Effects Of Socioeconomic Factors On Obesity Rates In Four Southern States And Colorado

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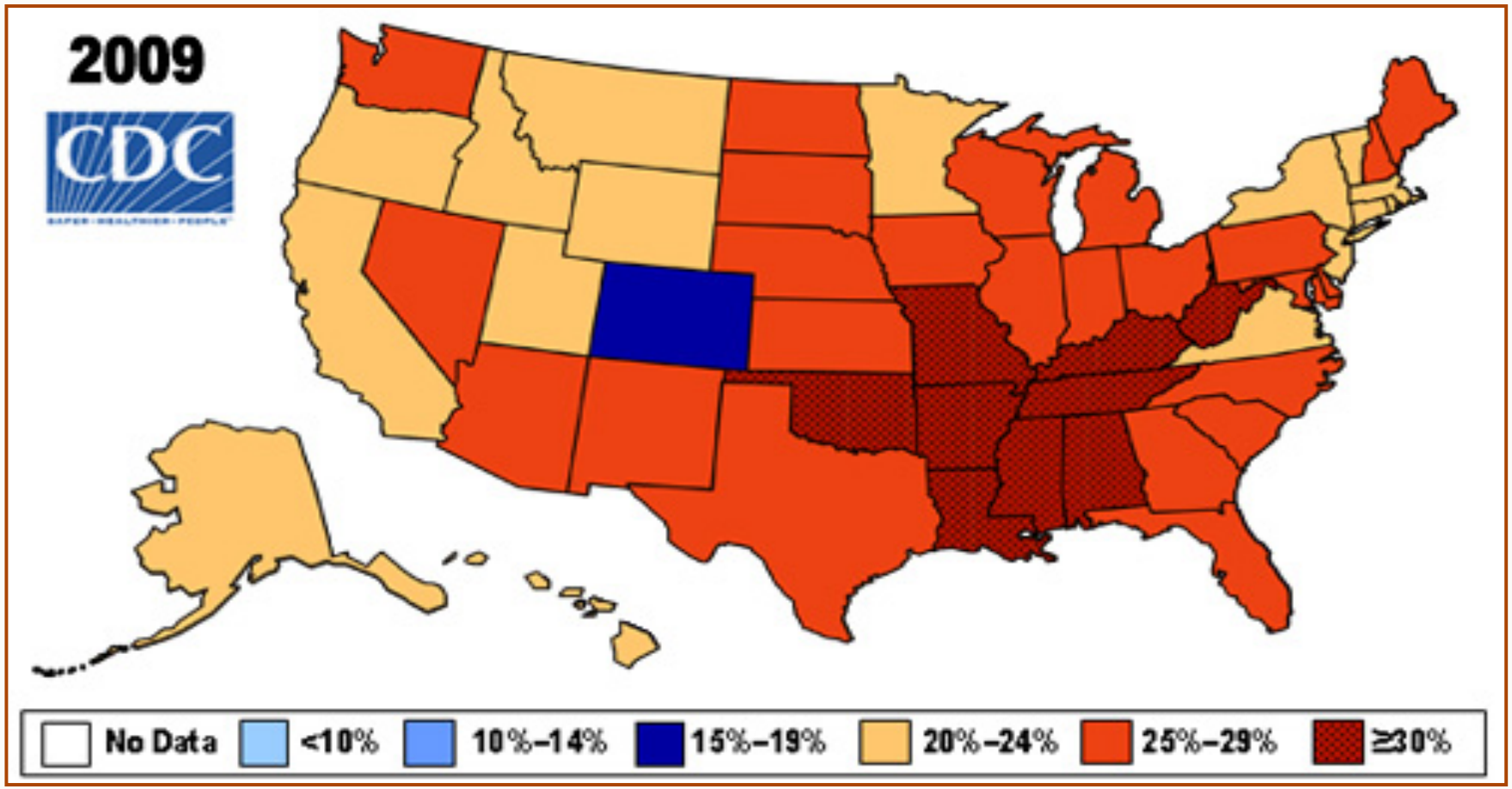
Obesity

- Obesity is a common manifestation of energy imbalance, which is classically defined as the balance between energy consumed, by food and drink, and energy expended through metabolism and physical activity.
- Lifestyle behavior, strongly linked to obesity, may be characterized by low levels of physical activity or high consumption of energy-dense diets, or both.
- BMI, a statistical measurement that compares weigh and height, defines people as overweight when their BMI is between 25 kg/m^2 and 30 kg/m^2, and obese when it is greater than 30 kg/m^2.

Background

- Overweight and obesity are among the leading causes of mortality and morbidity, causing an estimated 2.6 million deaths worldwide and 2.3% of the global burden of disease.
- Obesity was found to be a major risk factor for the development of type-2 diabetes, asthma, hypertension, stroke, coronary artery disease, cancer and cancer-related mortality, liver and gallbladder diseases, sleep apnea, osteoarthritis and gynecological complications.
- Higher rates of obesity are likely to be found among the lowest income and the least educated groups, particularly among women and certain ethnic group.
- An association between hunger and obesity may be explained by the relatively low cost of energy dense foods, the high palatability of sweets and fats associated with higher energy intakes, and the association of lower income and food insecurity with lower intakes of fruit and vegetables

Obesity Rates in the United States, 2009



www.cdc.gov

Objectives

- The objective of this study is to examine the relationships between socioeconomic factors, including income level, number of people below the poverty line, number of people receiving food stamps, unemployment levels and the geographic location and the obesity rate in the United States, in four southern states of Alabama (AL), Tennessee (TN), Mississippi (MS), Louisiana (LA) and in the state of Colorado (CO).

Data Collection

- BMI (weight in kg divided by the height^2) data was obtained from the CDC-BRFSS.
- The percent of people receiving Supplement Nutrition Assistant Program (SNAP/ Food Stamps) was calculated by obtaining the number of people who receive the benefits from the US Department of Agriculture, the Annual National Level report and the Annual States Reports for the states of MS, AL, LA, TN and CO from 995-2008. Population data of MS, AL, LA, TN, and CO were obtained from the US Census Bureau from 1995-2008.
- Unemployment rates from 1995-2008 were obtained from the US Department of labor. The national and states median household income data and the percent of people below the poverty level were obtained from the US Census Bureau from 1995-2008.

Statistics

- Data were analyzed using PROC REG procedure of SAS software (SAS, Inc, v 9.1) with the obesity rate as the dependent (response) variable and income level, unemployment rates, percent of people receiving SNAP and the percent of people below the poverty line as independent (explanatory) variables.
- PROC GLM was used to determine the significant difference in obesity among the states followed by TUKEY standardized test for further classification.

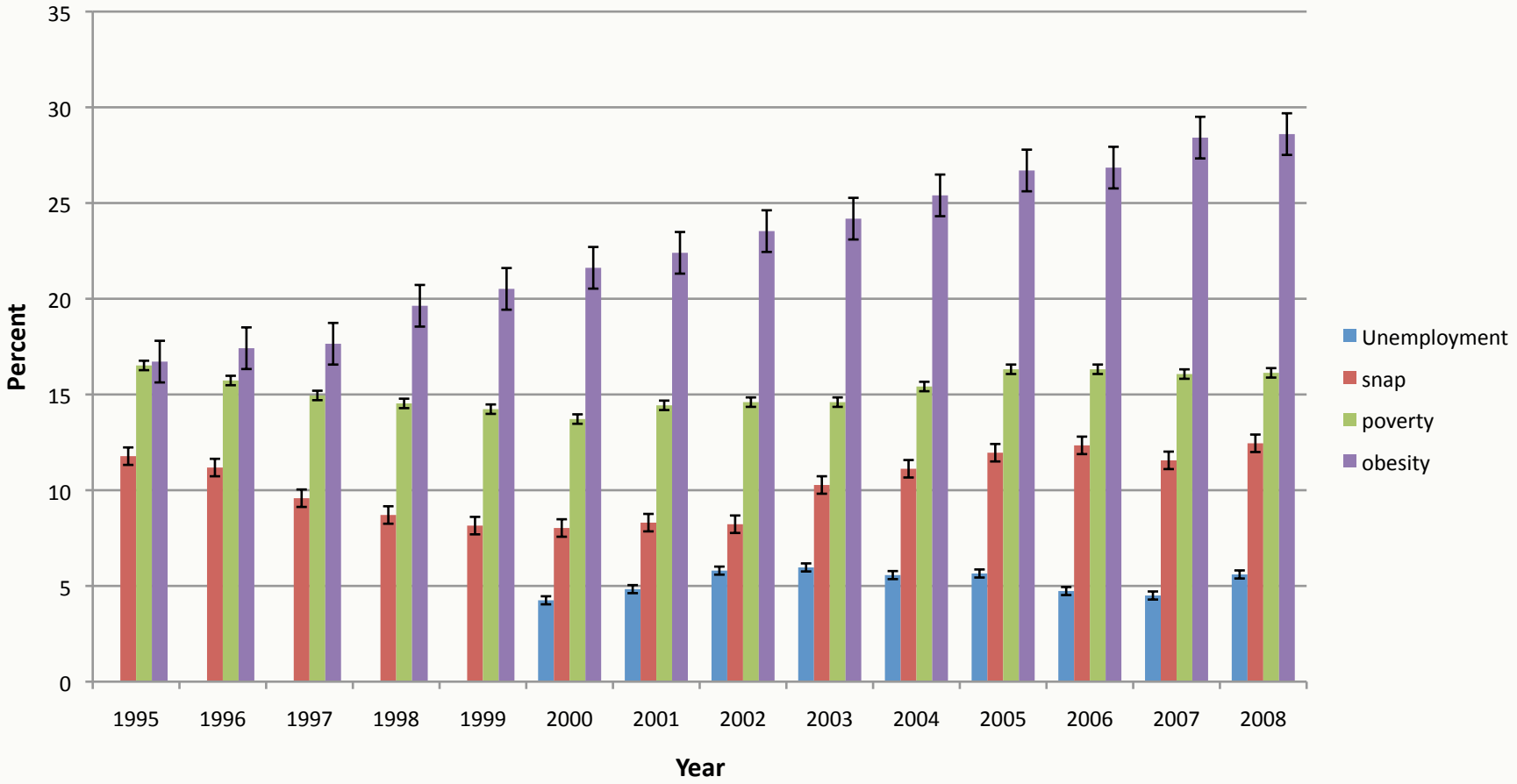
Results

Category/Region	USA Mean ± Std Dev	MS Mean ± Std Dev	AL Mean ± Std Dev	LA Mean ± Std Dev	TN Mean ± Std Dev	CO Mean ± Std Dev
Obesity Rates	21.31%± 3.29 D	26.52%±4.13 A	25.18%± 4.41 BB	24.56%± 3.99 BC	23.8%±4.24 CC	15.4%±2.63 E
Obesity-African American	31.45%±4.56 E	35.5%±5.08 AA	34.87%±5.52 AB	31.8%±5.56 AB	32.5%±7.06 C	24.32%±3.27 D
Obesity-Whites	20.25%±3.64 B	22.38%±4.41 A	22.79%±4.43 A	21.75%±3.64 A	22.4%±4.38 A	16.54%±0.88 C
Obesity-Males	21.80%±3.82 B	25.42%±4.57 A	25.08%±4.92 A	24.68%±4.75 A	24.1%±5.45 A	18.72%±1.06 C
Obesity-Female	20.83%±3.48 E	27.55%±4.82 A	25.5%±4.62 BB	24.42%±3.57 BC	23.6%±4.15C C	17.72%±1.15 D
Income level	$43259±5185.4 D	$32165±3179 AA	$35616.9±3985 BB	$34494±4561 AB	$34485±4541 AA	$48158±5506 C
SNAP Rates	7.58%±2.36 D	12.74%±2.14 BB	10.54%±1.30 CC	14.35%±2.73 A	11.56%±2.3 BC	4.76%±0.82 E
Unemployment Rates	5.17%± 0.67 B	6.50%±0.66 A	4.48%±0.77 B	5.17%±0.96 B	5.23%±0.68 B	4.68%±1.09 B
Poverty Rates	12.63%±0.75 D	19.24%±1.40 AA	13.99%±0.84 B	18.79%±1.06 A	14.13%±1.24 C	10.05%±0.96 E

Summary results-means and standard deviations from 1995-2008.
*Means with the same letter in a row are not significantly different

The analysis of variance showed a significant increase in obesity rates over time in all states and in the United States ($p < 0.001$).

Results

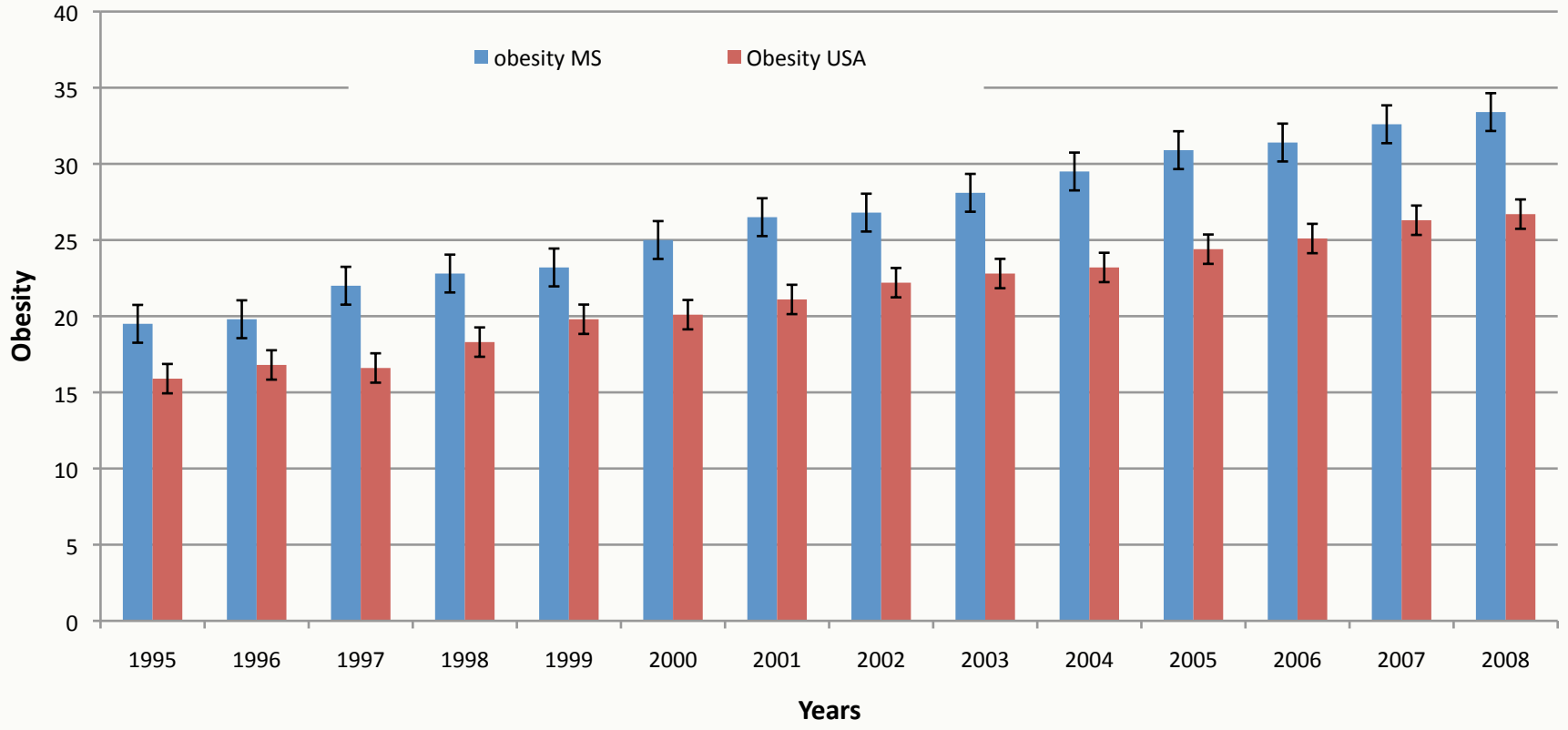


Average rate of Obesity, SNAP, Unemployment and Poverty from 1995-2008

Results

- Mississippi had the highest rate of obesity (26.52 ± 4.14 %) with a 13.9% increase in obesity rate since 1995; followed by Alabama (25.18± 4.41%), Louisiana (24.56± 3.9%), and Tennessee (23.8 ± 4.24%). All four southern states were significantly different from Colorado ($p < 0.0001$) that had the lowest rate of Obesity (15.4 ± 2.63). Poverty rates, percent of people receiving SNAP and unemployment rates had also showed an increasing trend over time.

MS Rates of Obesity



Obesity rate in MS and USA from 1995-2008

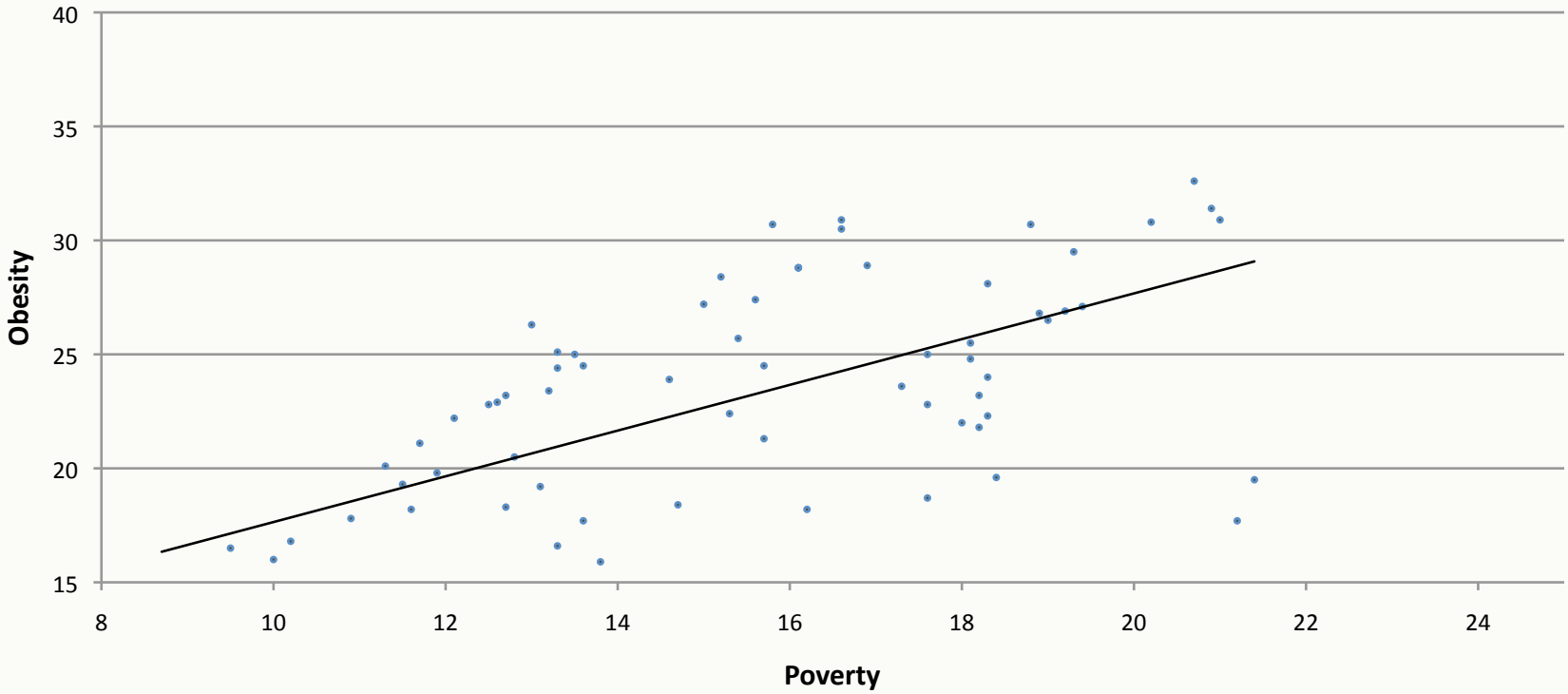
Regression Results

- Regression Analysis was performed to test the association between the obesity rates (BMI > 30) as response variable and the percent of people receiving SNAP, unemployment rates, income level, and percent of people below the poverty line (explanatory variables) for US, four southern states, and CO.

Regression Results

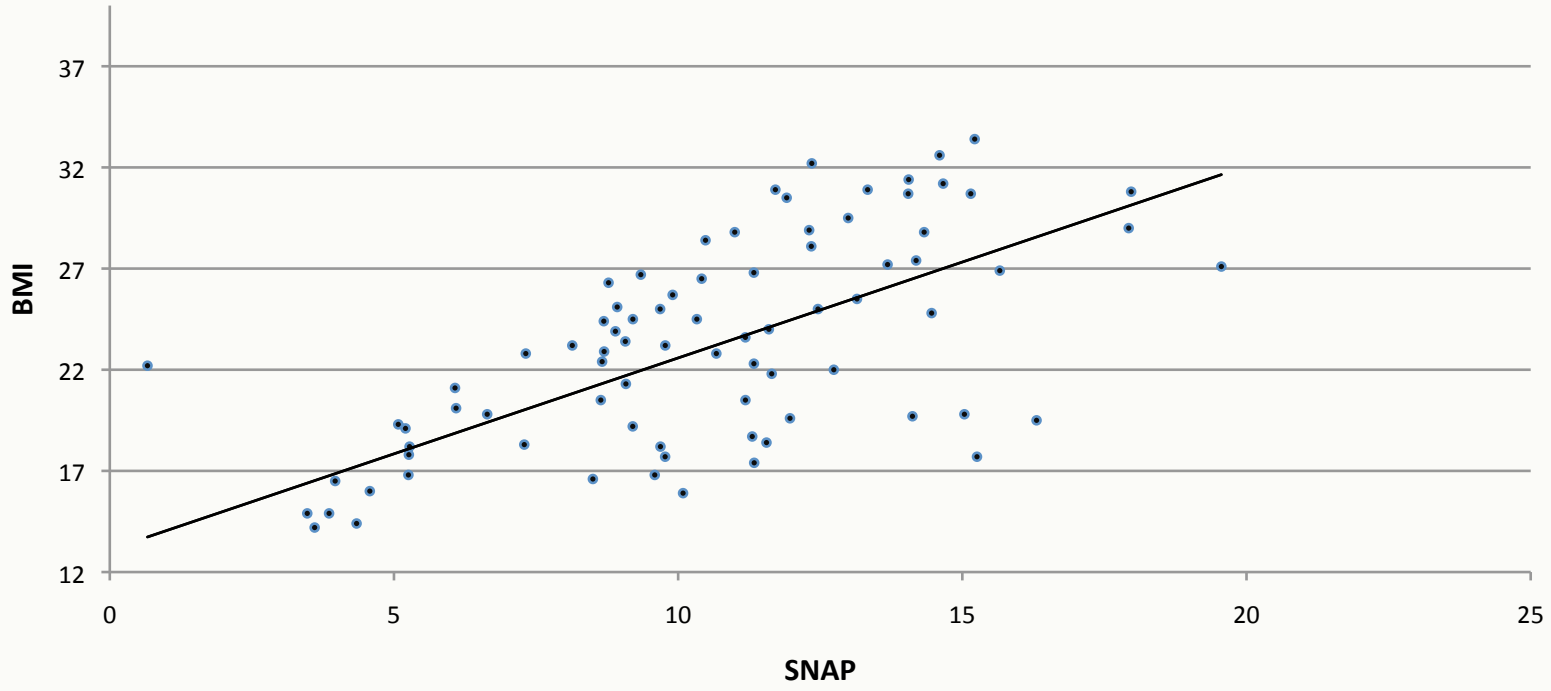
- The coefficient of determination, R^2 was 0.767 when a multiple regression analysis was performed to determine the association between obesity (BMI >30) and the explanatory variables.
- Scatter plots between obesity rate and the percent of people below poverty is shown in Fig 1 ($R^2 = 0.437$); between the obesity rate and percent of people receiving SNAP is shown in Fig 2 ($R^2 = 0.427$); between the obesity rate and unemployment rate in Fig 3 ($R^2 = 0.103$); and between the obesity rate and income level in Fig 4 ($R^2 = 0.018$).

Obesity and Poverty



Regression analysis between the obesity rates (BMI >30) and percentage of people below the poverty level for the US and the states of MS, AL, TN, LA and CO. **$y = 1.0029x + 7.6152$, $R^2 = 0.438$**

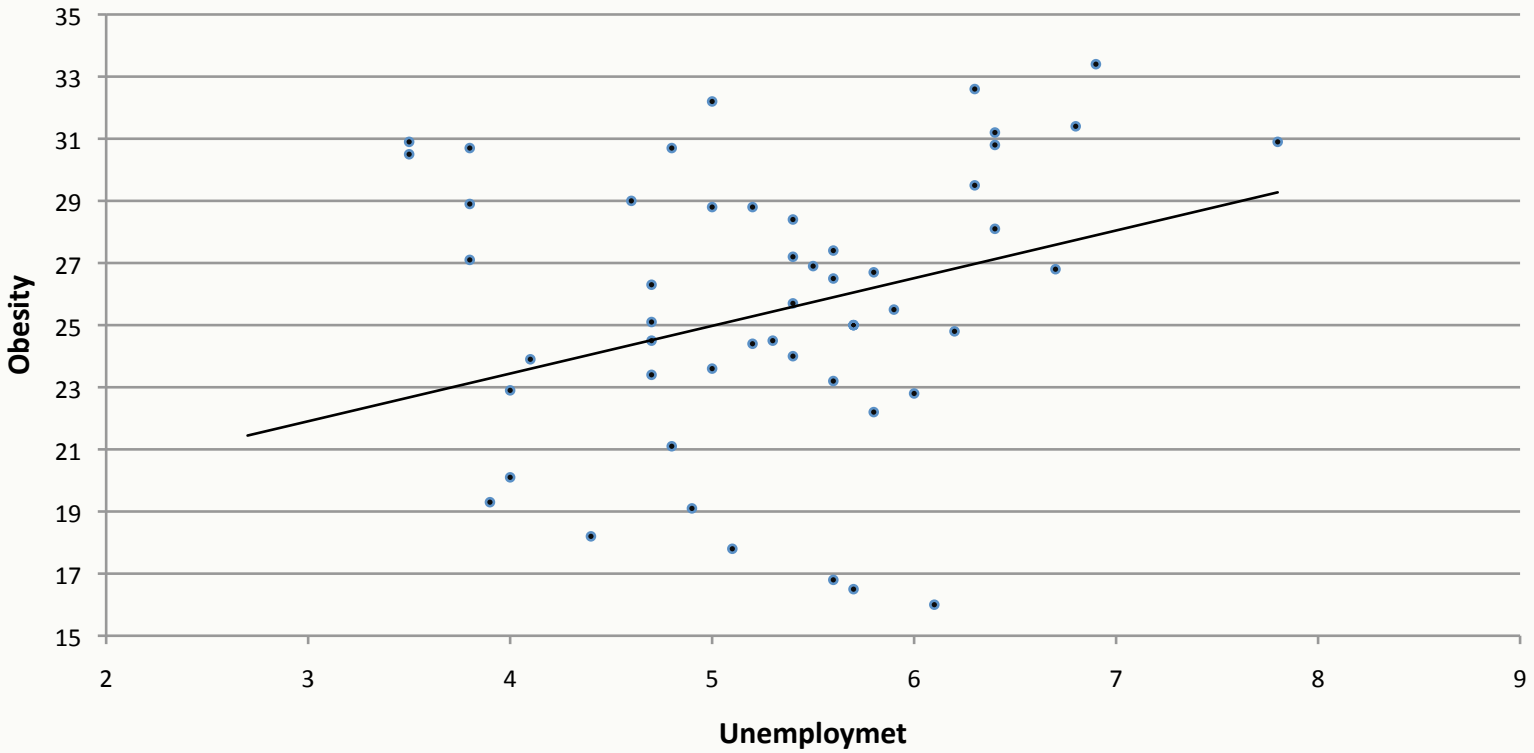
Obesity and SNAP



Regression analysis between the increase in obesity rates and the percent of people receiving Supplement Nutritional Assistant Program.

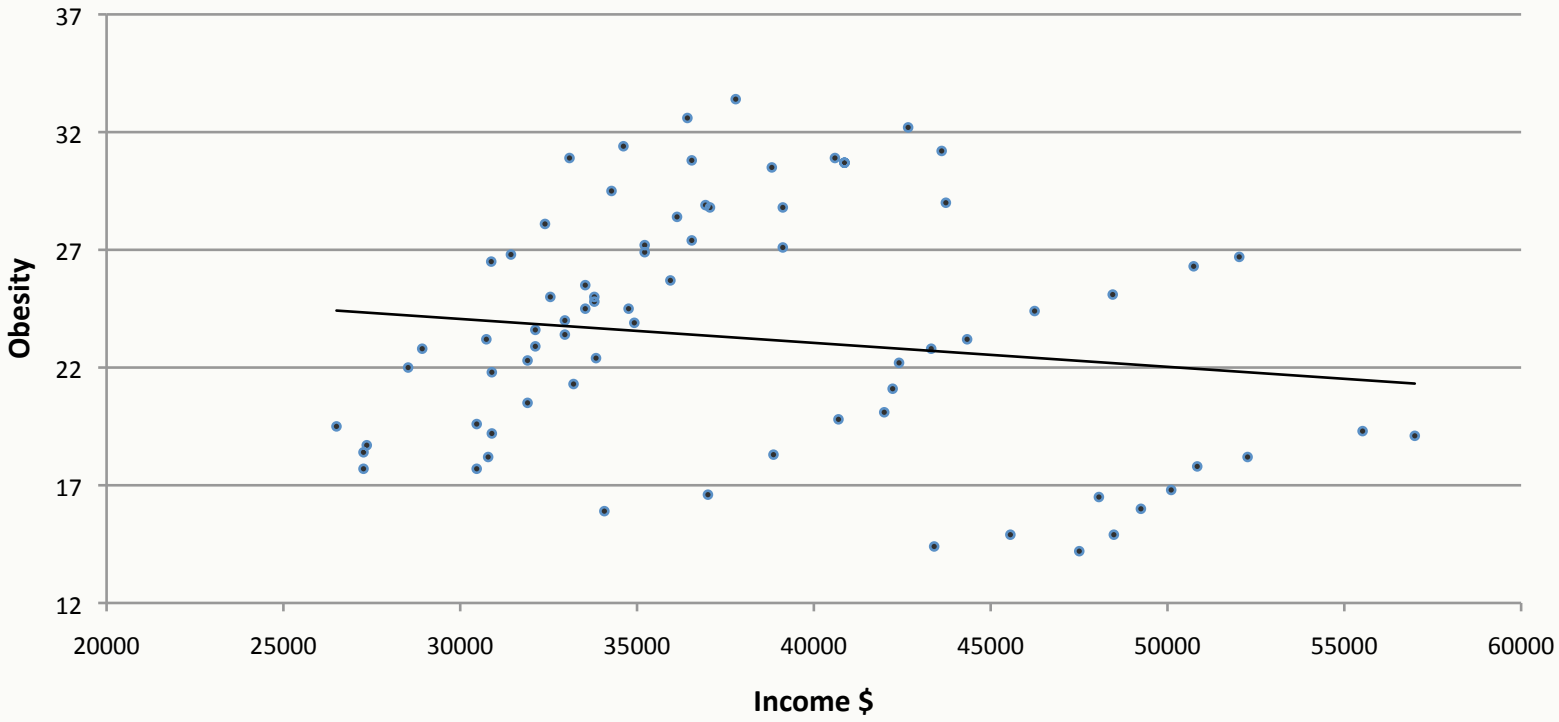
$y = 0.948x + 13.103$, $R^2 = 0.427$

Obesity and Unemployment



Regression analysis between the increase in obesity rates and the unemployment rates. $y = 1.5353x + 17.299$, $R^2 = 0.103$

Obesity and Income



Regression analysis between the increase in obesity rates with the income level.

$y = -0.0001x + 27.115$, $R^2 = 0.018$

Conclusion

- Results of this study had shown an increase rate of obesity contributed by several socioeconomic factors. Highest obesity rates were found in the African American group compared with White group. Geographic location had an impact on the obesity prevalence. The State of Mississippi had the highest rate of obesity for the past three years.

Conclusion

- Regression analysis showed a correlation between the increase in obesity prevalence with the increase in unemployment rates, poverty levels and percent of people receiving SNAP (Food Stamps) benefits.

Conclusion

- The large racial/ethnic differences in the prevalence of overweight and obesity suggest that culturally sensitive and appropriate approaches are needed in promoting healthful eating in fighting the obesity epidemic. It is crucial to tailor treatment and prevention efforts targeting a particular ethnicity group's specific needs and conditions.

Acknowledgement

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