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Center for Health Services Research and Development  
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**Disparities in Health Risk Factors and Health Status in  
Eastern North Carolina: Data from the Behavioral Risk Factor Surveillance  
Survey**

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## Introduction

Despite the goals set by Healthy People 2010, disparities in many health measures have persisted or even widened in recent years. This report describes disparities in perceived general health and health risk factors in North Carolina by income, education, and race/ethnicity and highlights the geographic disparities between Eastern North Carolina and the rest of the state.

The forty-one counties of Eastern North Carolina exhibit some of the highest mortality rates for leading causes of death in the nation. Trends and disparities in mortality are described in a number of region- and county-specific analyses prepared by the Center for Health Services Research and Development. They are published periodically as the Health Indicator Series and are available on the Center's website <http://www.chsrd.med.ecu.edu>.

This publication draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) survey in North Carolina to describe self-reported health status and behaviors that are known to be risk factors. The risk factors can be considered to be underlying or contributing causes of the diseases that cause the deaths. This analysis describes disparities in general health and health risk factors including obesity and overweight, diabetes, and lack of health insurance coverage by region, income, education, and race/ethnicity. Data have been collected between 2002 and 2006 in the statewide BRFSS survey program, which is administered by the North Carolina Center for Health Statistics.

The North Carolina BRFSS is a random telephone survey of adults conducted annually in all counties of the state. While the annual statewide sample is large (about 17,000 respondents) samples for most individual counties are too small, particularly for single years, to make valid descriptions and comparisons. Samples for minority population subgroups may also be too small for comparison in individual years. North Carolina data are recoded, aggregated into multiple years, and analyzed for the Eastern North Carolina as a whole at ECU's Center for Health Service Research and Development using SUDAAN, a statistical software package used in research involving complex sampling designs (Research Triangle Institute [2002]). To compensate for small sample sizes at the county level, analyses are based on aggregated 5-year data from 2002 to 2006. The methodology and the results of this aggregate analysis have been tested and verified against data published by the North Carolina Center for Health Statistics.

The Eastern region is defined as the 41 counties of the coastal plain (those essentially east of Interstate 95). The Eastern region is compared to the other counties and the state as a whole. Regional differences are further examined by demographic and socio-economic factors. Prior to 2002, interviews were conducted all in English, including the ones to Hispanic respondents. From 2002, North Carolina started BRFSS interviews in Spanish language for Spanish-speaking Hispanics in addition to interviews in English for

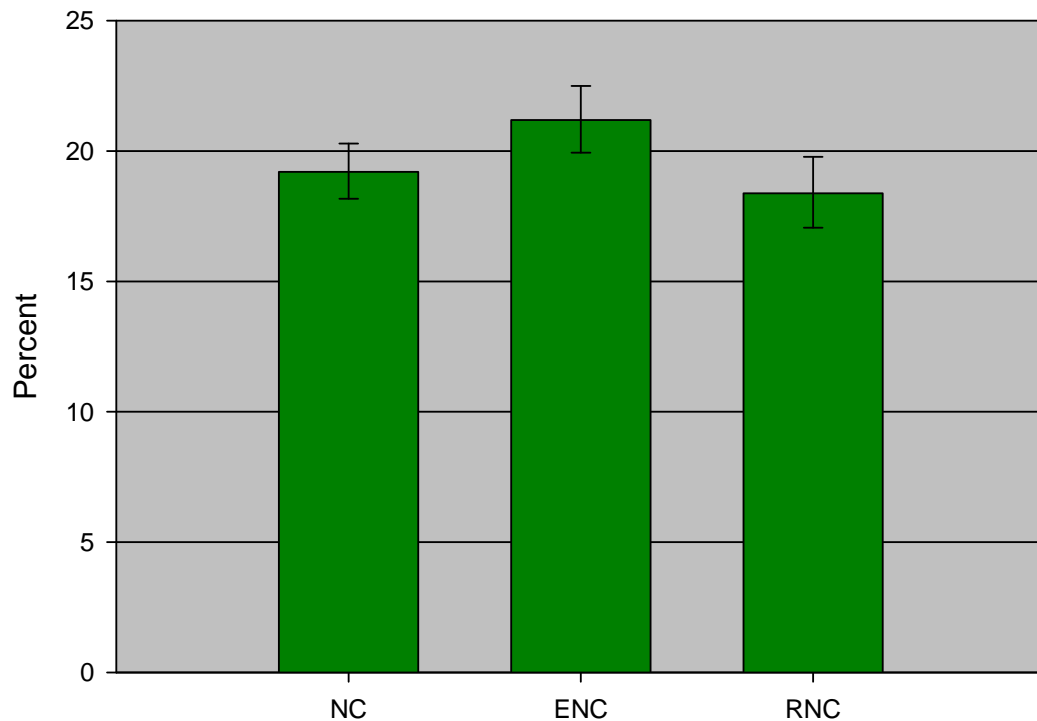
English-speaking Hispanics. The results of the analyses for the two populations show marked differences in general health and health risk factors, and are presented separately here.

In the analyses that follow, means for percentages are presented for groups compared along with 95 percent confidence intervals to provide both point estimates and reveal statistical significance, i.e., 95 of 100 similar random samples would yield an estimate within the confidence interval. Statistically significant ( $p < 0.05$ ) differences are found where confidence intervals do not overlap.

## General Health

When North Carolinians have been asked to describe their health in general (with response choices; excellent, very good, good, fair, or poor), respondents in the Eastern region rated their general health to be poorer than the those in rest of the state, with significant variation by income, education, and race/ethnicity.

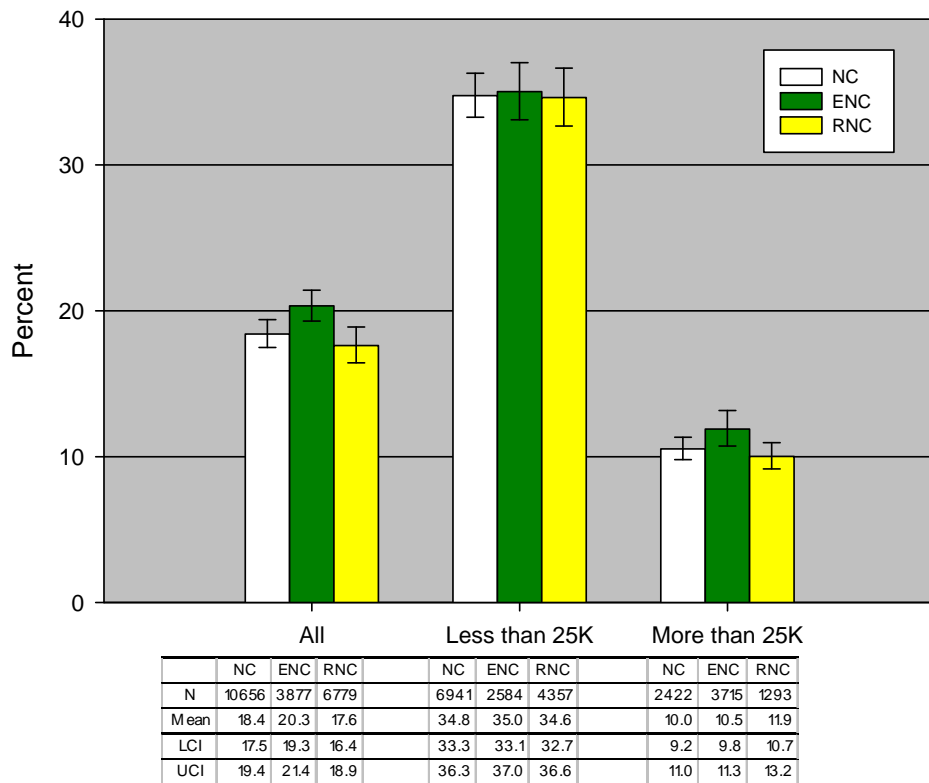
**Figure 1. Percent Reporting Fair-to-Poor Health by Region 2002 to 2006**



### Comparisons between Eastern North Carolina and the Rest of the State

Fewer people in Eastern North Carolina perceive themselves to be good health than those in the rest of the state. For the years 2002-2006, 21.2% of Eastern North Carolinians reported their health to be only "fair-to-poor" compared to 18.4% of other North Carolinians. The mean difference, 2.8 percentage points, is statistically significant (see Figure 1).

**Figure 2. Percent Reporting Fair-to-Poor Health by Income and Region 2002-2006**

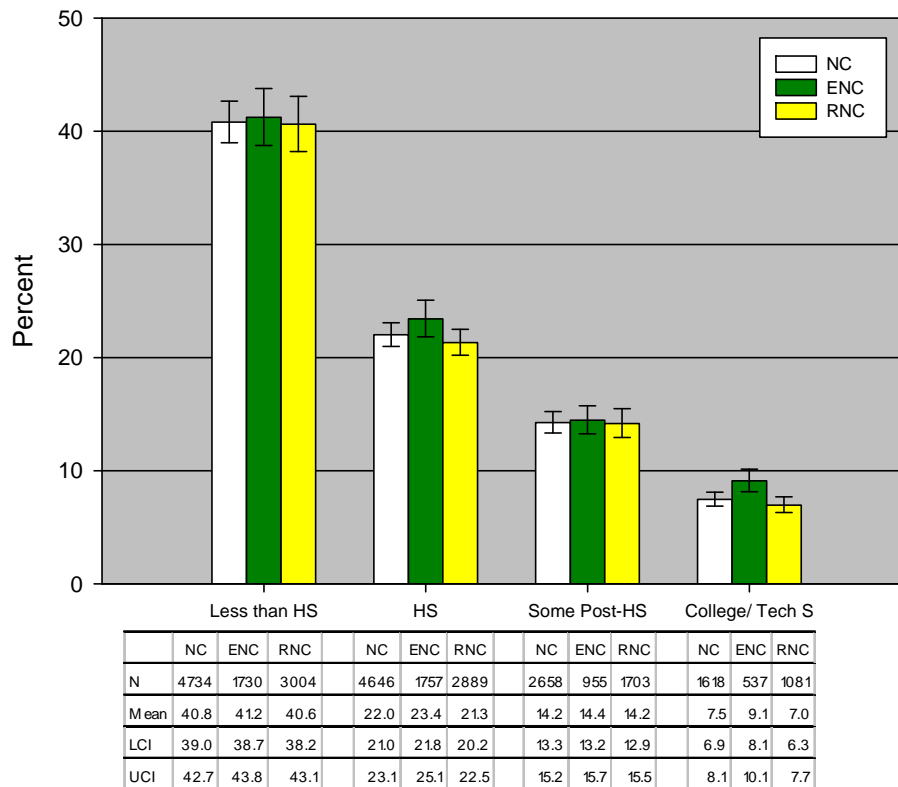


### Disparity in general health by income

Self-rated general health varies significantly by income, and the disparity related to poverty is substantial. Across the state, over a third of people who are poor (less than \$25,000 per family) reported their health to be only fair-to-poor, compared to only 10% of people who have higher annual income ( $p < 0.05$ , Figure 2).

A difference in regions (Eastern NC vs. the rest of the state) is present for those who have an annual income more than \$25,000, but not for those who have an annual income less than \$25,000.

**Figure 3. Percent Reporting Fair-to-Poor Health by Education and Region 2002-2006**

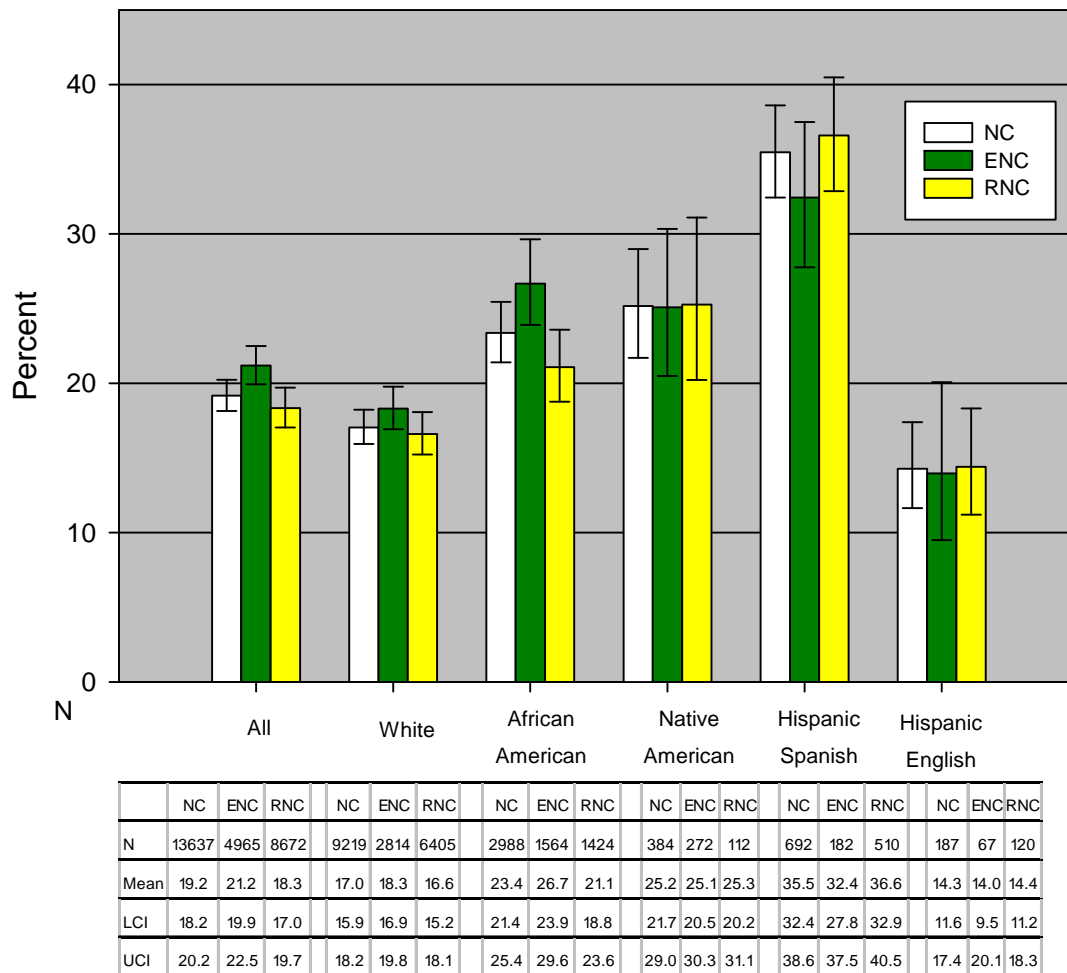


### Disparity in general health by education

Disparities are also seen in terms of education. There are stepwise associations of education with self-rated general health. More than 40% of people who did not graduate from high school reported their health to be only fair-to-poor compared to just 22% of those who graduated from high school (and went no further), and 14% of high school graduates with additional education. Those perceiving themselves to be the healthiest are college or technical school graduates; only 7.5% of those reported their health to be fair-to-poor.

The educational “effect” on health is across the state with no difference by region except for among those who are college or technical school graduates. Even the most educated citizens of Eastern North Carolina are less healthy than those in the rest of the state; 9% of college or technical school graduates in the east reported fair-to-poor general health compared to 7% of those in the rest of the state (see Figure 3).

**Figure 4. Percent Reporting Fair- to- Poor Health by Race and Region 2002-2006**



#### Disparity in general health by race/ethnicity

Substantial disparities exist in regard to self-reported health by self-reported race and ethnicity. Across the state, a smaller percentage (17%) of people describing themselves to be White reported themselves to be in fair-to-poor health than any other groups. Least healthy by this measure are Spanish-speaking Hispanics, 36% of whom reported health to be only fair-to-poor. More African Americans and Native Americans reported fair-to-poor general health (23.4% and 25.2%) than Whites and English-speaking Hispanics (17.1% and 19.2%) (see Figure 4).

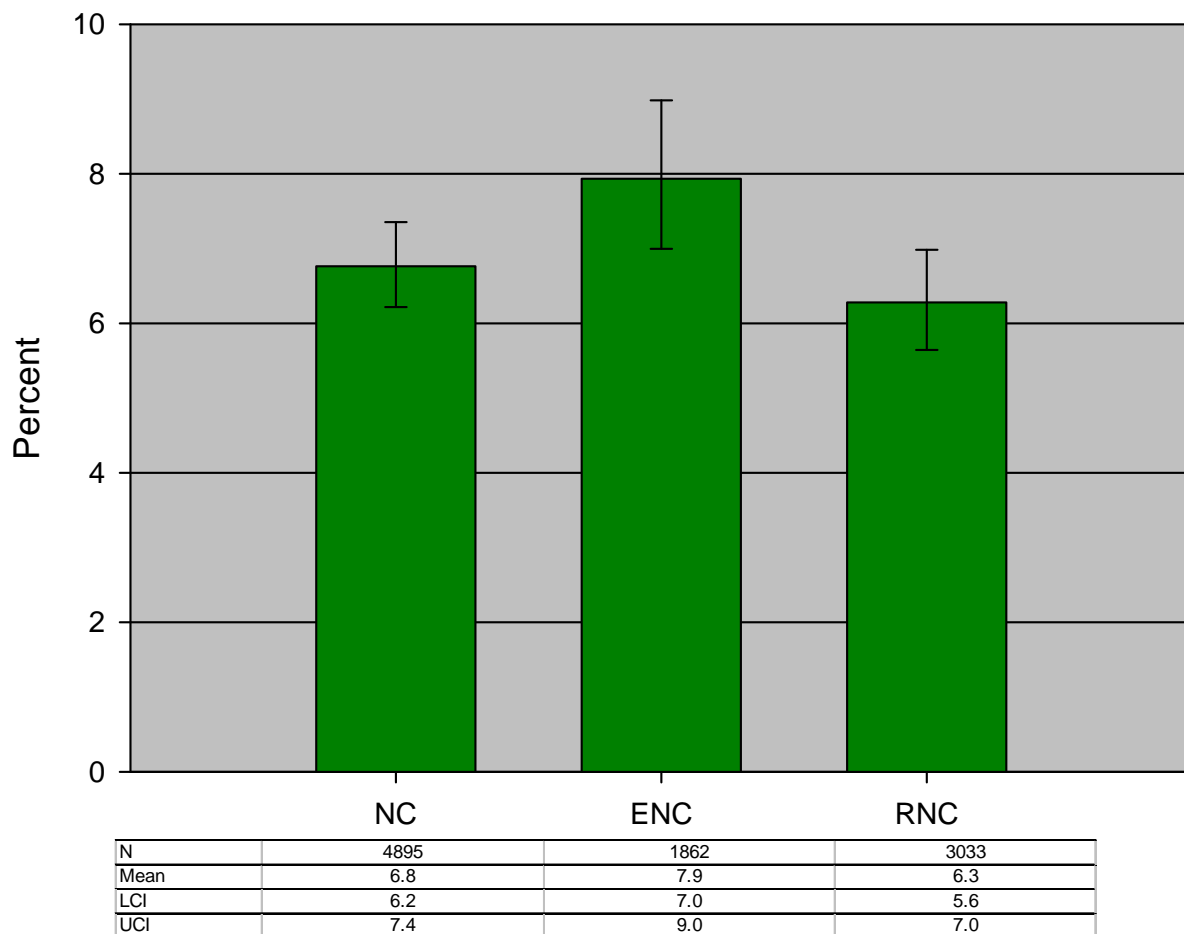
Within Eastern North Carolina, the patterns are similar. Statistically significant differences are found between Whites, African Americans, and Spanish-speaking Hispanics, percentages 18.3, 26.7, and 32.4 respectively. One out of four (25.1%) Native Americans in Eastern North Carolina say their health is less than good, significantly different (statistically) from Whites and English-speaking Hispanics but not from African Americans or Spanish-speaking Hispanics.

## Prevalence of Diseases and Risk Factors Based on Self-report

### Diabetes

Diabetes is a leading cause of death in NC and US. Diabetes mortality rates have been increasing, and the regional and racial disparities have been widening. Data from the BRFSS contributes importantly to our understanding of prevalence and distribution of this life-threatening disease by asking, "Have you ever been told by a doctor that you have diabetes?" Prevalence of diabetes varies significantly by region, education, and race/ethnicity. The following sections describe the regional differences and distributions by race and socio-economic factors.

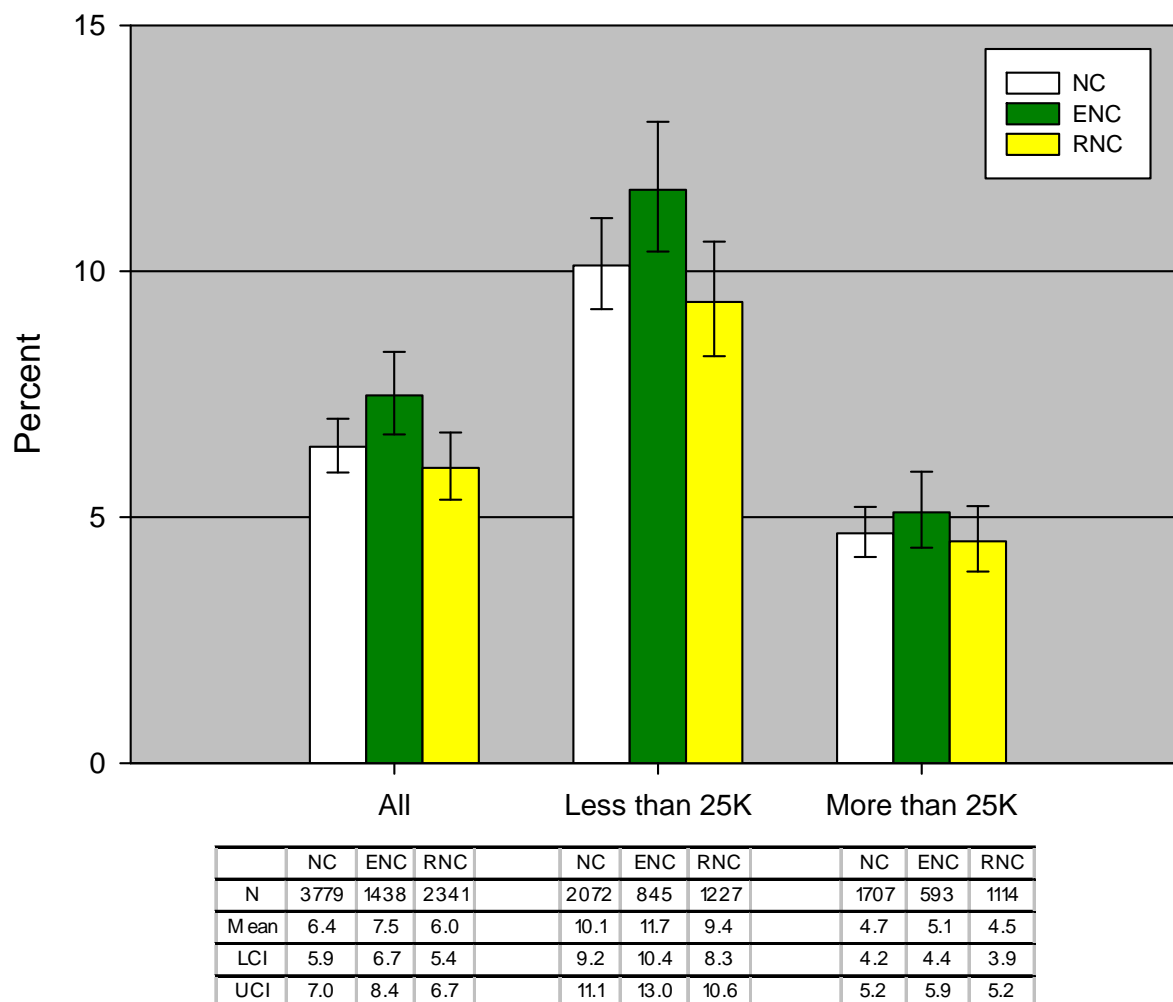
**Figure 5. Diabetes Prevalence by Region 2002-2006**



### Comparisons between Eastern North Carolina and the Rest of the State

More people who live in Eastern NC reported having diabetes (7.9%) than those who live in the rest of the state (6.3%), and the difference is statistically significant (see Figure 5).

**Figure 6. Diabetes Prevalence by Income and Region 2002-2006**

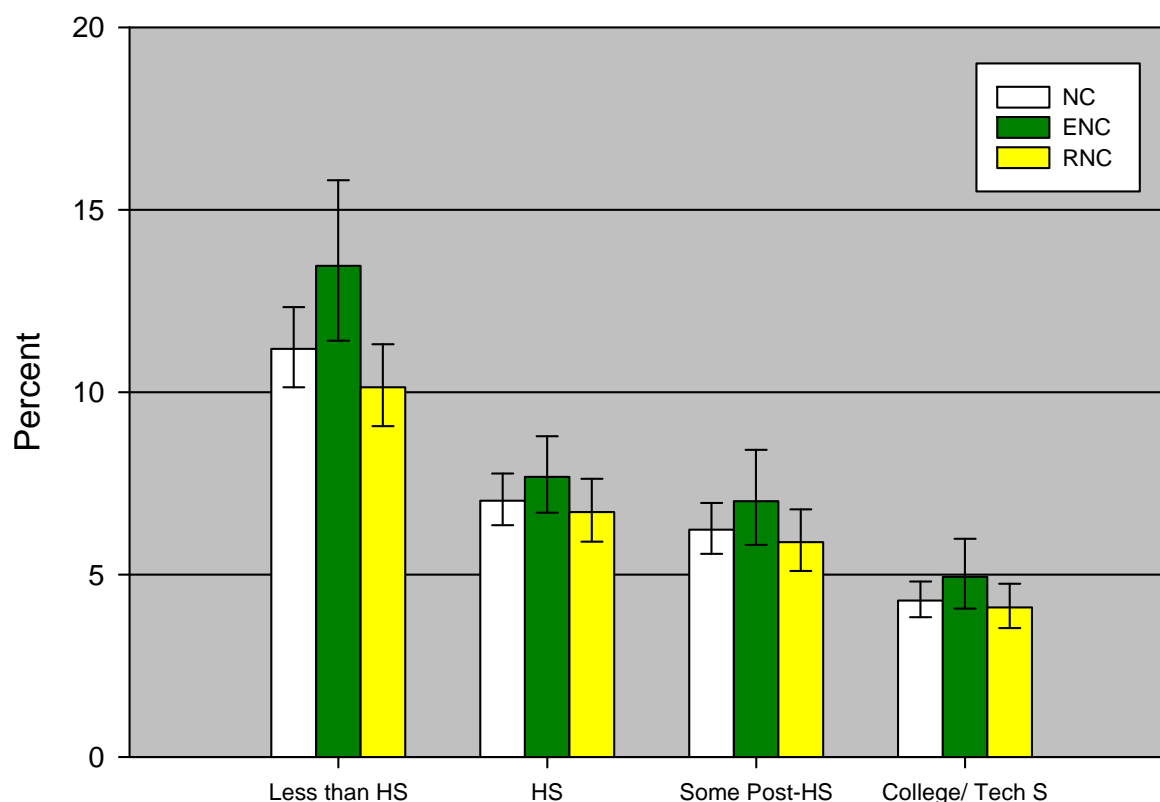


#### Disparity in diabetes prevalence by income

The prevalence of diabetes varies by household income. Across the state, more people with low household income (less than \$25,000) reported having diabetes than people with higher income (10.1% vs. 4.7%,  $p < 0.05$ ).

The difference between this distinction of “rich and poor” is greater in Eastern NC. Almost one of eight (11.7%) people with low income in Eastern NC reported having diabetes compared to about one of 20 (5.1%) people in families making more than \$25,000 ( $p < 0.05$ ) (see Figure 6).

**Figure 7. Diabetes Prevalence by Education and Region 2002-2006**

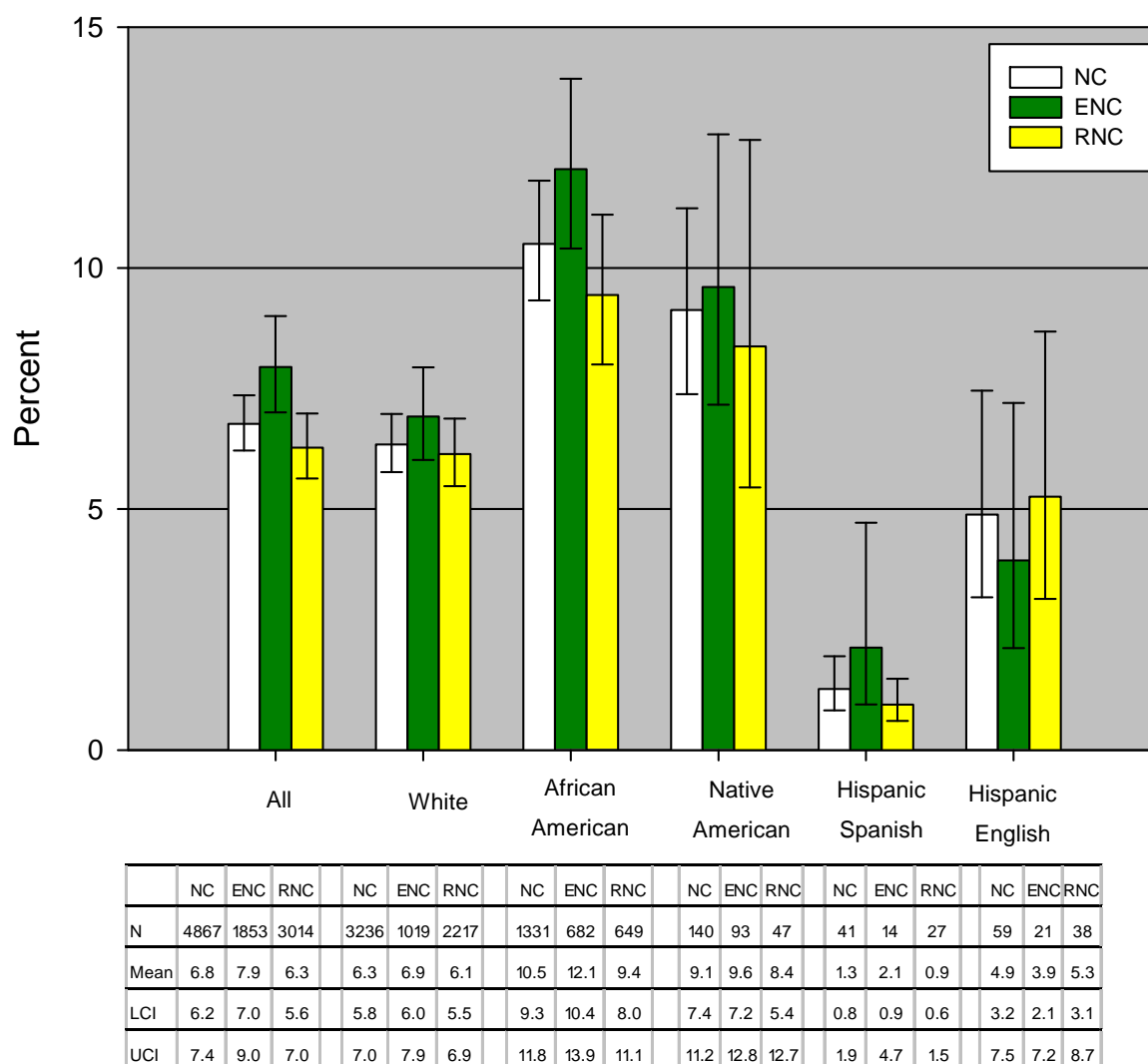


#### Disparity in diabetes prevalence by education

There are stepwise effects of education on reported incidence of diabetes. Across the state, the highest percentage of people with diabetes is those less than high school education (11.2%), followed by those with high school (7.0%) or some post-high school education (6.2%). Those with college or technical school education have the lowest rate of diabetes prevalence (4.3%). Contrasts are statistically significant for all but the “some post-high school” group.

A statistically significant regional difference exists only in the contrast of those with less than high school education to the other groups. Among the less educated there is a difference within the state. In Eastern NC, 13.5% of those without high school education reported having diabetes as compared to 10.1% of those living in the rest of the state (see Figure 7).

**Figure 8. Diabetes Prevalence by Race/ Ethnicity and Region 2002-2006**



#### Disparity in diabetes prevalence by race and ethnicity

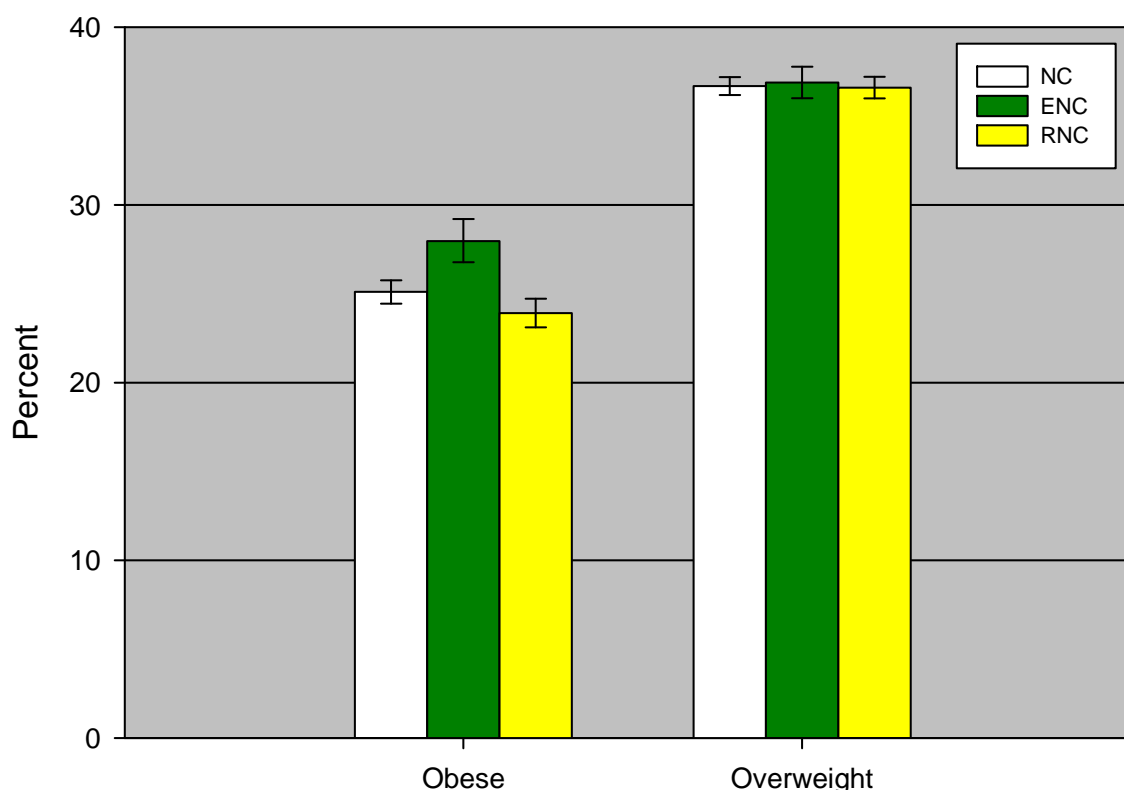
Prevalence of reported diabetes varies substantially and significantly by race and ethnicity. Across the state, more African Americans (10.5%) and Native Americans (9.1%) reported having diabetes than Whites (6.3%). Spanish-speaking Hispanics reported the lowest rate of diabetes (1.3%), much lower than English-speaking Hispanics (4.9%) or Whites (6.3%). The large disparity in prevalence between Whites and African Americans is even more pronounced in Eastern North Carolina. Diabetes is almost twice as prevalent among African Americans as Whites in the eastern region (12.1% and 6.7% respectively,  $p < 0.05$ ). All groups in the eastern region except English-speaking Hispanics have higher prevalence than those groups in the rest of the state, but regional effects are not statistically significant (see Figure 8).

## BMI (Obesity and Overweight)

The BMI is constructed using two basic anthropometric measures; height and weight. Height in meters is squared and then divided into weight recorded in kilograms. For adults, 20 years and older in this survey, a BMI of 25.0 up to 30.0 is considered overweight, while those with a BMI of 30.0 and greater are considered obese.

In the following sections, percent obese and percent overweight show different patterns by region and other factors, and are presented separately.

**Figure 9. Percent Obese or Overweight by Region 2002-2006**

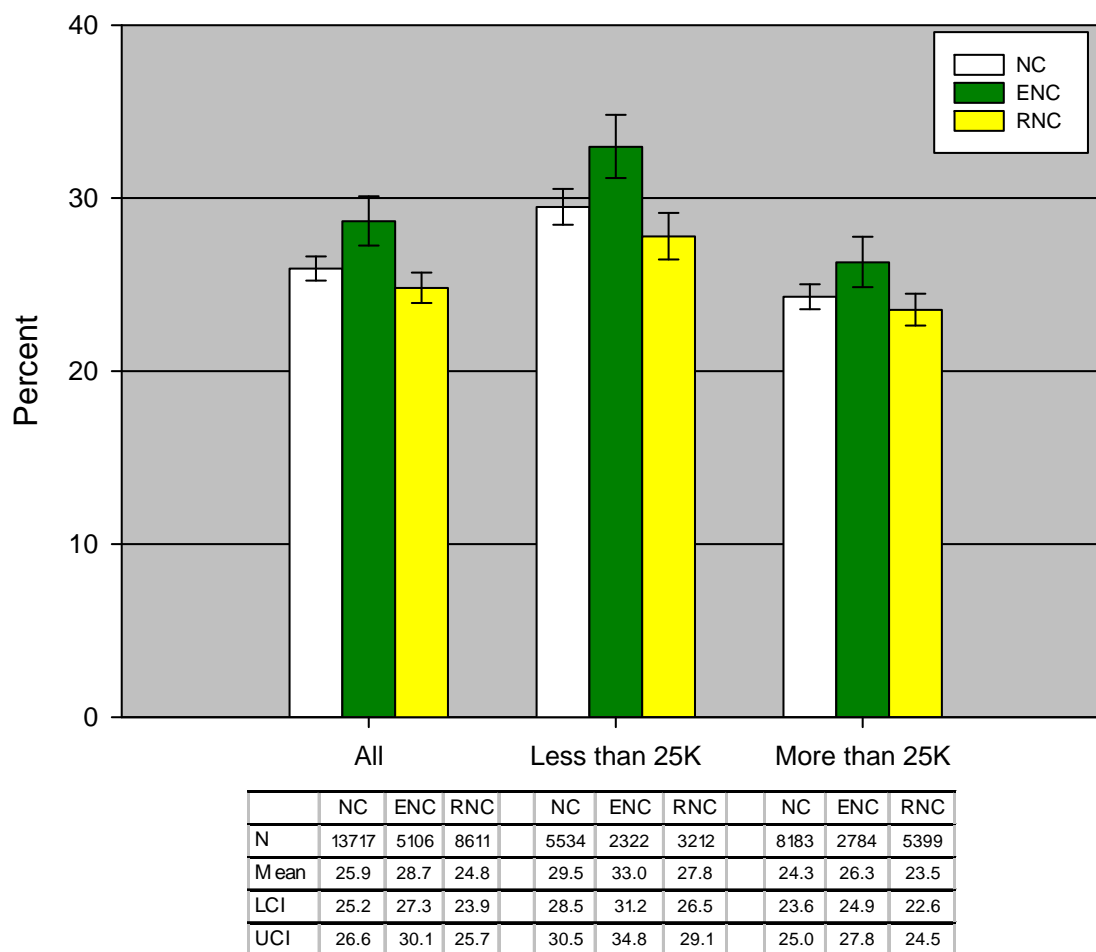


	NC	ENC	RNC		NC	ENC	RNC
N	16085	6018	10067		21816	7163	14653
Mean	25.1	28.0	23.9		36.7	36.9	36.6
LCI	24.4	26.8	23.1		36.2	36.0	36.0
UCI	25.8	29.2	24.7		37.2	37.8	37.2

### Comparisons between Eastern NC and the Rest of the State

More people who lived in Eastern NC were obese (28.0%) than those who lived in the rest of the state (23.9%). There is no regional difference in percent overweight. More than a third of respondents (36.7%) in NC were overweight (see Figure 9).

**Figure 10. Percent Obese by Income and Region 2002-2006**

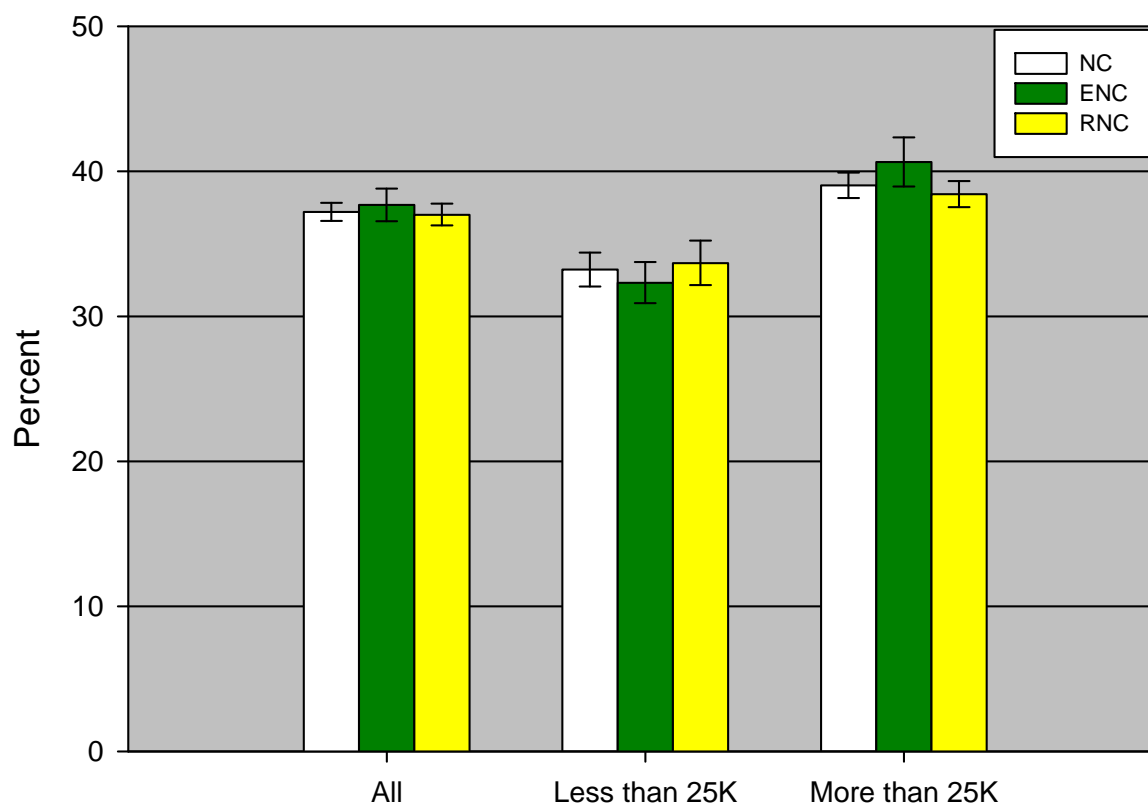


#### Prevalence of obesity by income

Percent obese and overweight varies significantly by income and region. Across the state, more people who are poor (less than \$25,000 per family) are obese (29.5%) than those whose income is above \$25,000 (24.3%).

The difference in regions (Eastern NC vs. the rest of the state) in prevalence of obesity was larger for those with annual income less than \$25,000 than those who earned more (see Figure 10).

**Figure 11. Percent Overweight by Income and Region 2002-2006**

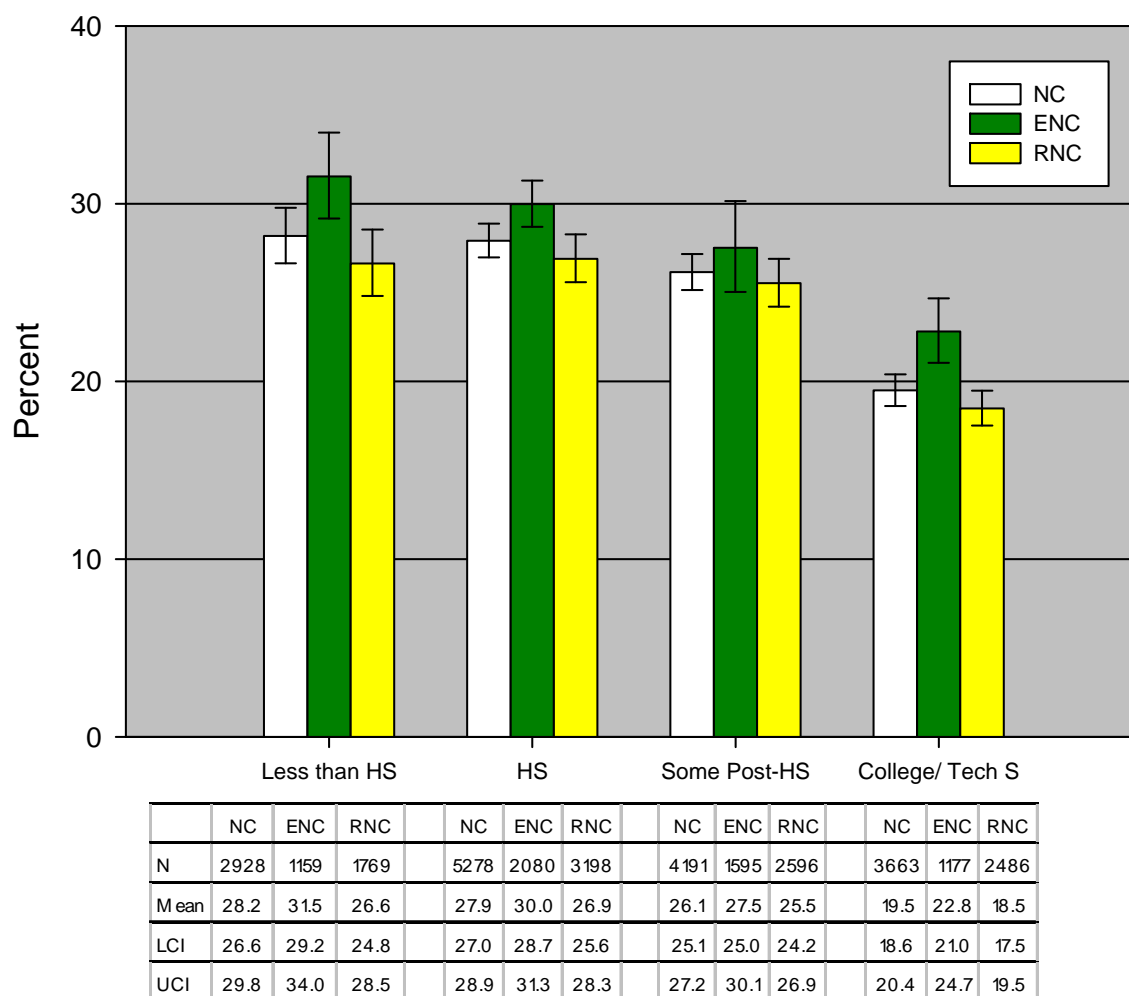


	NC	ENC	RNC	NC	ENC	RNC	NC	ENC	RNC
N	18148	5971	12177	5856	2086	3770	12292	3885	8407
Mean	37.2	37.7	37.0	33.2	32.3	33.7	39.0	40.6	38.4
LCI	36.6	36.6	36.3	32.1	30.9	32.1	38.1	39.0	37.5
UCI	37.8	38.8	37.8	34.4	33.7	35.2	39.9	42.3	39.3

#### Prevalence of overweight by income

Percent overweight has a different pattern from percent obese. Statewide, more people who have annual income more than \$25,000 are overweight (39.0%) than those who have less income (33.2%). There is no significant regional difference for percent overweight (see Figure 11).

**Figure 12. Percent Obese by Education and Region 2002-2006**

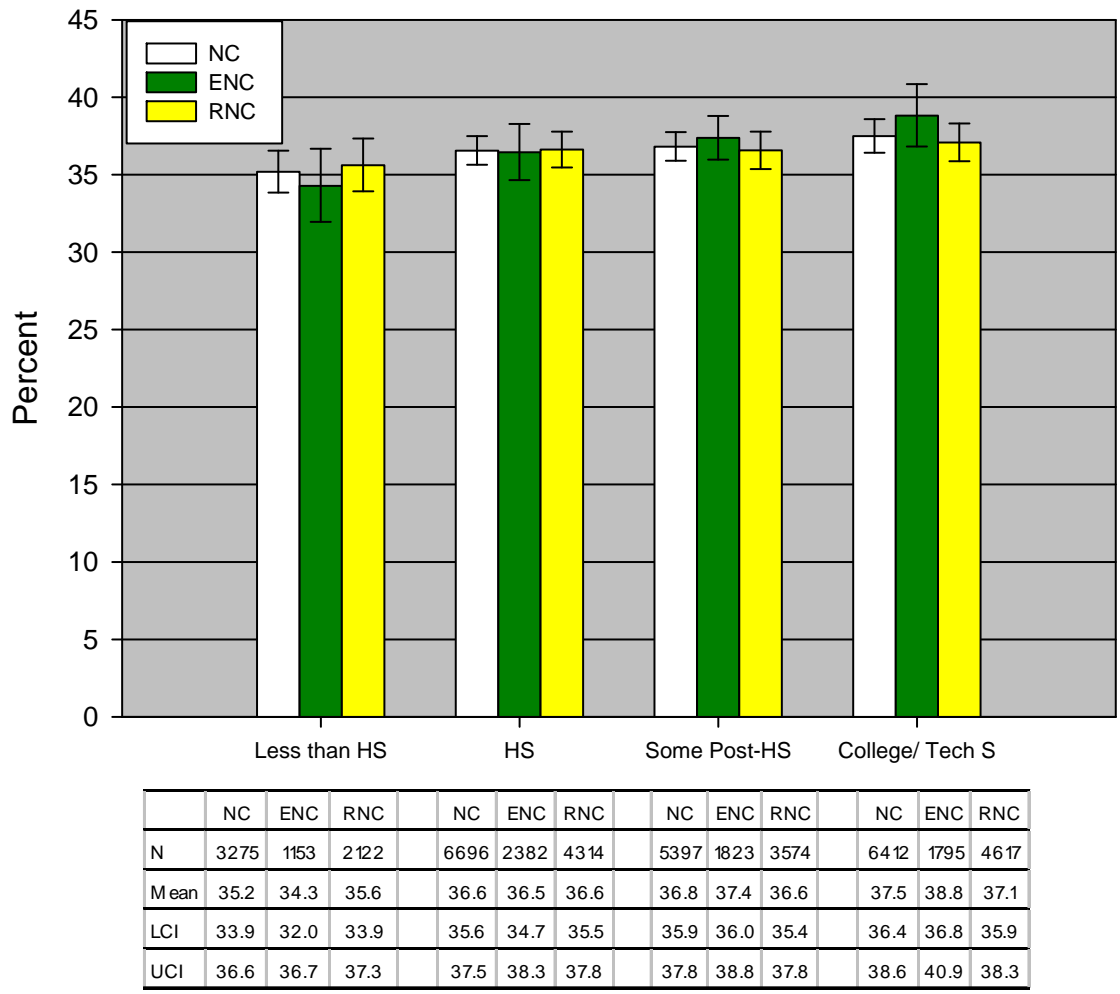


#### Prevalence of obesity by education

Significantly fewer people who have completed college or technical school (19.5%) are obese than those with high school (27.9%), some post-high school education (26.1%) or without high school education (28.2%).

Regional differences are present except for those with some post-high school education. More people who have college/technical school, or high school education or less than high school education living in Eastern NC are obese (22.8%, 30.0%, 31.5%, respectively) than those with comparable education living in the rest of the state (18.5%, 26.9%, and 24.8%, respectively) (see Figure 12).

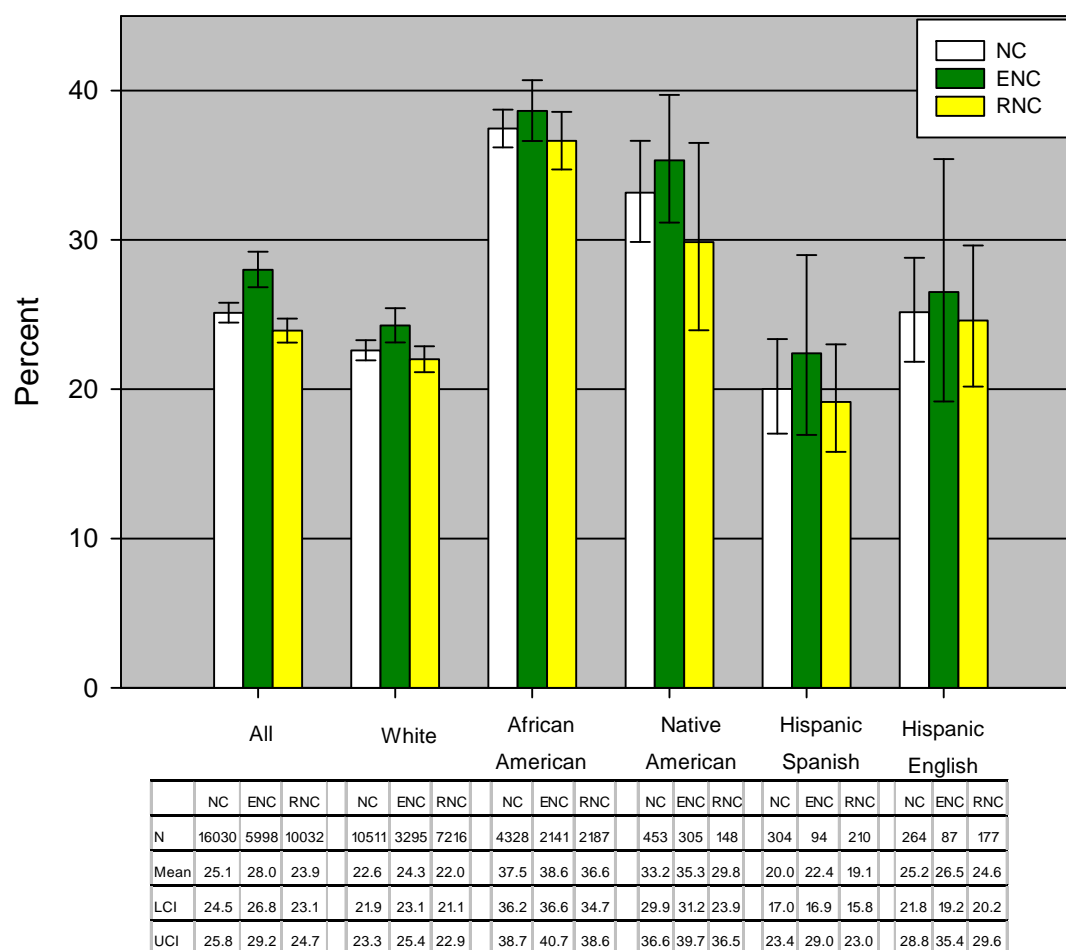
**Figure 13. Percent Overweight by Education and Region 2006-2006**



Prevalence of overweight by education

There is a numerical trend that more people are overweight with higher education, but differences are not significant. There is no significant regional difference (see Figure 13).

**Figure 14. Percent Obese by Race/ Ethnicity and Region 2002-2006**

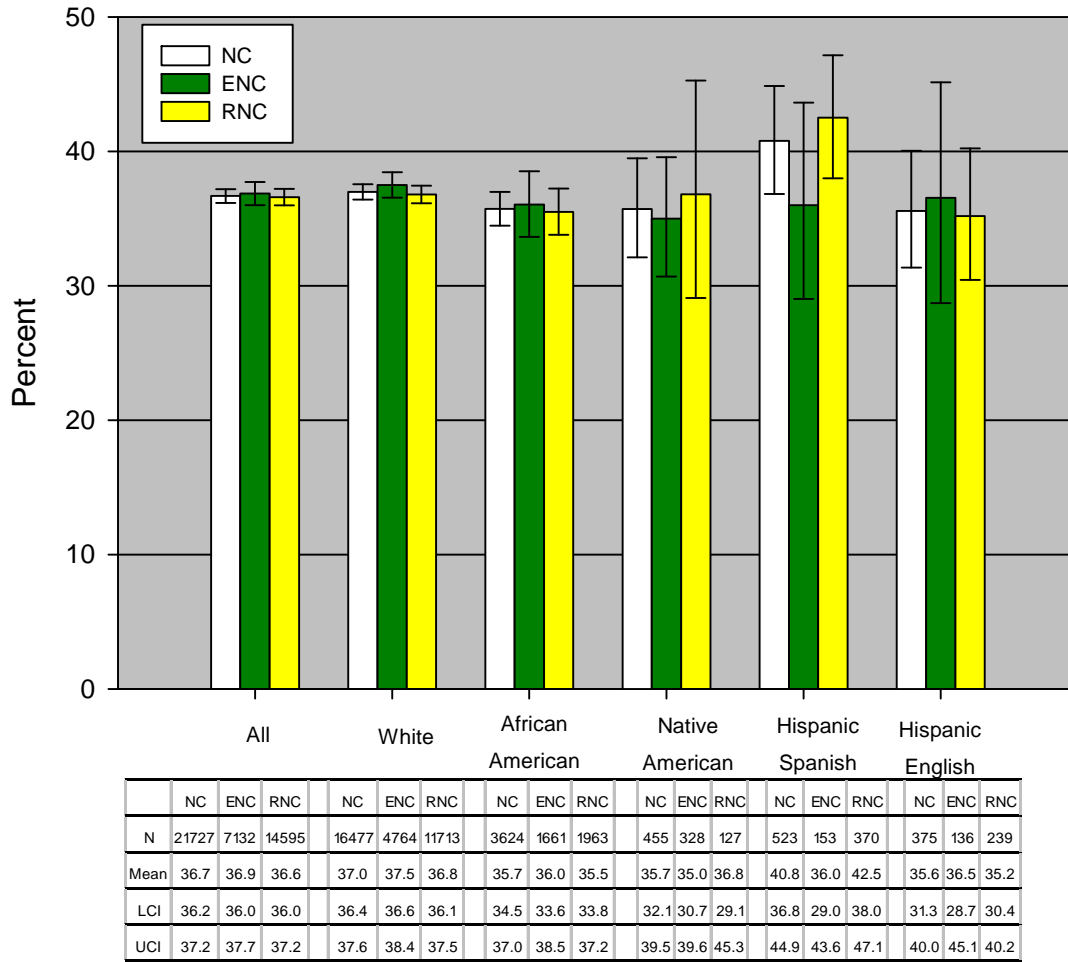


#### Prevalence of obesity by race/ethnicity

Prevalence of obesity significantly varies by race/ethnicity. Statewide, more African Americans (37.5%) and Native Americans (33.2%) are obese than Whites (22.6%) or Hispanics (20.0% for Spanish-speaking; 25.2% for English-speaking Hispanics).

The regional difference is statistically significant for Whites only. More Whites living in Eastern NC (24.3%) are obese than those living in the rest of the state (22.0%) (see Figure 14).

**Figure 15. Percent Overweight by Race/ Ethnicity and Region 2002-2006**



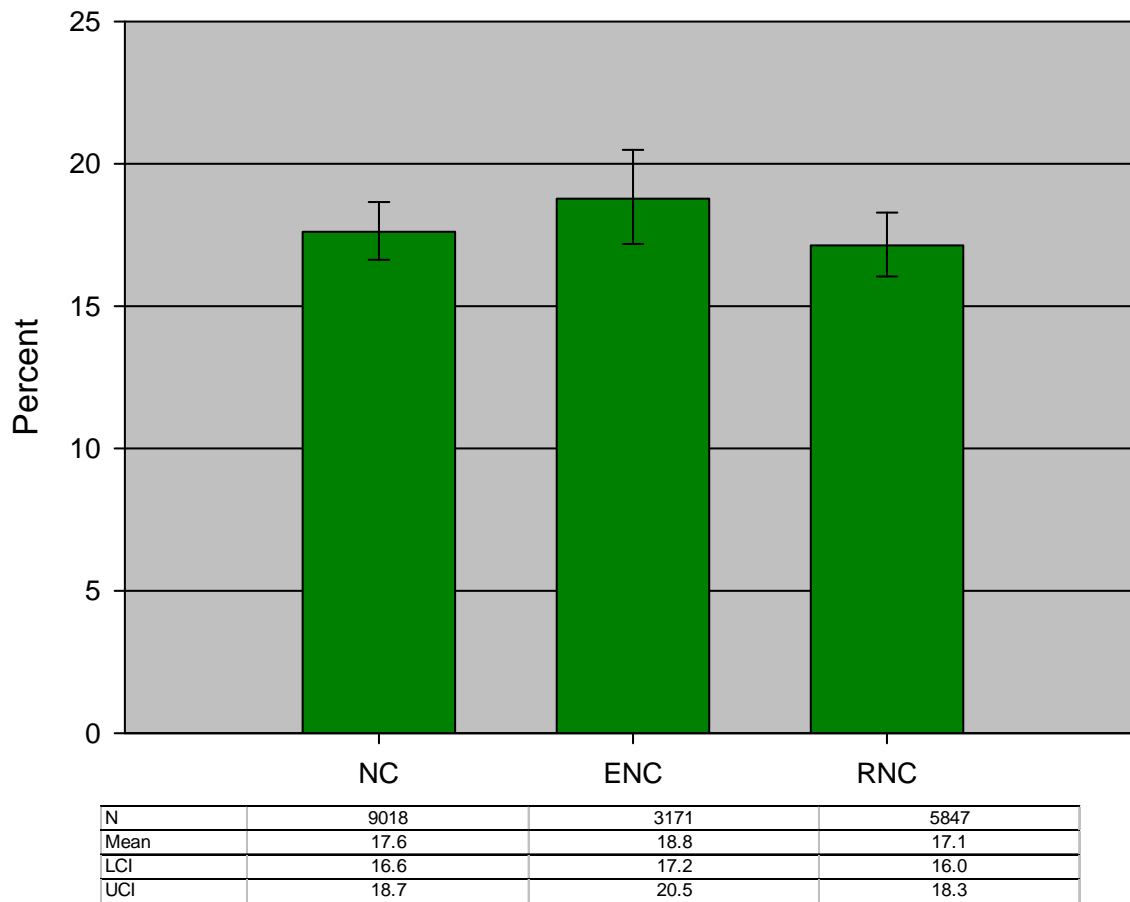
Prevalence of overweight by race/ethnicity

Prevalence of overweight does not significantly vary by race/ethnicity or region (see Figure 15).

## Health Care Coverage

Not having health care coverage is a health risk that could potentially have dire consequences. Percent of people not having health care coverage does not vary by region, but it varies significantly by income, education, race/ ethnicity.

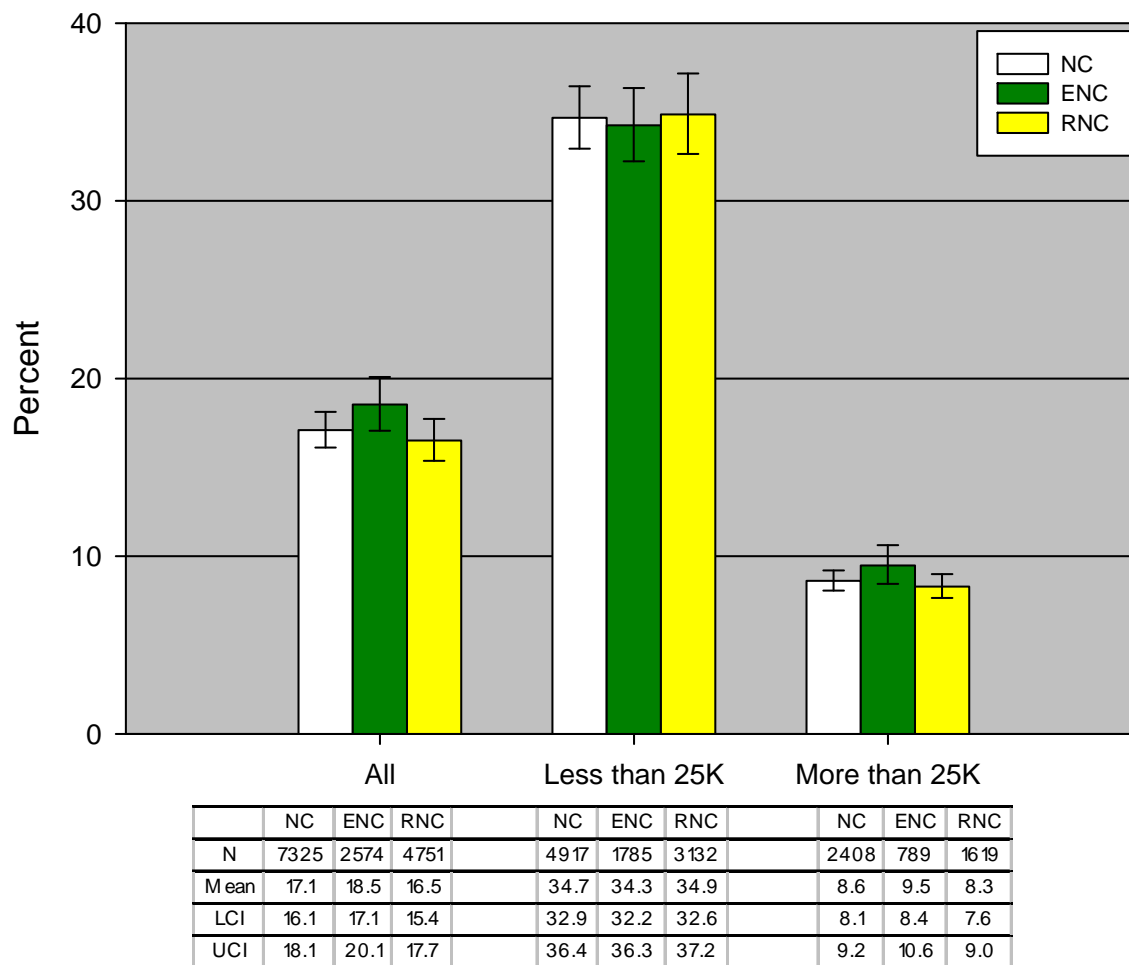
**Figure 16. Percent No Health Care Coverage by Region 2002-2006**



### Comparisons between Eastern NC and the Rest of the State

There is no regional difference in percentage of people without health care coverage (see Figure 16).

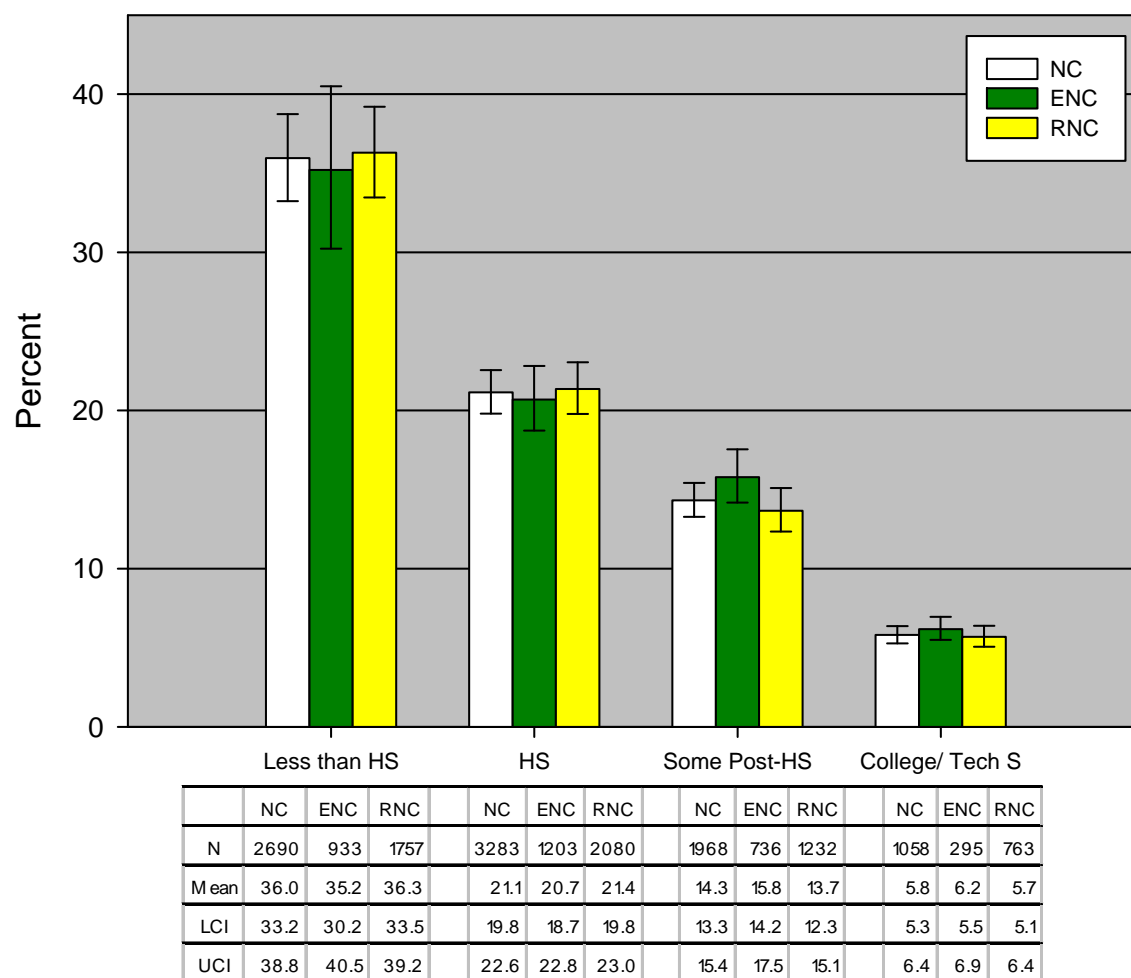
**Figure 17. Percent No Health Care Coverage by Income and Region 2002-2006**



Disparity in health care coverage by income

Percentage of people without health care coverage varies greatly by income. Across the state, a little more than a third of people (34.7%) who are poor (less than \$25,000 annual income per family) have no health care coverage while 8.6% of people whose income is above \$25,000 had no health care coverage (see Figure 17).

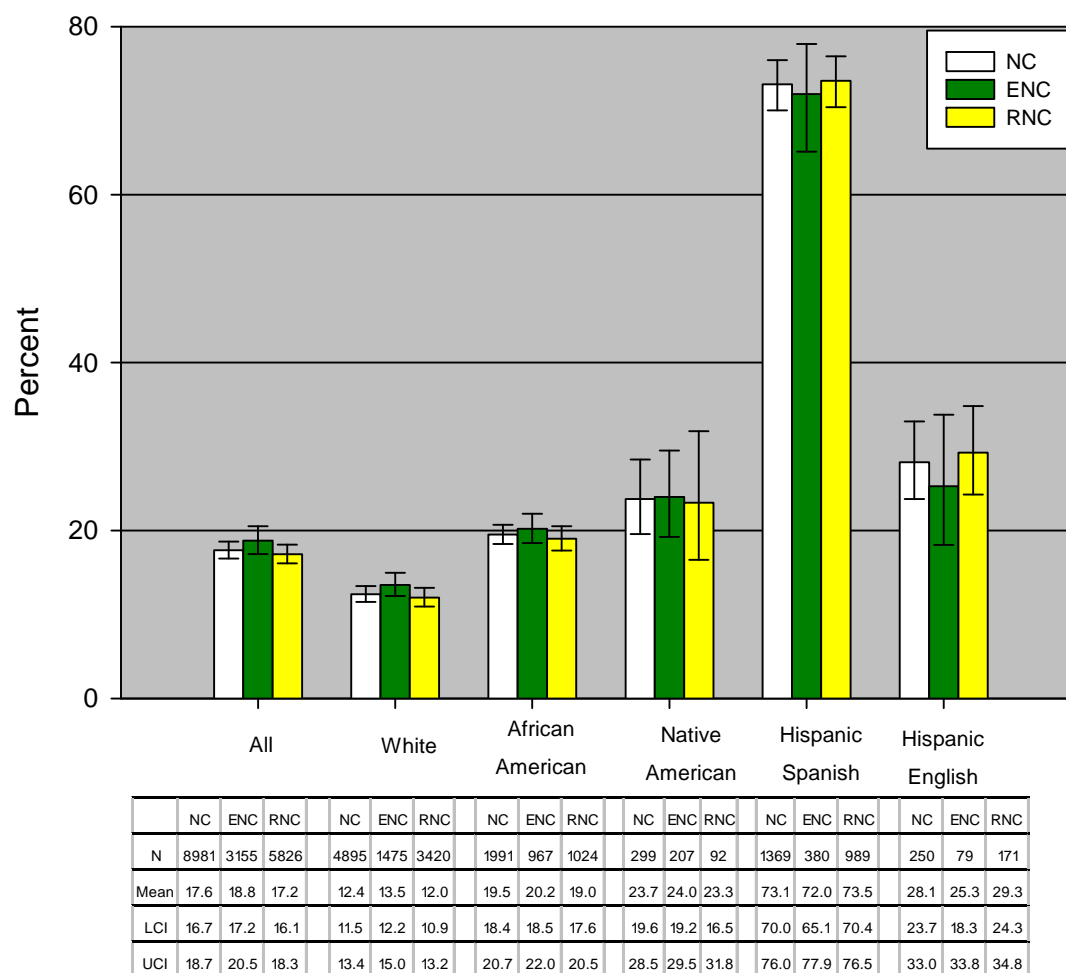
**Figure 18. Percent No Health Care Coverage by Education and Region 2002-2006**



#### Disparity in health care coverage by education

A little more than a third of people (36.0%) without completion of high school have no health care coverage as compared to 21.1% of high school graduates, 14.3% of people with some post high school education and 5.8% of college or technical school graduates (Figure 18).

**Figure 19. Percent No Health Care Coverage by Race/Ethnicity and Region 2002-2006**



#### Disparity in health care coverage in race/ethnicity

There are significant differences in health care coverage by race/ethnicity. In NC more African Americans (19.5%), Native Americans (23.7%) and Hispanics have no health care coverage than Whites (12.4%). Among Hispanics, 73% of those interviewed in Spanish have no health care coverage, while 28% of those interviewed in English have no health care coverage (Figure 19).

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