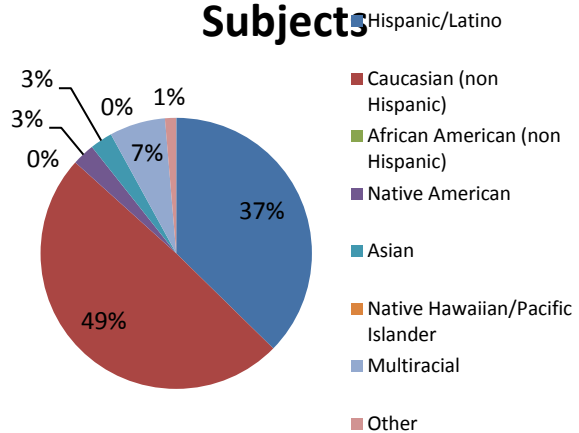




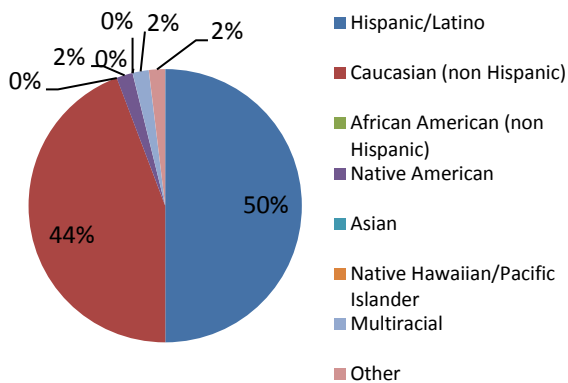
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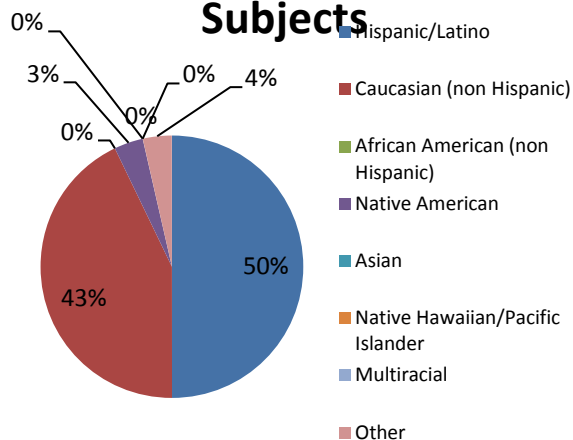
### Ethnicities of Normal Weight Subjects



### Ethnicities of Overweight Subjects

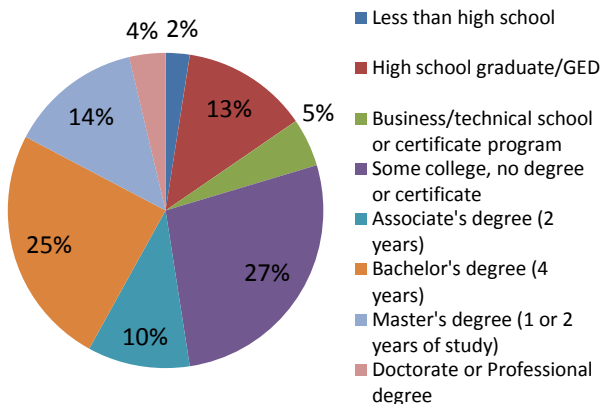


### Ethnicities of Obese Subjects

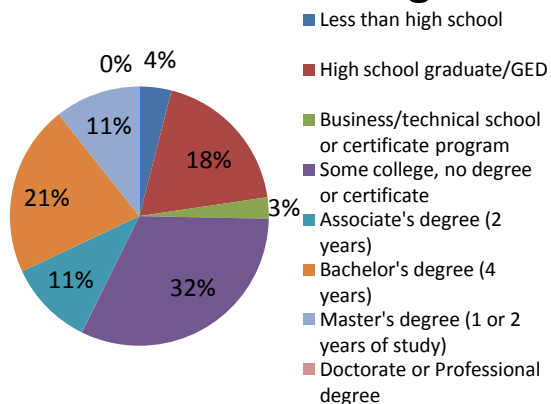




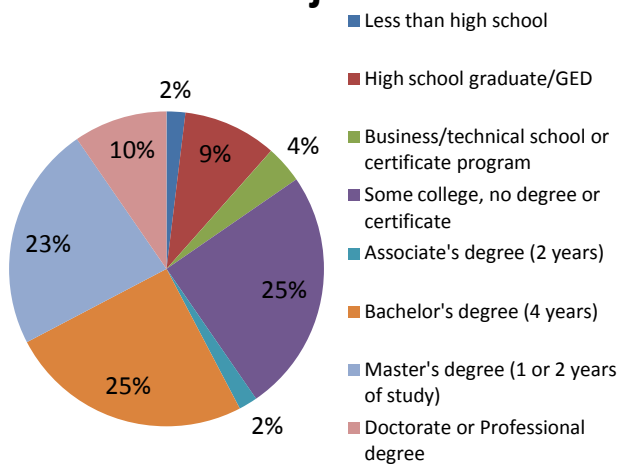
### Highest Level of Education for All Subjects



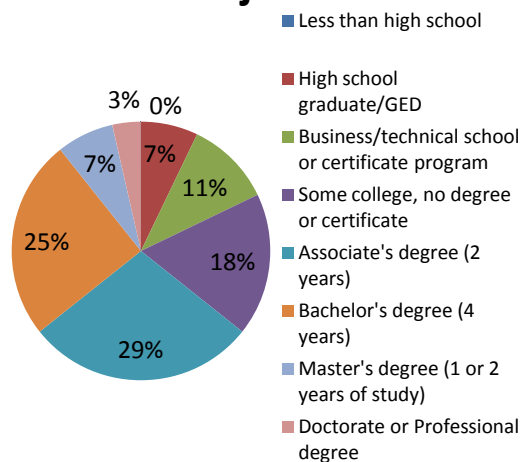
### Highest Level of Education for Subjects of Normal Weight



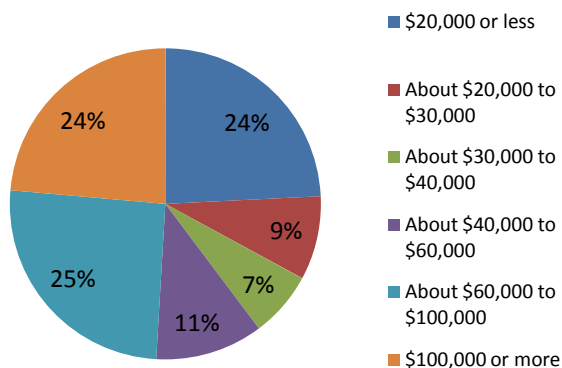
### Highest Level of Education for Overweight Subjects



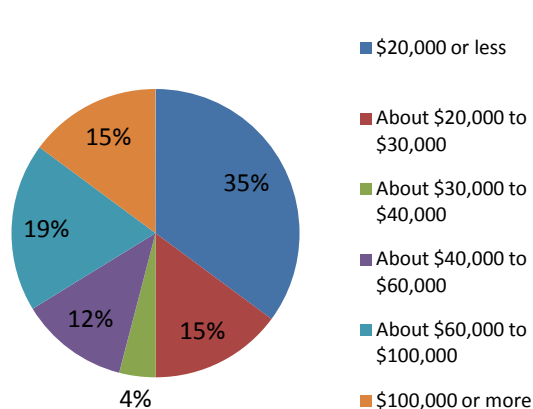
### Highest Level of Education for Obese Subjects



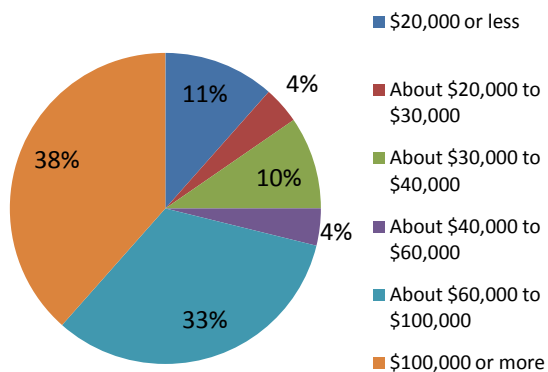
### Income for All Subjects



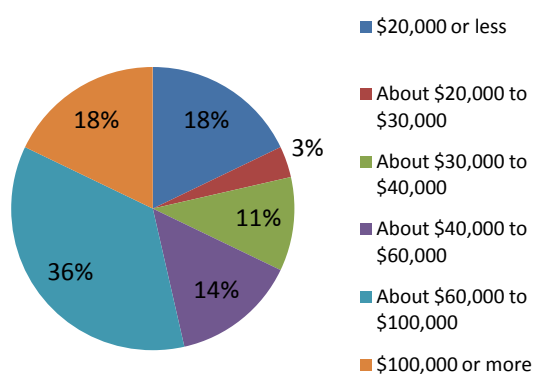
### Income for Subjects of Normal Weight



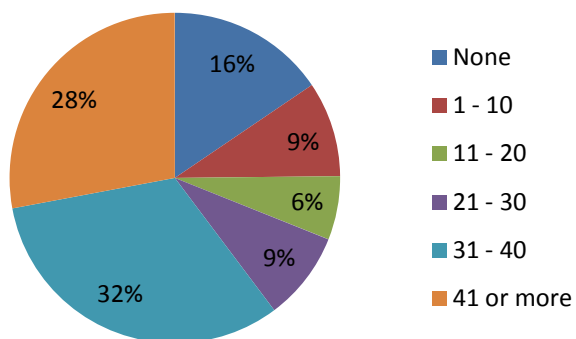
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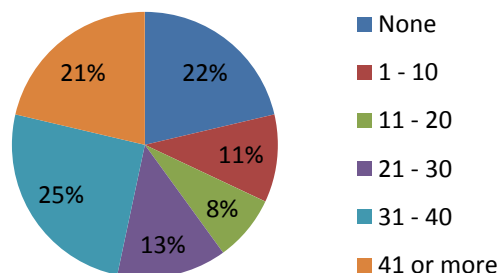
### Income for Obese Subjects



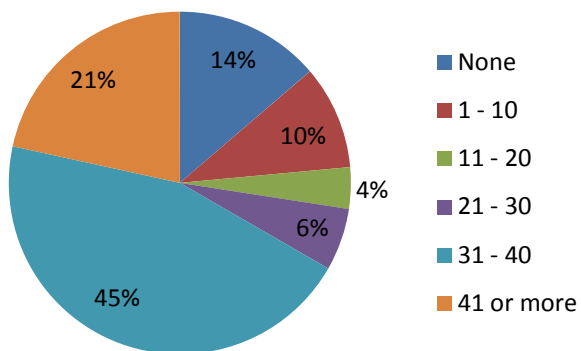
**Work Hours Per Week for All Subjects**



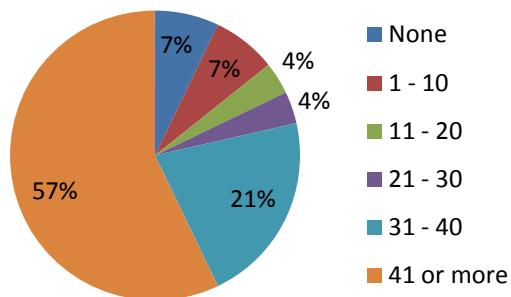
**Work Hours per Week for Normal Weight Subjects**



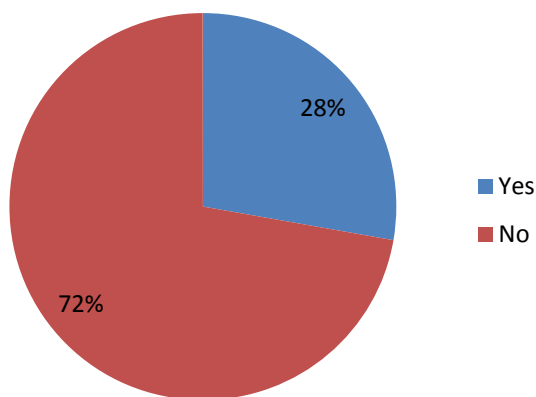
**Work Hours per Week for Overweight Subjects**



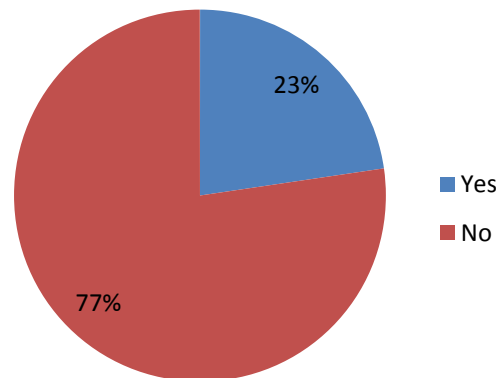
**Work Hours per Week for Obese Subjects**



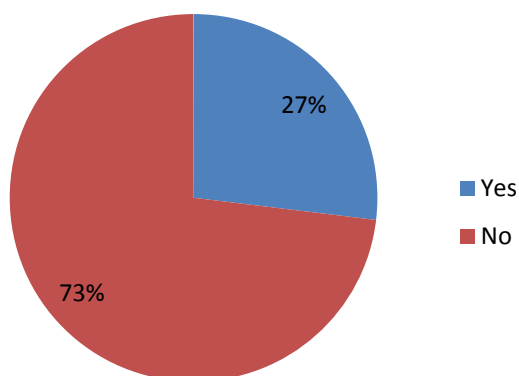
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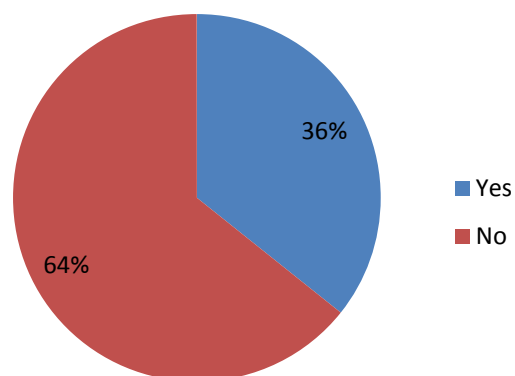
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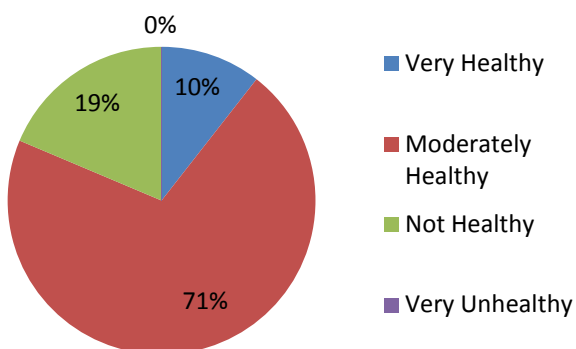
### Family History of Obesity for Overweight Subjects



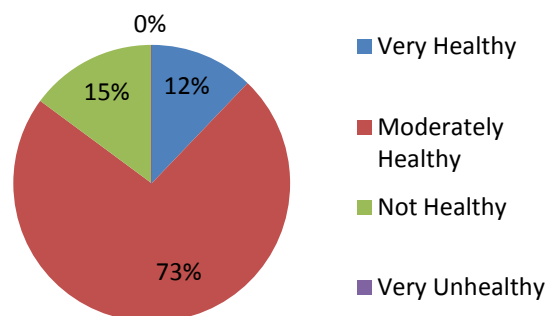
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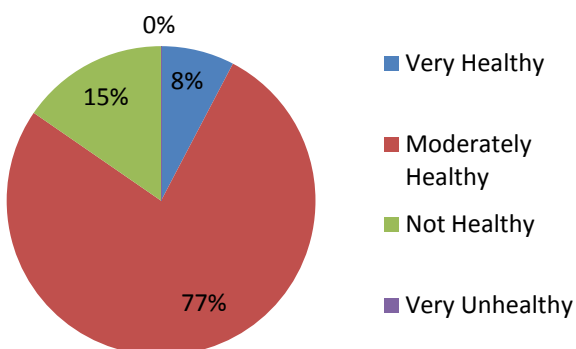
### Opinion of Diet for All Subjects



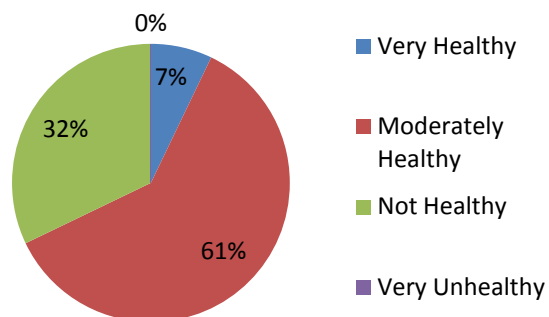
### Opinion of Diet for Normal Weight Subjects



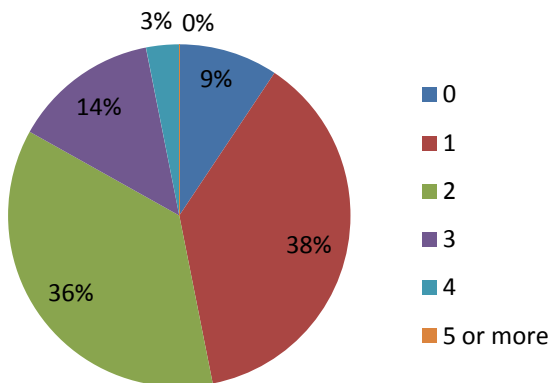
### Opinion of Diet for Overweight Subjects



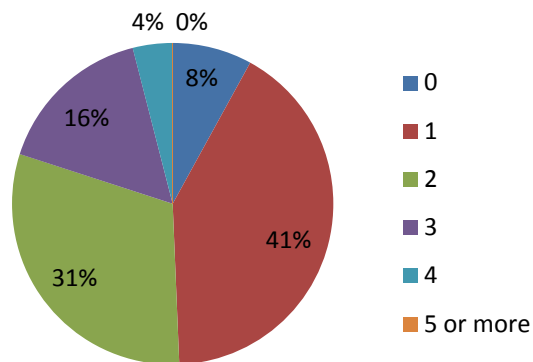
### Opinion of Diet for Obese Subjects



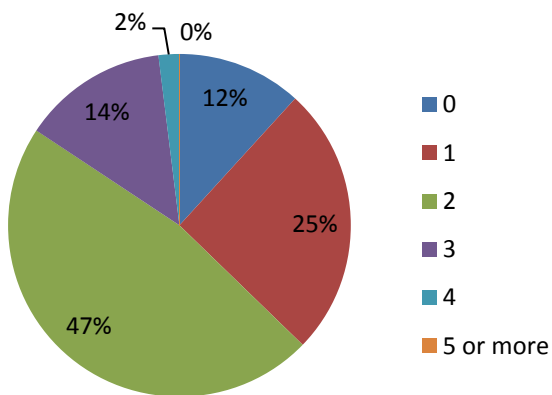
**Fruits per Day for All Subjects**



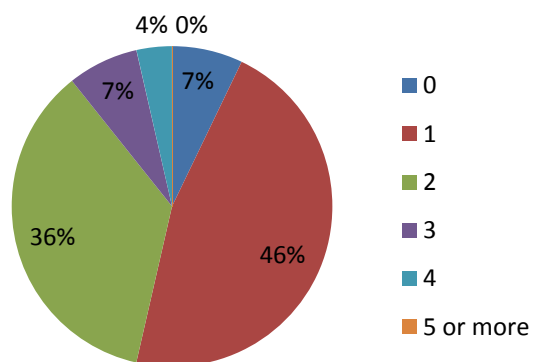
**Fruit Servings per Day for People of Normal Weight**



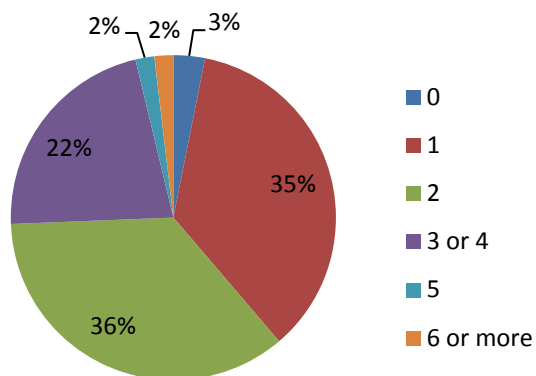
**Fruit Servings per Day for Overweight Subjects**



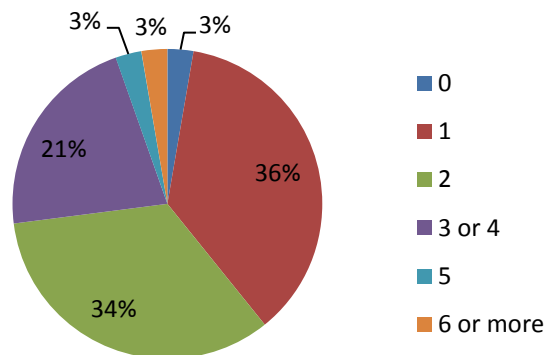
**Fruit Servings per Day of Obese Subjects**



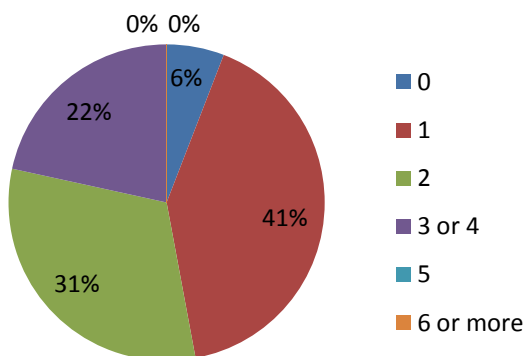
### Vegetable Servings per Day for All Subjects



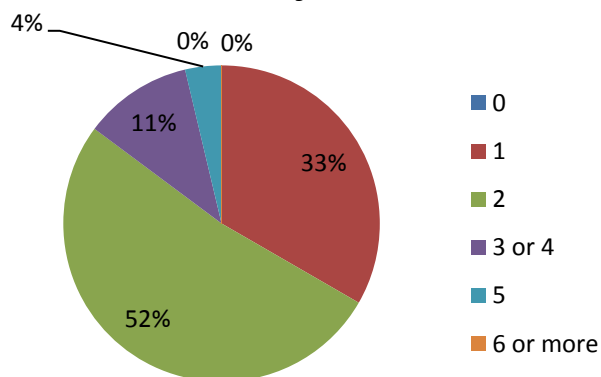
### Vegetable Servings per Day for Normal Weight Subjects



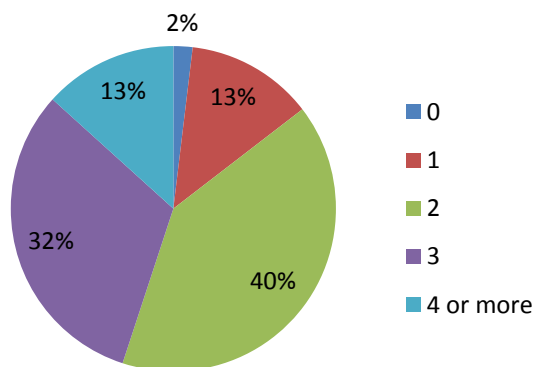
### Vegetable Servings per Day for Overweight Subjects



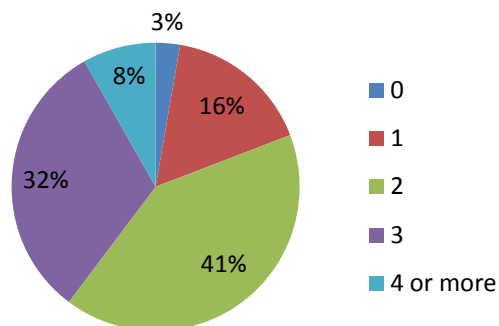
### Vegetable Servings Per Day for Obese Weight Subjects



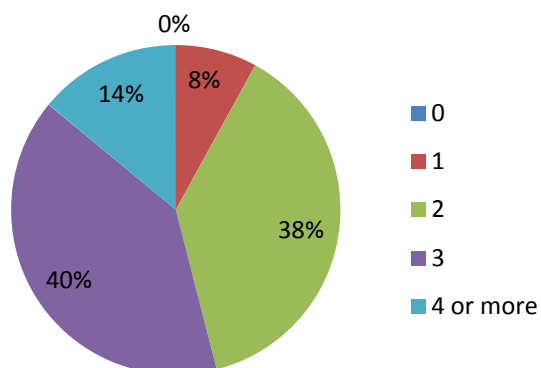
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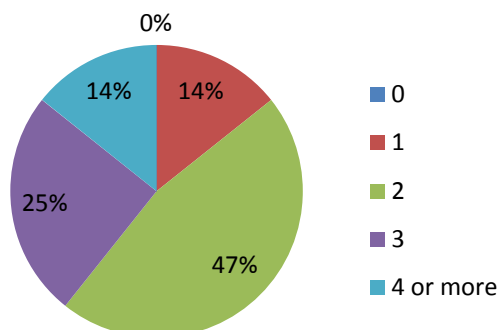
### Protein Servings per Day for Normal Weight Subjects



### Protein Servings per Day for Overweight Subjects

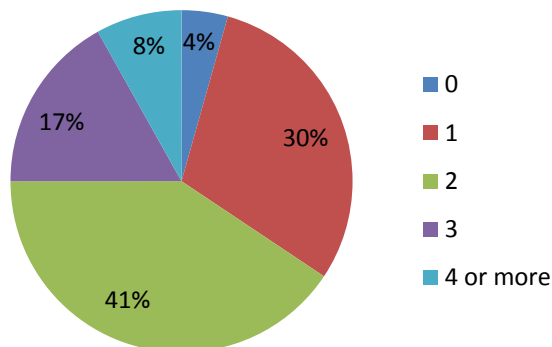


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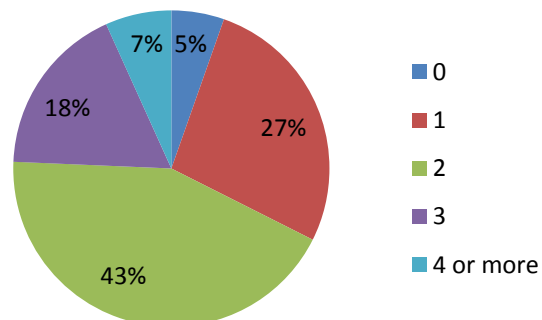




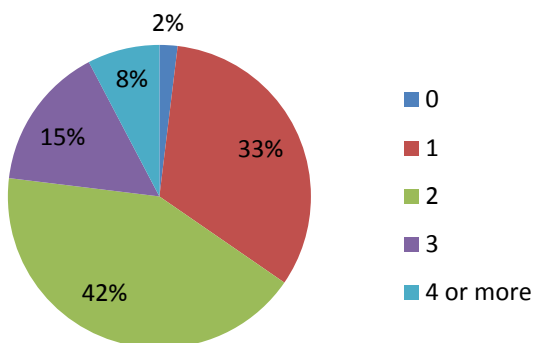
### Dairy Product Servings per Day for All Subjects



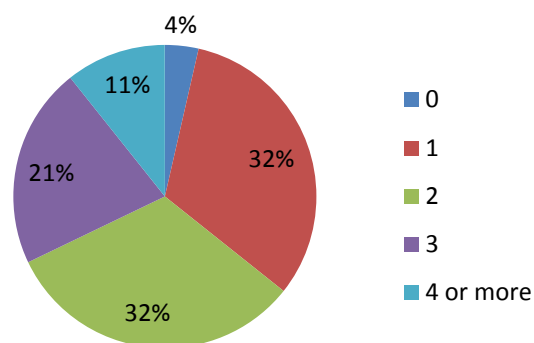
### Dairy Product Servings per Day for Normal Weight Subjects



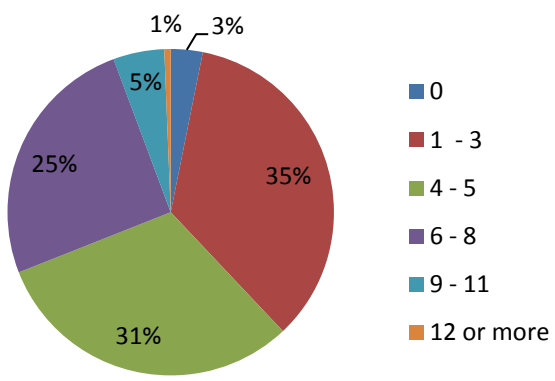
### Dairy Product Servings per Day for Overweight Subjects



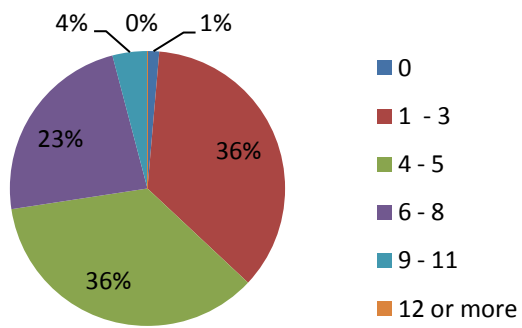
### Dairy Product Servings per Day for Obese Subjects



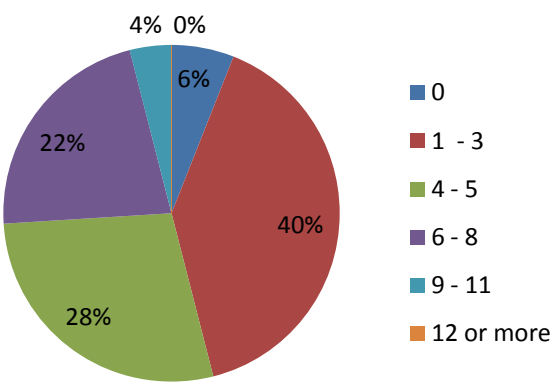
### Grain and Carbohydrate Servings per Day for All Subjects



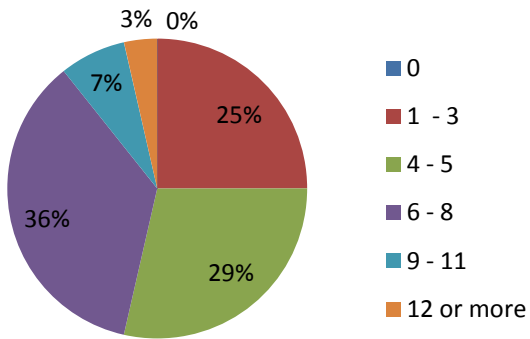
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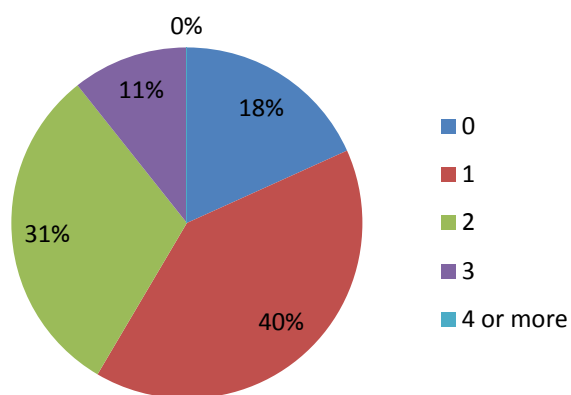
### Grain and Carbohydrate Servings per Day for Overweight Subjects



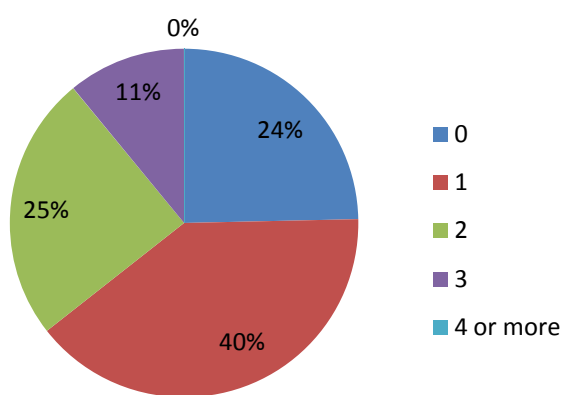
### Grain and Carbohydrate Servings per Day for Obese Subjects



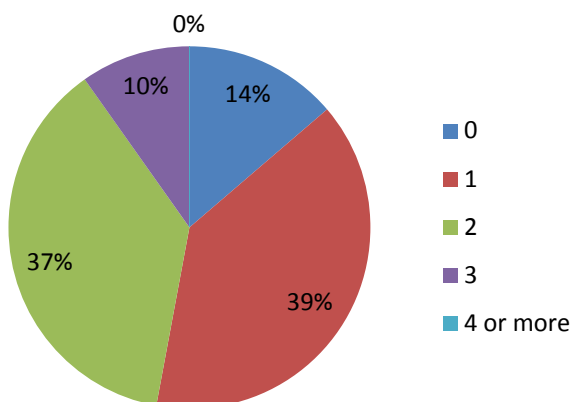
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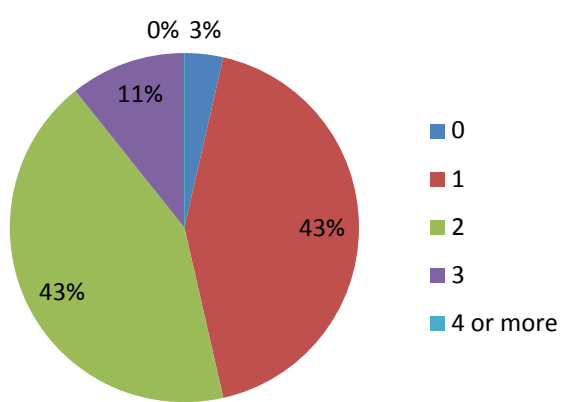
### Fatty or Fried Food Servings per Day for Normal Weight Subjects



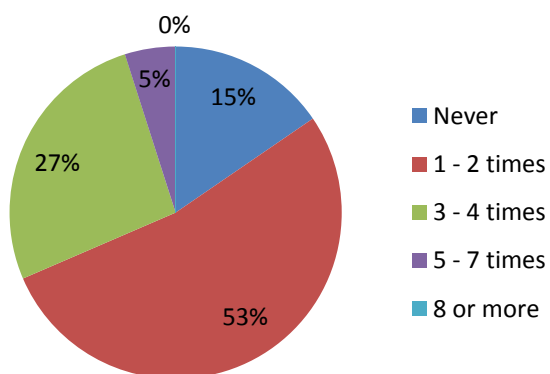
### Fried or Fatty Food Servings per Day for Overweight Subjects



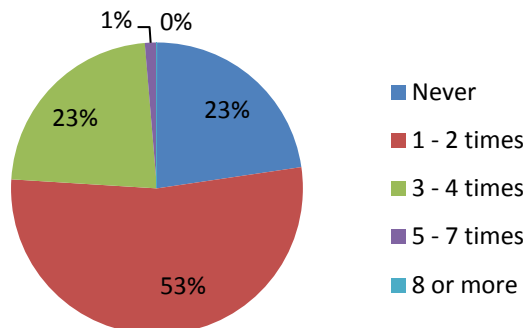
### Fried or Fatty Food Servings per Day for Obese Subjects



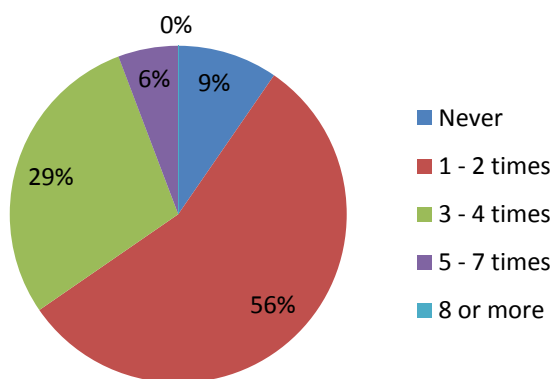
### Eating Out per Week for All Subjects



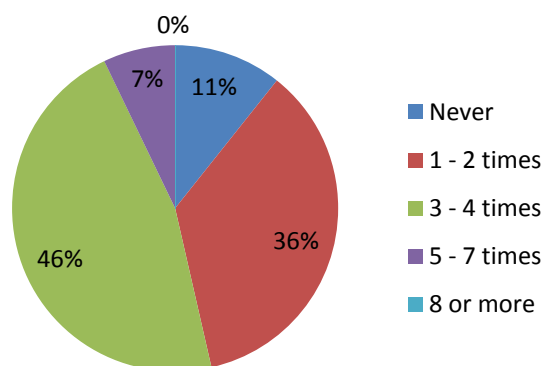
### Eating Out per Week for Normal Weight Subjects



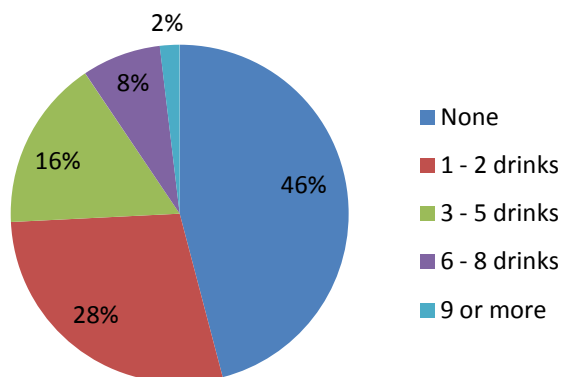
### Eating Out per Week for Overweight Subjects



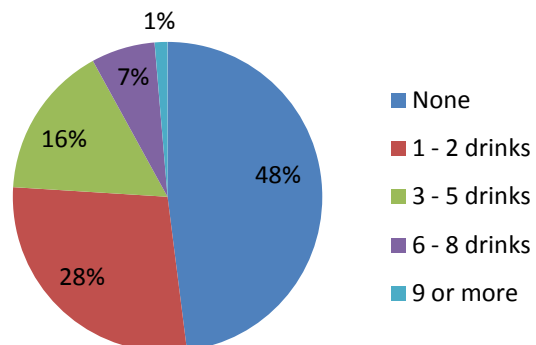
### Eating Out per Week for Obese Subjects



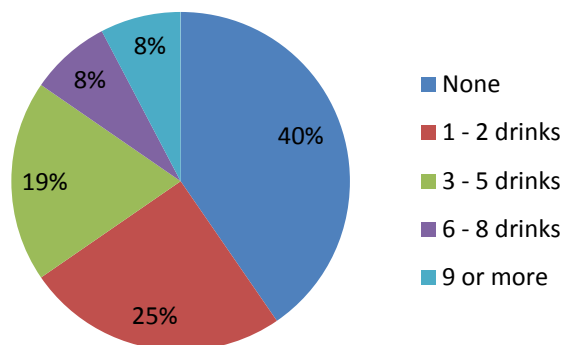
### Alcoholic Beverages Consumed per Week for All Subjects



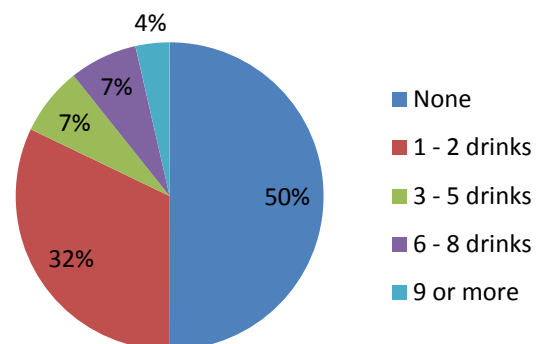
### Alcoholic Beverages Consumed per Week for Normal Weight Subjects



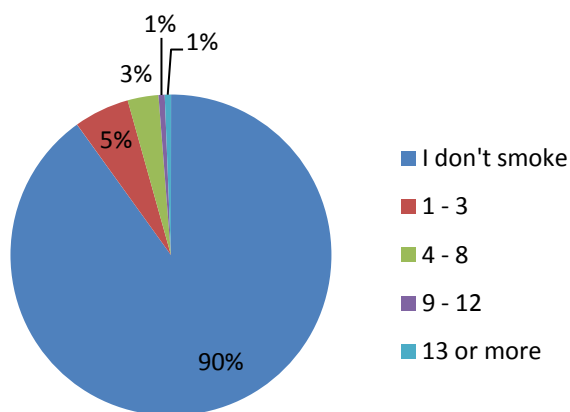
### Alcoholic Beverages Consumed per Week for Overweight Subjects



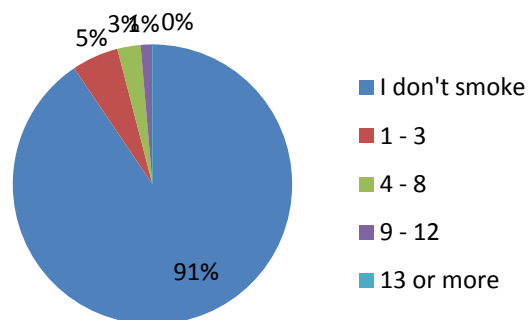
### Alcoholic Beverages Consumed per Week for Obese Subjects



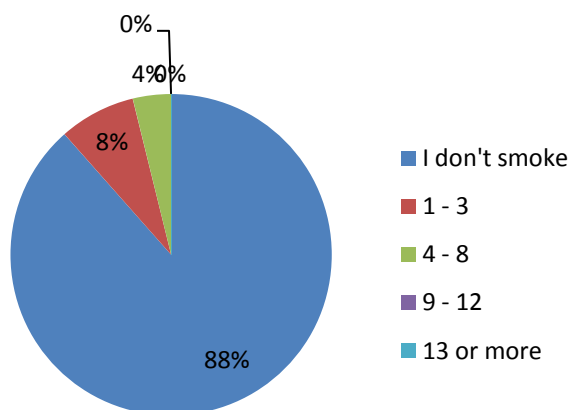
### Smoking per Day for All Subjects



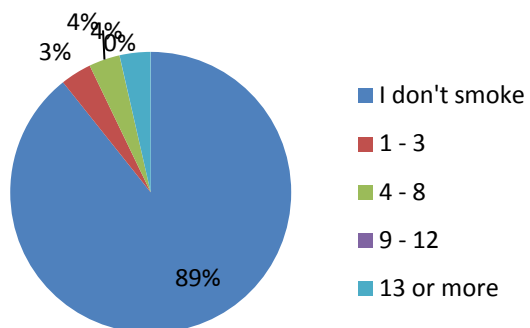
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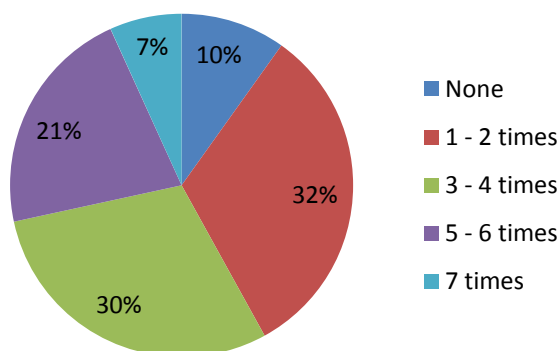
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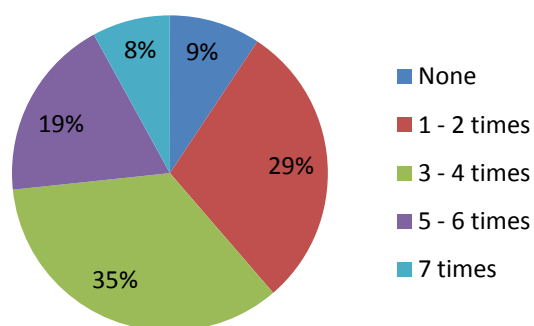
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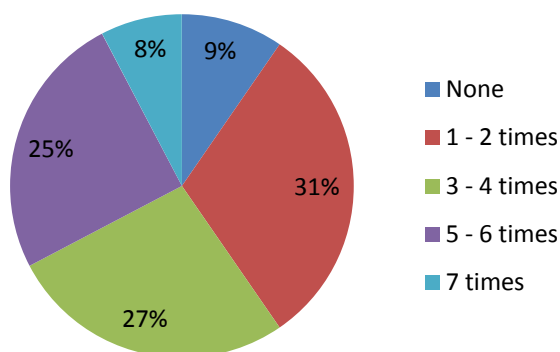
### Physical Activity per Week for All Subjects



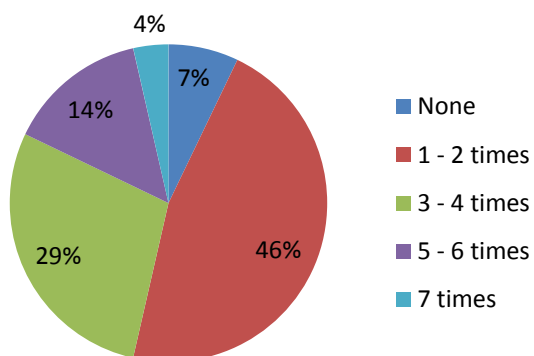
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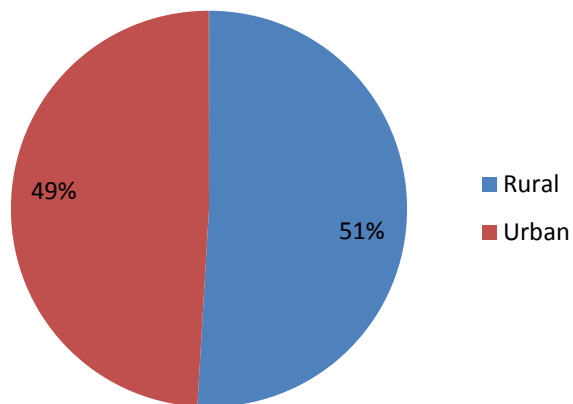
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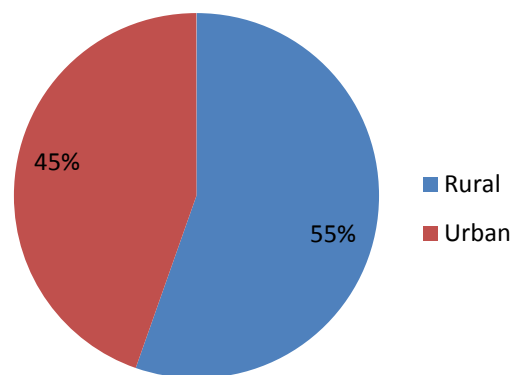
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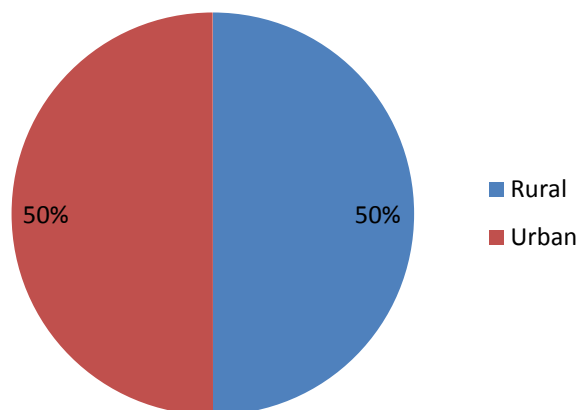
### Location Classification for All Subjects



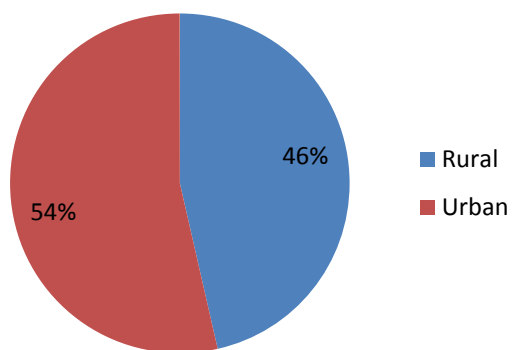
### Location Classification for Normal Weight Subjects



### Location Classification for Overweight Subjects

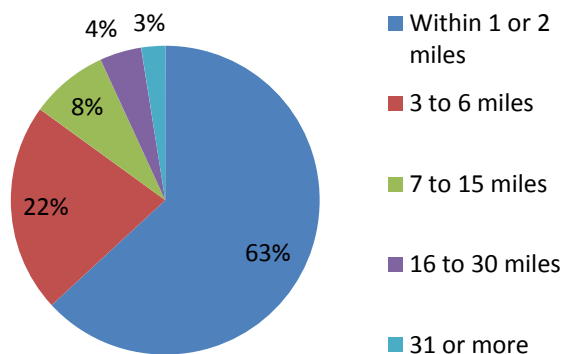


### Location Classification for Obese Subjects

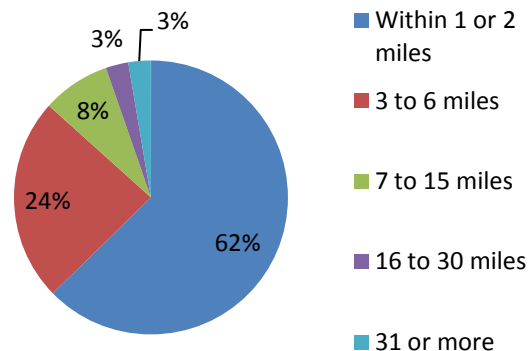




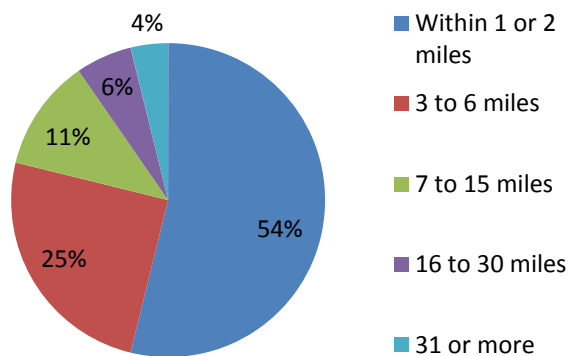
### Proximity to Nearest Recreational Facility for All Subjects



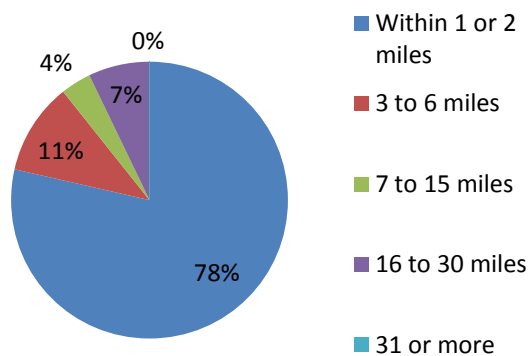
### Proximity to Nearest Recreational Facility for Normal Weight Subjects



### Proximity to Nearest Recreational Facility for Overweight Subjects



### Proximity to Nearest Recreational Facility for Obese Subjects



## Results

The results are as follows: Using the weight classifications according to BMI, the underweight class was removed because only two surveys were collected in which the recorded BMI was considered underweight. The morbidly obese category was also removed because of the similar lack of surveys. It was determined using scatter plots that age has no correlation to BMI.

Based on the multiple linear regression model analyzed by the SAS program, several factors were removed from the model because they did not show any significance to BMI. These included, in order of removal, fatty and fried food servings per day, alcohol consumption, vegetable servings per day, fruit servings per day, dairy servings per day, proximity to the nearest recreational facility, physical activity, cigarettes smoked per day, grains and carbohydrates servings per day, work hours per week, age, protein servings per day, and opinion of diet. They were removed because they each had the largest P-value of that particular model. The model continued its elimination process until all remaining factors had a P-value of less than or equal to 0.1. These factors included eating out per week, family history of obesity, gender, income, highest level of education, and location of residence. Because these factors did have a P-value of less than or equal to 0.1, they do show significance to BMI.

## Discussion

Because of the large number of variables researched in this project, there are many opportunities for error. The data given is also not completely accurate because the information gathered from the surveys is individual opinion and not fact. Often people do not even realize what they do on a daily basis, so the answers given may be biased. For example: Someone may think that they eat healthy, although they really don't. Also it is unknown whether the subjects even told the truth in their surveys, especially in sensitive subjects like weight. The results of this project could be further strengthened by collecting more surveys, therefore getting more data. With only a few answers, especially in the category for obese subjects, a few people's answers may sway the correlations. Lastly, an individual's BMI is calculated through their height and weight. As far as weight is concerned, a person can have either muscle weight or fat weight. So for example, a very muscular person can be considered overweight, even though they may be at a healthy body weight. The most accurate way to determine a person's obesity level is to take a water displacement, or hydrostatic, body fat test. For the purposes of this project, and for the main reason of convenience, the individual's BMI's were calculated, even though there is a certain amount of error in this method. The most important thing to remember is that the cause of a person's weight is not from only one of these factors. Obesity

is caused by a combination of all these things, and in order to lose weight, a person must set up a plan that is individual to them. For some people that may be eating less and working out more. For others it may mean working less and making their lunch instead of eating out. Some factors do affect people more; however, it is a combination of lifestyle choices and situations that ultimately affect a person's weight. Also upon review, it was observed that the factor of ethnicity was left out of the SAS multiple linear regression. Ethnicity was not included because a project mentor advised that there was not enough distinction between a person's race and ethnicity. Therefore, this factor was not included in the data analysis.

## **Conclusion**

A correlation was not determined between obesity and diet and obesity and physical activity. These two factors were among those that were removed from the model based on their P-value of greater than 0.1, which shows no significance to BMI. Therefore, alternative  $H_{11}$  was rejected and null hypothesis  $H_{01}$  was accepted.

A correlation was not determined between obesity and proximity of residence to the nearest recreational facility. It was among the factors that were removed from the model showing no significance to BMI. However, a correlation was determined between obesity and location of residence. This factor did have a P-value of less than or equal to 0.1, which shows a significance to BMI. This data does not support what was predicted in hypothesis  $H_{12}$ , because it does show a correlation. Because of mixed results, alternative hypothesis  $H_{12}$  and null hypothesis  $H_{02}$  were neither accepted nor rejected.

Factors that did show significance to BMI based on the SAS model include eating out per week, family history of obesity, gender, income, highest level of education, and location of residence. Although only one of these factors (location of residence) was predicted to show a correlation to obesity, these factors also showed a correlation to obesity in New Mexico.

## Acknowledgements

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Zoh, Roger – PhD. student of statistics at Iowa State University

Jones, Molly – Bio-statistician

## Works Cited

- A.D.A.M. "Obesity." Google Health. 3 January 2010 <<https://health.google.com/health/ref/Obesity>>.
- "General Causes of Modern Obesity." Causes of Obesity. 3 January 2010 <<http://www.annecollins.com/obesity/causes-of-obesity.htm>>.
- Johnson, Len. "Chemicals In Cigarettes." 2010. Quite Smoking Stop. 9 January 2011 <<http://www.quit-smoking-stop.com/harmful-chemicals-in-cigarettes.html>>.
- "Science News." 8 February 2008. Science Daily. 9 January 2011 <<http://www.sciencedaily.com/releases/2008/02/080207163807.htm>>.
- Sørensen, T.I.A. "Obesity - A Research Journal." 30 December 2002. 9 January 2011 <<http://www.nature.com/oby/journal/v11/n10/full/oby2003170a.html>>.
- The Health Care Center. "The Correlation between Fast Food and Obesity in America." The Health Care Center. 3 January 2010 <[http://www.thehealthcarecenter.com/fast\\_food\\_and\\_obesity\\_in\\_america.html](http://www.thehealthcarecenter.com/fast_food_and_obesity_in_america.html)>.
- The New Encyclopedia Britannica. "Obesity." 15th edition ed.: pg. 853.
- The New Mexico Department of Health. Obesity and Overweight in New Mexico. 12 November 2009 <[http://www.health.state.nm.us/pdf/3\\_nm\\_ob\\_ow.pdf](http://www.health.state.nm.us/pdf/3_nm_ob_ow.pdf)>.
- The Weight Watchers Research Department. "Gender Differences in Metabolism." January 2007. Weight Watchers. 19 December 2008 <[http://www.weightwatchers.com/util/art/index\\_art.aspx?tabnum=1&art\\_id=35431&sc=801](http://www.weightwatchers.com/util/art/index_art.aspx?tabnum=1&art_id=35431&sc=801)>.
- "Top 10 Dangerous Diseases Caused by Fast Food Obesity." 12 December 2008. NutraLegacy.com. 19 January 2010 <<http://www.nutralegacy.com/blog/general-healthcare/top-10-dangerous-diseases-caused-by-fast-food-obesity/>>.
- United States. "Centers for Disease Control and Prevention." 26 October 2009. U.S. Obesity Trends. 12 November 2009 <<http://www.cdc.gov/obesity/data/trends.html#State>>.
- . "Overweight and Obesity." 7 December 2009. Centers for Disease Control and Prevention. 3 January 2010 <<http://www.cdc.gov/obesity/index.html>>.
- University of New Mexico Prevention Research Center. "The New Mexico Plan to Promote Healthier Weight." 2006. 9 January 2011 <<http://www.health.state.nm.us/ERD/HealthData/Obesity/ExSum.pdf>>.

