

# **County-Level Estimates of the Uninsured in North Carolina, 1999-2001**

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**(An update of the 1995-1999 report by J. Ostermann, T. Pendergraft and T. Ricketts)**

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## **County-level estimates of the uninsured in North Carolina for persons under 65 years of age, 1999-2001**

### **Background**

In March 2001, the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill issued a report entitled *County-Level Estimates of the Uninsured in North Carolina, 1995-1999*. That report used data from the US Census Bureau's Current Population Surveys (CPS) and other data sources to estimate the number of persons under the age of 65 years who did not have health insurance in each of North Carolina's 100 counties. This report uses more recent data to update the county-level estimates of the under-65 uninsured in North Carolina to the three-year period, 1999-2001, including gender, age, race, ethnicity, poverty status, educational attainment, and employment characteristics. Because data sources and methodology differ between the two reports, direct comparison of rates from the two time periods should be viewed with caution.

The data used for the estimates of uninsurance are drawn primarily from the US Census Bureau's annual survey of insurance coverage, which reports a statewide rate. In order to make county-level uninsurance estimates, three years of CPS data are pooled and reported in this analysis. The three-year weighted average creates an overall statewide estimate that differs slightly from the CPS estimates for any year during that period.

### **Findings in Brief**

This report provides annual county-level estimates of the number and percentage of people under the age of 65 who lack health insurance for the three-year period, 1999-2001. The model used pooled data from the US Census Bureau's CPS and population characteristics of each of North Carolina's 100 counties to estimate uninsurance. Calculations were made for two subsets of the population: under age 18 years and those 18 to 64 years of age. The county level estimates ranged from a low of 11.79% for Orange County in 2000 to a high of 25.14% for Robeson County in 2001. Along with Orange—Wake, Davie, Transylvania, Dare and Catawba Counties appeared in the top five counties for insured persons under 65 years over the three-year period. Northampton, Duplin, Halifax, Sampson, Greene and Hertford Counties joined Robeson County in the bottom five for insurance coverage at some point between 1999 and 2001.

### **State Level Estimates**

The goal of this study was to develop county-level estimates. The process involved pooling data for three years of CPS statewide surveys and applying those state level estimates to individual county-level data for each of the three years. This procedure adjusts for the specific

characteristics prevailing in each county for each of those years. Summing the county level estimates to a statewide number creates a slightly different overall estimate of the number of uninsured in the state from what is reported in the Census Bureau CPS estimates. Summing the county level estimates yields statewide estimates of the percentage of North Carolinians under 65 years who were uninsured to be 17.54% 1999, 15.55% in 2000, and 17.70% in 2001. Table 1 compares the summed county level estimates with CPS estimates for the three years. Note that the CPS has made several adjustments to its estimates using updated population adjustments.

*Table 1. Comparison of Estimates of Uninsured in North Carolina:  
Cecil G. Sheps Center for Health Services Research and Current Population Survey.*

	Estimate of Uninsured in North Carolina			CPS Estimate
	0-17 years	18-64 years	Total (<65 years)	<65 years
<b>1999</b>	11.38 %	19.91 %	17.54 %	16.2 %
<b>2000</b>	9.33 %	19.41 %	15.55 %	15.3 %*
<b>2001</b>	11.13 %	22.17 %	17.7 %	16.2 %**

\* Statewide rate also estimated at 14.8% with follow-up survey data included, the 15.3% estimate is based on a further adjustment to match 2000 Census results.

\*\* Revised after follow-up survey; the original estimate was 17.3%.

## Data Sources and Assumptions

The 2000 through 2002 Current Population Surveys<sup>1</sup> contained responses from between 2,651 and 3,887 North Carolina residents each year who were under age 65 and not members of the armed forces. The weighted percentage of respondents (18-64 years) lacking health insurance coverage was 20.93 percent in 2000, 17.92 percent in 2001, and 21.2 percent in 2002. The weighted percentage of respondents (<18 years) lacking health insurance coverage was 13.14 percent in 2000, 9.97 percent in 2001, and 11.58 percent in 2002. *Note that each year's survey data refer to the previous calendar year, e.g. 2000 survey data refer to calendar year 1999.*

Like the earlier study, several individual level characteristics were used to quantify the extent to which individual characteristics influence a person's likelihood of having health insurance coverage. The most recent data source was used to update this information, but data sources for some characteristics differed from the earlier report. The selection of variables that are used to make the estimates was limited by the availability of corresponding county-level variables, used to make predictions of the number of uninsured in each county in North Carolina. Demographic characteristics, educational attainment, and income at varying degrees of poverty, as well as

<sup>1</sup> US Census Bureau, [www.census.gov](http://www.census.gov)

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sector of employment and lack of employment, respectively, were included in the model for persons age 18 to 64 (see Table 2). The model for respondents under age 18 included race, ethnicity, and poverty variables (see Table 3).

The data were gathered from several sources:

- The Log Into North Carolina (LINC) database was used to obtain county-level data on the population distribution by age and gender for each county in North Carolina for each of the three years. These data are based on Census Bureau county-level population estimates by age, gender, race, and Hispanic origin.<sup>2</sup>
- Information on educational attainment for this revision was obtained from the 2000 Census.<sup>3</sup> These data reflect educational attainment for the population 25 years and older. These rates have not been adjusted for the 18 and older population, but are assumed to be the same proportion for the 25 and older population.
- Information on the number of individuals in each county with annual incomes at varying percentages of the Federal Poverty Guidelines in 1999 was derived from the 2000 Census.<sup>4</sup> Cut points for percent of poverty level differed from the earlier report. The percentages of the population falling into various poverty and education categories were assumed to have remained constant throughout the 1999-2001 study period.
- Information on unemployment rates and sector of employment were obtained from the Employment Security Commission.<sup>5</sup>

## Methods

Linear probability regression models<sup>6</sup> were used to quantify the extent to which individual characteristics influence a person's likelihood of having health insurance coverage. Two separate models were estimated for respondents under age 18, and those between ages 18 and 64. For respondents over age 65, Medicare coverage was assumed; hence respondents over age 65 were excluded from the analysis. Members of the armed forces were also excluded.

The coefficients derived from the logistic regression were applied to county-level population data. The distribution of the population in each county across the variable categories in Table 2

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<sup>2</sup> Hispanic origin data for 2000 was applied to both 2000 and 2001.

<sup>3</sup> The earlier report used educational attainment data from the Employment Security Commission.

<sup>4</sup> The earlier report used data from a 1996 study on the working poor.

<sup>5</sup> Industry employment sector data was not available for the full 2001 year. Quarter 4 data of 2001 were used and are assumed to be applicable for the full year. Quarter 3 data of 2001 were used for Clay County.

<sup>6</sup> A linear probability model was chosen over logistic regression, because of the non-linearity in predictions associated with the logistic regression. Refer to Appendix I for details.

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was used to identify the characteristics of a (fictive) person who is representative of the entire population in that county. For example, if females age 25-29 represent three percent of a county's population, the representative person was assigned a value for that particular variable of 0.03. Using these values, and the coefficients obtained from the regression model, a probability of being uninsured was calculated for this representative person. The probability of being uninsured was then multiplied with the number of persons under age 65 in that particular county to estimate the total number of uninsured. This process was repeated for every county for each of the three years, and for each of the two population subgroups (0 < 18 years; 18 - 64 years). The estimated total number of uninsured between the ages of 0 and 64 for each county and year was obtained by adding the estimated number of uninsured across the two age groups.

## Results

The results of the regression analyses are displayed in Tables 4, 4a (18 – 64 years) and 5, 5a (0 < 18 years). Males below age 35 appear to be much more likely to be uninsured than females. A preliminary analysis of the effect of race on the probability of being uninsured showed that the distribution of the uninsured by age and gender was very similar for whites and nonwhites, except for a relatively constant additive effect. Therefore, race was used as a unique predictor in the equation and was not interacted with age and gender. The estimating equation included dummy variables for non-whites and Hispanics. Dummy variables for being unemployed and the sector of employment, respectively, appear to be important predictors of insurance coverage, through their role as determinants of the availability of coverage to the individual through the employer. Household income at or near the federal poverty level, less education, being Hispanic or non-white all increased a person's likelihood of lacking health insurance coverage. The annual fixed effects suggest a slight decrease in the uninsured population between 1999 and 2000, and a sharp increase of between 2000 and 2001.

Among respondents under age 18, age and gender did not appear to be significant predictors of insurance coverage. Education and employment variables were not included in the model. Other variables had effects similar to those described above. A significant drop in the number of uninsured occurred between 1999 and 2000, and an increase of nearly identical magnitude between 2000 and 2001.

The projected number of uninsured, as well as the percentage of the population under age 65 estimated to lack insurance coverage in 1999, 2000, and 2001 in each county are displayed in Tables 6.1999 through 6.2001. The estimated number of uninsured persons in North Carolina appears to have decreased between 1999 and 2000 from 17.54 percent to 15.55 percent. The increase in the estimated number of uninsured between 2000 and 2001, from 15.5 percent to 17.7 percent, offsets the earlier decrease. This increase results in an estimated 1.2 million people in North Carolina who lack insurance in 2001.

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The estimates reveal substantial variation across counties in the percentage of the population without insurance. In 2001, the estimated percentage of people under age 65 lacking health insurance ranged from a low of 13.80 percent in Orange County to a high of 25.14 percent for Robeson County. The ranking of counties according to the percentage of the population without coverage (Table 6.1999-2001) for most counties fluctuate slightly over time.

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## Appendix I

A linear probability model was chosen over the commonly used logistic regression model, because of the non-linearity in predictions associated with the latter. The problem is identical to the difference between the probability of the mean and the mean of probabilities. For this particular estimation, the sample mean for lack of insurance was 18.12 percent. For a person with exactly average characteristics, however, the estimated probability of being uninsured was 13.44 percent, significantly understating the actual probability of being uninsured. Applying coefficient estimates from the logistic regression to aggregate county-level data would have a similar effect. For example, in a county with characteristics exactly identical to those of the sample, 13.44 percent of the population would be estimated to lack insurance coverage, while the actual percentage would likely be much closer to the 18.12 percent found in the sample.

A linear probability model ensures that the estimated probability of being uninsured for a person *representative of the entire population* (in this case the CPS sample) is the same as the percentage of individuals in the sample that are uninsured. Stated differently, a fictive person with average age, gender, education, poverty, etc., will have a probability of being uninsured that is identical to the percentage of the sample without insurance. Therefore a linear probability model is conceptually preferred if the estimates are to be applied to aggregate data.

One drawback of linear probability models is that theoretically predictions below 0 percent or above 100 percent are possible. These would be particularly likely for data points near, at, or outside the range of values in the survey sample. This, however, is unlikely in this particular scenario. All variables in the logistic regression are entered as dummy variables with values of *either* 0 or 1. All county characteristics are percentages, i.e., have values *between* 0 and 1. However, to estimate the theoretical maximum and minimum probabilities across counties, the maximum and minimum data points in the entire sample of 100 counties were selected, and used to define the characteristics of two fictional counties, with the maximum and minimum percentage of uninsured, respectively. For the “maximum” county, maximum values were used for variables positively related to lack of insurance, and minimum values for variables negatively related to lack of insurance. The estimated percentage of individuals without insurance coverage for this county was approximately 40 percent. For the “minimum” county, minimum values were used for variables positively related to lack of insurance, and maximum values for variables negatively related to lack of insurance. The estimated percentage of individuals without coverage for this county was approximately 3 percent. Both estimates are well within the 0-1 interval, and appear reasonable, minimizing concerns relating to possibly distorted predictions in counties with very high or low values for predictors of insurance coverage.

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