Mortality Trends in Halifax County, NC

A Resource for Healthy Communities

Health Indicator Series - Report # 2.083
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Center for Health Services Research and Development
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Introduction

Health Indicators Series:
A Resource for Healthy Communities
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Report Series #2: Mortality Trends for Halifax County

Health Indicators is a series of reports describing community health at the state and county level. Health Indicators supplements the Eastern North Carolina Health Care Atlas published by the Center for Health Services Research and Development at East Carolina University. These reports are intended to provide state policy makers, local health departments, hospitals, and community-based health planning groups with a wide range of information useful for diagnosing the health of North Carolina and its local communities, evaluating the effectiveness of existing services, and envisioning and planning new interventions. The reports in this periodically published series can be used in conjunction with the County Health Data Book, produced by the North Carolina Office of Healthy Carolinians, as part of the Community Health Assessment Process. Individual reports in ECU's Health Indicator Series are custom made for the counties of North Carolina. Reports in this series will describe trends in mortality, including premature mortality for all causes of death, true (crude) and age-adjusted mortality for leading causes of death, and measures of rate disparities or inequalities.

Report Series #2 of the series focuses attention on the two overarching goals of Healthy People 2010, the national blueprint for health improvement. The first goal is to increase the span and quality of life and the second is to eliminate health disparities. North Carolina’s companion plan Healthy Carolinians 2010 has also embraced these two goals.

Report Series #2 is a tool to help evaluate how well Halifax County and North Carolina are doing in relation to the goals set forth in Healthy People 2010 and Healthy Carolinians 2010 as well as important differences in life span. Using rate comparisons, this report describes the inequalities between Halifax County and North Carolina, between whites and non-whites, and between males and females. Premature mortality, the focus of Report Series #1, is included in the death from all causes section located at the beginning of this report. The measure used to quantify premature mortality is described in more detail in the Methods and Interpretations section.

This report describes the leading contributors to mortality, provides a geographic context, and examines trends and inequalities over twenty years. The report begins with data highlights, provided as an introduction to the data, rather than a summary of it. Readers are encouraged to draw their own conclusions from the data and pose new questions suggested by what they see. The second section presents overall and five leading contributors to mortality for the state as a whole and by race and gender. Pie charts describe the relative contribution of each of five leading contributors to the overall rate. The charts also provide comparisons to the nation. Making the area of each pie chart equivalent to the rate for the population group conveys the dimension of disparity across population groups. The last section charts recent trends in mortality and disparities in early death and provides projections to the year 2010. These charts place Halifax County health status in a historical context and provide a glimpse into the future.
Data Highlights

**Leading causes of death in Halifax County, 1999-2001**

The five leading causes of death are:
1. Heart Disease
2. Cancer (all sites)
3. Stroke
4. COPD
5. Diabetes

(unless otherwise noted, trends are reliable – $R^2>0.35$)

**Twenty-three year trends in mortality rates:**

- Halifax County’s true mortality rate is above regional and state levels.
- Halifax County’s age-adjusted mortality rate is higher than regional, state and national levels, and has shown a decrease of 13%.
- In a moderately reliable trend, White males have seen the largest decrease in age-adjusted mortality rates, having experienced a 18% decrease over the 23-year time period.
- In a moderately reliable trend, white females experienced an 8% decrease for the same time period.
- Non-white males experienced a decrease of 15%, in a moderately reliable trend.
- The trend for non-white females was not reliable.
- Deaths due to all causes of disease have decreased for both non-whites and whites.
- The trend for racial disparity was not reliable.

**All Causes of Premature Mortality**

- Decreasing by 15%, Halifax County had a lower decrease in its true rate of premature mortality than did the Eastern region and the state.
- A greater decrease in age-adjusted mortality rates was seen by the citizens of Halifax County than the rate of the Eastern region.
- All demographic groups saw decreases in their age-adjusted rates of premature mortality, with the exception of white females. Reliable trends occurred in males, but not in females. Non-white males experienced the largest decrease (34%), followed by white males (29%).
- Racial disparities rose 12% in a moderately reliable trend.
Comparison of county to state rates of age-adjusted mortality by 10 leading contributors in 2001

<table>
<thead>
<tr>
<th>Higher than the state rate</th>
<th>Lower than the state rate</th>
</tr>
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<tbody>
<tr>
<td>Unintentional Motor Vehicle Injuries — 53%</td>
<td>Influenza and Pneumonia — 13%</td>
</tr>
<tr>
<td>Cancer: Colon, Rectum and Anus — 41%</td>
<td>Heart Disease — 10%</td>
</tr>
<tr>
<td>Cancer: Breast — 41%</td>
<td></td>
</tr>
<tr>
<td>Diabetes — 29%</td>
<td></td>
</tr>
<tr>
<td>Cancer: Prostate — 25%</td>
<td></td>
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<tr>
<td>Stroke — 22%</td>
<td></td>
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<tr>
<td>COPD — 5%</td>
<td></td>
</tr>
<tr>
<td>Cancer: Trachea, Bronchus, Lung — 3%</td>
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</tbody>
</table>

Heart Disease

- Halifax County’s true rate of heart disease decreased by 11%, in comparison with state and regional decreases of 27% and 18%, respectively.
- In 1979, Halifax’s true rate of heart disease was 1349% greater than Eastern North Carolina; in 2001, Halifax’s true rate of heart disease was 1670% greater than Eastern North Carolina.
- The county’s age-adjusted rate shows a 33% decrease over the time period, and is decreasing at a faster rate than that of the state and national rates.
- All demographic groups saw decreases in their age-adjusted mortality rates, with white males and white females both showing a decrease of 35%. Non-white females experienced a similar decrease of 32%.
- Although non-white rates were 2% less than white rates in 1979, they have increased to 8% greater than white rates by 2001.
- The trend for racial disparity was not reliable.

Stroke

- Halifax County’s rate of age-adjusted mortality due to stroke was comparable to trends in the region, state, and nation.
- All racial and gender groups saw decreases in their rates of age-adjusted mortality due to stroke; non-white males had the greatest decrease (55%).
- Both non-whites and whites experienced more than a 40% decrease in their age-adjusted stroke mortality rates.
- The trend for racial disparity was not reliable.

Cancer – Trachea, Bronchus, and Lung

- Halifax county’s true mortality rate for TBL cancer changed from 19% lower than the regional rate in 1979 to 9% lower than the regional rate in 2001.
Halifax County’s age-adjusted rate of TBL cancer is lower than that of the state, but exhibits a similar rate of increase, in a moderately reliable trend.
- White (197%) and non-white (523%) females saw large increases in their propensity to die due to TBL cancer, in a reliable trend.
- Disparity between non-white and white has grown significantly, increasing from 2% in 1979 to 17% in 2001.
- The trend in racial disparities in this area is not reliable.

**Chronic Lower Respiratory Disease**

- Halifax County’s true mortality rate due to CLRD has increased 125% over 23 years.
- Halifax County age-adjusted CLRD mortality experienced a lower rate of increase than the region and state, in a reliable trend.
- White females (228%) have seen the largest increase in death rates from COPD using reliable trends. In a moderately reliable trend, non-white females have also seen a dramatic increase (166%) in CLRD related death. Non-white males have also seen a large increase (214%) in the number of deaths from CLRD with a moderately reliable trend. The trend for white males is not reliable.
- The trend for whites and non-whites shows similar death rates, but non-whites have a greater increase (163%) in actual CLRD mortality.
- Racial disparities in CLRD death show a moderately reliable trend of a 87% increase.

**Diabetes Mellitus**

- Halifax County has had a similar rate of true mortality (111%) due of diabetes compared to the regional (178%) and state (142%) increase in the true mortality rate due to diabetes.
- In age-adjusted mortality, however, the trend shows that Halifax County has a smaller increase than the region and state.
- White males have seen a very large rate increase (282%) in their rate of age-adjusted mortality due to diabetes, and white females have seen an increase (66%). The trends for non-white males and non-white females were not reliable.
- In the trend for white age-adjusted mortality due to Diabetes is steadily increasing (123%), but the non-white trend is unreliable.
- The trend in racial disparities in this area is not reliable.

**Unintentional Motor Vehicle Injuries**

- Mortality resulting from unintentional motor vehicle injuries for Halifax County was lower than the state rate in 1979, but is 24% greater than the state rate in 2001.
- White females experienced a 220% increase in unintentional motor vehicle accident mortality, with moderately reliable trends. The trends for all other demographic groups are unreliable.
- The trend in racial disparities is not reliable.
Influenza and Pneumonia

- Neither the trend in true mortality nor that of age-adjusted mortality for Halifax County is reliable.
- A moderately reliable trend for age-adjusted mortality of white males in influenza and pneumonia shows a decrease of 61%.
- Non-white females showed a moderately reliable trend of increasing influenza and pneumonia (147%) during the 23-year time period.
- The trend for racial disparities in influenza and pneumonia was unreliable.

Cancer – Prostate

- Halifax County’s percent increase in true rates of mortality due to prostate cancer was more than twice as great as the state percent increase.
- Halifax County’s true mortality relative to regional true rate increased from 36% in 1979 to 57% in 2001.
- Trends for all demographic and disparity groups were unreliable.

Cancer – Colon, Rectum, and Anus

- In a moderately reliable trend, Halifax County’s percent increase in true rates of mortality due to CRA cancer was almost triple the state percent increase.
- Halifax County’s true mortality relative to region rate increased from 18% in 1979 to 25% in 2001.
- Trends for all demographic and disparity groups were unreliable.

Cancer – Breast

- The trend for Halifax County’s true mortality due to breast cancer is two and a half times greater than the regional rate.
- Halifax County’s crude mortality rate relative to regional rate increased from 8% in 1979 to 46% in 2001.
- Non-white males have seen a 440% increase due to breast cancer, while non-white females experienced a 62% increase; both in moderately reliable trends.
Methods, Interpretation, and References

Methods and Interpretation

Data Sources
The data for mortality and premature mortality in Halifax County were obtained from death certificate data from the North Carolina State Center for Health Statistics and population data from the North Carolina Office of State Planning. For the US, data were obtained from the Compressed Mortality File compiled by the National Center for Health Statistics.

Measures
Two types of mortality measures are covered in this report. The first type is based on the density of deaths per population for a given area over a specified time interval. This type includes the true or “crude” mortality and age-adjusted mortality rates. These mortality rates are typically used in discerning where deaths are occurring and for comparing mortality among areas. The second type of mortality measure is years of life lost before age 75 (YLL-75). The YLL-75 measures include the death density component of both types of mortality rate measures, but they are further weighted by the number of years of life lost before age 75. Like mortality rates, they can either be true (crude) or age-adjusted. These measures provide an indication of the burden of premature mortality in a population or community, much like a count of the number of deaths. In this report the first type of mortality measures—true and age-adjusted rates—are emphasized. Premature mortality (YLL-75) is considered only for general mortality or deaths by all causes. Premature mortality is the focus of report #1.

A simple count of the number of deaths occurring within an area for a given time period is useful for identifying potential problems or issues of public concern--particularly if the deaths result from a rare cause or are deemed an emerging problem for at-risk socio-demographic groups. In this sense, simple count data act as harbingers. Because nothing is known about the underlying population base from which health events arise, the analytical or even political utility of simple count data is limited. The size of the underlying population will have a natural influence on the observed number of health events. The observed influence can be measured as the density of deaths per underlying population. When measured over a given unit of time (usually 1 to 5 years), the density becomes a rate. (The rate is typically multiplied by 100,000 for ease in interpreting the usually small resultant value.) This is the actual observed or true rate for an area and it is an improvement over simple count data because it accounts for the relative size of the underlying population. The size of the underlying population will have a natural influence on the observed number of health events. The observed influence can be measured as the density of deaths per underlying population. When measured over a given unit of time (usually 1 to 5 years), the density becomes a rate. (The rate is typically multiplied by 100,000 for ease in interpreting the usually small resultant value.) This is the actual observed or true rate for an area and it is an improvement over simple count data because it accounts for the relative size of the underlying population. The composition of the population will have additional effects on the number of health events that occur and for the analysis of mortality the most important effect is that of the population’s age structure.

Because aging is the greatest risk for mortality, the age structure (composition) of a population will have an effect on the true mortality rate. For example, two counties may have similar population sizes but one has a larger proportion of people over the age of 45 than the other. It is more likely that the older population will experience more deaths over the course of time, which will be reflected in a higher true mortality rate. Age structure, therefore, has a direct effect on the true mortality rate and in order to make meaningful comparisons, population age structures need to be controlled.
Age-adjustment or controlling for a population’s age structure requires an external reference or standard to weight the comparison populations by age groups. (Currently, the US 2000 Standard Million Population is used in age adjusting populations for comparisons.) The weighting scheme redistributes the age group sizes of the observed population as if it had the same structure as the standard reference population. The standardized age group population is then applied the number of deaths found in the corresponding age group of the observed population to produce an expected number of deaths for that age group. The expected number of deaths are summed and then divided by the weighted total population yielding an age-adjusted death rate. Once age structure is controlled, analysis of the effects of selected diseases on mortality is more tractable and the effects of race and gender can be studied more effectively.

The study of premature mortality focuses on the burden of disease and death in a population. The amount of burden is measured in the accumulated amount of years of life lost (YLL) before a benchmark age. We use 75 years of age as a benchmark because it approximates current life expectancy at birth in the United States and gives weight to deaths from chronic disease occurring in later life. To calculate the number of years lost, the age of each person who dies before age 75 is subtracted from 75 and the lost years are summed. The YLL for each person who dies before age 75 is first aggregated and then the result divided by the population under 75 years of age. Again, the value will be relatively small and so a further multiplication of 10,000 magnifies the number into a more understandable rate. The true YLL for an area, like the true mortality rate, is not readily comparable to other areas but it is useful for assessing community health, evaluating health services, and for health planning. Comparisons are possible when age-adjustment with a standard reference population is used.

Age-adjusted rates for both mortality and premature mortality have little intrinsic meaning, however, and can mask the burden and trends of health events that may be of local importance. A casual inspection of adjusted rates may divert attention from the actual health problems of a population and inappropriately guide interventions or resource allocation. Thus, it is important to consider the actual number of deaths (count data) in conjunction with the true rate first, and then use the adjusted rate only if one wishes to factor out age in understanding the health of a population. All of the statistics presented are for the three-year period (1999 to 2001). A three-year period was used because it provides a useful summary of the mortality experience while minimizing wide year-to-year fluctuations in the rate due to the effect of small numbers.

Interpreting the Pie Charts
Pie charts are provided as a visual representation of the burden of mortality and they also depict the proportion of mortality accounted for by each of the leading contributors. (The leading causes of death are found in the table preceding the pie chart section.) The pie charts compare the relative levels of burden and proportions by region and demographic groups. With the exception of the second pie chart figure, all rates are true (or crude). The area of each pie is based on the true mortality rate for the population over a three-year period (1999-2001), with larger pie charts representing higher true mortality rates. For purposes of presentation, we set a limit on the smallest possible area of a circle and assigned this area to the population with the smallest rate. (This lower limit is based on the age-adjusted rate for white females in North Carolina.) We then scaled up the circles for all other groups proportionately based on their rates.

The first two pie chart figures compare the proportions of leading causes of death across regions at the national, state, and county level. The first figure in this set allows comparisons using true rates, which illustrates the relative burden of disease intrinsic to each region. The second figure, which is age-adjusted, allows for direct comparisons among regions. The following two figures use proportions based on true mortality rates to show the relative burden of disease intrinsic within race/gender groups and within two major racial groups.

While comparing the pie charts, the reader should remember that the slices of the pie show differences in how much of the total true or age-
adjusted mortality rate is accounted for by a specific contributor, not the absolute differences in magnitude of the disease-specific true mortality rate. Finally, the reader will see that some pies are composed of different leading contributors to mortality, so they have different colored slices. The variable sizes of pie slices demonstrate differences in the mortality patterns across populations and are of significant importance in studying inequalities and disparities in population health.

**Interpreting the Trend Figures**

Four different types of figures are created to show trends in mortality by all causes and for each of the leading causes in the county over a twenty-three year period. True and age-adjusted mortality rate trends are shown for deaths by all causes in addition to the ten leading causes of death. Premature mortality is described for deaths by all causes only. The first figure in the trend series illustrates the true mortality rates for the county, region, and state. Here, the magnitude of each region’s mortality pattern for each time interval can be examined. The second figure shows age-adjusted mortality rates for the county, region, state, and nation. In this figure, these geographical entities can be compared directly, because their age structures have been controlled. The third figure compares trends in age-adjusted mortality rates by race and gender. Again, age structure is controlled for each group, which permits observation of the effects of race and gender on these groups. The last figure depicts racial differentials based on true mortality over the twenty-three year time period. True mortality is used here so that the percent differences of the actual number of deaths, or the relative mortality experience for, can be examined for potential disparities. Trend lines provide historical depth to mortality processes as well as a basis for future comparisons and action.

The trend line concept is borrowed from statistical modeling. However, unlike true modeling, we are not assuming the statistical independence of each sequential observation (the rate at time interval x). Instead, our assumption is that each observation is dependent to some degree on previous observations, forming a trend. If the degree of dependence is high, then the observations (rates) should lie close to the trend line. If observations appear to bounce around the fitted line in a random fashion, then there is less dependence and less of a trend in the observations. The purpose of trend lines is to uncover patterns in the data, which will assist the investigator in determining and understanding the underlying processes which generate them.

Mathematically, an equation of the line can be derived from a set of observation points. This line is an estimate of where each observed rate would be if the previous observation could predict with 100% accuracy the value of the next observation. In nature, this situation seldom arises and the degree to which individual observations deviate from this linear trend line is an indication of how well they “fit” or conform to the trend. The linear trend lines in the time series figures project theoretical rates to the year 2010 from historical values (1979 to 2001) to provide a general idea about where mortality trends are heading.

The equation of the line allows the user to calculate an expected or fitted rate—a rate on the trend line—for a given year. The variable “x” in the equation of the line represents the ordinal year in the series. For example, 1990 represents the 11th year in the time series. When the number 11 is substituted for x in the equation describing ENC’s age-adjusted mortality rate for cancer of lung, trachea, and bronchus for the years 1979 to 2001, the calculated fitted rate approaches 63 persons dying per 100,000 people from this disease. The observed age-adjusted rate for 1990 is 69 deaths per 100,000 people. (The observed rates are the values found in the table that runs along the x-axis of the time series chart.) For the year 1990, the expected mortality rate is 63 per 100,000 people compared to the observed rate of 69—an underestimate of six people for that year. Each previous and subsequent year’s difference between the expected and observed rates will vary by a greater or lesser degree. The amount of variation can be measured to determine how well the line fits or models the observed data.
The time series figures include coefficients of determination ($R^2$), to note when the trend lines are significant, and the percent increase or decrease from 1979 to 2001. The coefficients of determination are included in order to show how well the trend lines fit the data. R-square can range from 0 to 1, with higher scores representing a better fit. The trend lines are generally unreliable when $R^2$ is less than 0.11, moderately reliable when $R^2$ is between 0.11 and 0.35, and most reliable when $R^2$ is greater than 0.35. Graphically, data points, data lines, and trend lines are weighted according to their significance. The thinnest, dotted trend lines are for those where $R^2$ is less than 0.11 and should be considered non-significant. The thickest dotted lines are used for trends where the $R^2$ is greater than 35.0. In some cases, the trend lines do not fit the data well (i.e. small $R^2$). In other words, the presentation of a trend line does not necessarily indicate a linear trend in the data line. In some instances a non-linear trend may be present; however, the theoretical basis with which to explore non-linear trends is beyond the scope of this publication. The percent change provides a quantitative measure of the projected rate of change as well as an indication of whether the trend is increasing or decreasing. Percentage increase or decrease is provided on the graphs for trends where $R^2$ is greater than 0.11. The reader should evaluate all available data carefully before drawing conclusions about mortality patterns.

The reader will notice that some data lines in the trend figures fluctuate widely. This fluctuation is due to two main factors. In a small population, the number of deaths may vary widely from year-to-year and lead to large changes in annual mortality and premature mortality rates, a phenomenon known as the effect of small numbers. In addition, because mortality is based on the age of death, any fluctuation in the distribution of deaths across age groups from year-to-year can cause rates to change dramatically. Both the number of deaths and the age of decedents influence trends in mortality.

Each figure, with the exception of the one showing disparity, is accompanied by two comparison tables located in the lower portion of the page. These tables are structured so that the reader can compare the rates derived from the equation of the line (i.e., the fitted rates) among different regions or demographic groups. The 1979 and 2001 tables compare the fitted rates calculated for the beginning and end of the observed time series in terms of percent difference. For example, ENC’s fitted rate for age-adjusted cancer of the lung, trachea, and bronchus in 1979 is 6% less than (LT) Halifax County’s fitted rate. In 2001, ENC’s fitted rate is 6% less than as Halifax County’s fitted rate. The tables permit a quick assessment of trends calculated from observed time series data.

Caveats about the Concepts of Race, Gender, and Geography

We also offer several caveats about the concepts of race, gender, and geography as they apply to the analysis of mortality patterns. While we do intend to bring attention to the stark racial inequalities in mortality across North Carolina, we do not mean to imply that this is a biological phenomenon. Other factors such as differences in socioeconomic status, educational attainment, occupation, and lifestyle probably account for the large racial gaps in mortality rates. Likewise, gender inequalities may have less to do with biological differences between men and women than with socially structured gender roles, health behaviors, occupational exposures, and use of health services. Finally, it is important to consider that county borders may not always be the most appropriate way to look at specific health problems. Few of our health care problems begin or end at political boundary lines and many of our health problems in North Carolina are common to large groups of counties. Counties are convenient units of data collection and readers should not jump to conclusions about health problems or possible solutions based solely on the way data appear when aggregated to this level. In some cases, data at multi-county, zip code, or minor civil division levels are a better way to understand problems and solutions. Similarly, as indicated in Healthy Carolinians 2010, consideration needs to be given to whether or not a county is characterized as rural or urban, as this can be an indication to the level of development and amount of resources available in a county.
References


Leading Causes of Death in Halifax County, NC
Figure 1. Leading causes of death for the United States, North Carolina, Eastern North Carolina, and Halifax County, (1999-2001). True Mortality rate per 100,000 population.

Pie charts are proportionally scaled using the state age-adjusted mortality rate of white-females (718 deaths / 100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.

- Halifax rate is 31% higher than NC rate.
- Halifax rate is 37% higher than US rate.
- Halifax rate is 26% higher than ENC rate.
Figure 2. Leading causes of death for the United States, North Carolina, Eastern North Carolina, and Halifax County, (1999-2001). Age-Adjusted Mortality rate per 100,000 population.

<table>
<thead>
<tr>
<th>United States</th>
<th>North Carolina</th>
<th>Eastern North Carolina</th>
<th>Halifax County</th>
</tr>
</thead>
<tbody>
<tr>
<td>855 deaths/100,000</td>
<td>908 deaths/100,000</td>
<td>988 deaths/100,000</td>
<td>1045 deaths/100,000</td>
</tr>
</tbody>
</table>

Pie charts are proportionally scaled using the state age-adjusted mortality rate of white-females (718 deaths / 100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.

NC rate is 6% higher than US
ENC rate is 9% higher than NC rate. Halifax rate is 6% higher than ENC rate.

Halifax rate is 15% higher than NC rate.
Halifax rate is 22% higher than US rate.
Figure 3: Leading causes of death for Halifax County by race and gender, (1999-2001). True Mortality rate per 100,000 population.

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Total Deaths</th>
<th>Percentage of Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-White Males</td>
<td>1034</td>
<td>27%</td>
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<tr>
<td>White Males</td>
<td>1416</td>
<td>30%</td>
</tr>
<tr>
<td>Non-White Females</td>
<td>931</td>
<td>26%</td>
</tr>
<tr>
<td>White Females</td>
<td>1383</td>
<td>32%</td>
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</tbody>
</table>

Pie charts are proportionally scaled using the state age-adjusted mortality rate of white-females (718 deaths / 100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 3a: Leading causes of death for Halifax County by race and gender, (1999-2001). Age-Adjusted Mortality rate per 100,000 population.

The Non-White Male rate is 11% higher than the White Male rate, and 54% higher than Non-White Female rate.

<table>
<thead>
<tr>
<th>Category</th>
<th>Race</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Disease</td>
<td>Non-White Males</td>
<td>35%</td>
</tr>
<tr>
<td>Cancer</td>
<td>Non-White Males</td>
<td>27%</td>
</tr>
<tr>
<td>Stroke</td>
<td>Non-White Males</td>
<td>25%</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>Non-White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>Non-White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Motor Vehicle Injuries</td>
<td>Non-White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Influenza and Pneumonia</td>
<td>Non-White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Nephritis</td>
<td>Non-White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Essential Hypertension</td>
<td>Non-White Males</td>
<td>30%</td>
</tr>
<tr>
<td>All Other Deaths</td>
<td>Non-White Males</td>
<td>30%</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>White Males</td>
<td>30%</td>
</tr>
<tr>
<td>Cancer</td>
<td>White Males</td>
<td>30%</td>
</tr>
<tr>
<td>Stroke</td>
<td>White Males</td>
<td>24%</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>White Males</td>
<td>7%</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Motor Vehicle Injuries</td>
<td>White Males</td>
<td>5%</td>
</tr>
<tr>
<td>Influenza and Pneumonia</td>
<td>White Males</td>
<td>6%</td>
</tr>
<tr>
<td>Nephritis</td>
<td>White Males</td>
<td>6%</td>
</tr>
<tr>
<td>Essential Hypertension</td>
<td>White Males</td>
<td>10%</td>
</tr>
<tr>
<td>All Other Deaths</td>
<td>White Males</td>
<td>17%</td>
</tr>
</tbody>
</table>

The Non-White Female rate is 35% lower than the Non-White Male rate, and 3% higher than the White Female rate.

<table>
<thead>
<tr>
<th>Category</th>
<th>Race</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Disease</td>
<td>Non-White Females</td>
<td>33%</td>
</tr>
<tr>
<td>Cancer</td>
<td>Non-White Females</td>
<td>26%</td>
</tr>
<tr>
<td>Stroke</td>
<td>Non-White Females</td>
<td>19%</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>Non-White Females</td>
<td>11%</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>Non-White Females</td>
<td>19%</td>
</tr>
<tr>
<td>Motor Vehicle Injuries</td>
<td>Non-White Females</td>
<td>11%</td>
</tr>
<tr>
<td>Influenza and Pneumonia</td>
<td>Non-White Females</td>
<td>11%</td>
</tr>
<tr>
<td>Nephritis</td>
<td>Non-White Females</td>
<td>11%</td>
</tr>
<tr>
<td>Essential Hypertension</td>
<td>Non-White Females</td>
<td>11%</td>
</tr>
<tr>
<td>All Other Deaths</td>
<td>Non-White Females</td>
<td>11%</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>White Females</td>
<td>31%</td>
</tr>
<tr>
<td>Cancer</td>
<td>White Females</td>
<td>32%</td>
</tr>
<tr>
<td>Stroke</td>
<td>White Females</td>
<td>17%</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>White Females</td>
<td>6%</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>White Females</td>
<td>6%</td>
</tr>
<tr>
<td>Motor Vehicle Injuries</td>
<td>White Females</td>
<td>6%</td>
</tr>
<tr>
<td>Influenza and Pneumonia</td>
<td>White Females</td>
<td>6%</td>
</tr>
<tr>
<td>Nephritis</td>
<td>White Females</td>
<td>6%</td>
</tr>
<tr>
<td>Essential Hypertension</td>
<td>White Females</td>
<td>6%</td>
</tr>
<tr>
<td>All Other Deaths</td>
<td>White Females</td>
<td>6%</td>
</tr>
</tbody>
</table>

Pie charts are proportionally scaled using the state age-adjusted mortality rate of white-females (718 deaths / 100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 4: Leading causes of death for Halifax County by race (1999-2001). True Mortality rate per 100,000 population.

<table>
<thead>
<tr>
<th>Race</th>
<th>Heart Disease</th>
<th>Cancer</th>
<th>Stroke</th>
<th>Chronic Lower Respiratory Diseases</th>
<th>Diabetes Mellitus</th>
<th>Motor Vehicle Injuries</th>
<th>All other deaths</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Whites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>980 deaths</td>
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<tr>
<td>Whites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1399 deaths</td>
</tr>
</tbody>
</table>

Pie charts are proportionally scaled using the state age-adjusted mortality rate of white-females (718 deaths / 100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 4a: Leading causes of death for Halifax County by race (1999-2001). Age-Adjusted Mortality rate per 100,000 population.

Non-Whites
- Heart Disease: 34%
- Cancer: 27%
- Stroke: 8%
- Chronic Lower Respiratory Diseases: 22%
- Diabetes Mellitus: 8%
- Motor Vehicle Injuries: 3%
- All other deaths: 8%

1099 deaths/100,000

Whites
- Heart Disease: 30%
- Cancer: 33%
- Stroke: 20%
- Chronic Lower Respiratory Diseases: 8%
- Diabetes Mellitus: 8%
- Motor Vehicle Injuries: 3%
- All other deaths: 8%

975 deaths/100,000

The Non-White rate is 13% higher than the White rate.

Pie charts are proportionally scaled using the state age-adjusted mortality rate of white-females (718 deaths / 100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 5. Population Pyramid for Halifax County, 2000.
(Total 57,370; M-27,284; F-30,086)
Table 1. Leading contributors to mortality in Halifax County by race and gender, 1999-2001.

<table>
<thead>
<tr>
<th>Race by Gender</th>
<th>Non-White Males</th>
<th>White Males</th>
<th>Non-White Females</th>
<th>White Females</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>Heart Disease</td>
<td>Heart Disease</td>
<td>Heart Disease</td>
<td>Heart Disease</td>
</tr>
<tr>
<td>2nd</td>
<td>Cancer (all sites)</td>
<td>Cancer (all sites)</td>
<td>Cancer (all sites)</td>
<td>Cancer (all sites)</td>
</tr>
<tr>
<td>3rd</td>
<td>Stroke</td>
<td>Stroke</td>
<td>Stroke</td>
<td>Stroke</td>
</tr>
<tr>
<td>4th</td>
<td>Motor Vehicle Injuries</td>
<td>Diabetes Mellitus</td>
<td>Diabetes Mellitus</td>
<td>COPD and allied conditions</td>
</tr>
<tr>
<td>5th (Tie)</td>
<td>COPD and allied conditions</td>
<td>COPD and allied conditions</td>
<td>COPD and allied conditions</td>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>5th (Tie)</td>
<td></td>
<td></td>
<td></td>
<td>Influenza and Pneumonia</td>
</tr>
<tr>
<td>5th (Tie)</td>
<td></td>
<td></td>
<td></td>
<td>Nephritis</td>
</tr>
<tr>
<td>5th (Tie)</td>
<td></td>
<td></td>
<td></td>
<td>Essential Hypertension</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>Non-White</th>
<th>White</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>Heart Disease</td>
<td>Heart Disease</td>
</tr>
<tr>
<td>2nd</td>
<td>Cancer (all sites)</td>
<td>Cancer (all sites)</td>
</tr>
<tr>
<td>3rd</td>
<td>Stroke</td>
<td>Stroke</td>
</tr>
<tr>
<td>4th</td>
<td>Motor Vehicle Injuries</td>
<td>COPD and allied conditions</td>
</tr>
<tr>
<td>5th (Tie)</td>
<td>COPD and allied conditions</td>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>5th (Tie)</td>
<td>Diabetes Mellitus</td>
<td></td>
</tr>
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</table>
Ten Leading Causes of Death

Heart Disease

Stroke

Cancer — Trachea, Bronchus, and Lung

Chronic Lower Respiratory Diseases

Diabetes Mellitus

Unintentional Motor Vehicle Injuries

Influenza and Pneumonia

Cancer — Prostate

Cancer — Colon, Rectum, and Anus

Cancer — Breast
All Causes of Death
Figure 6. All Causes of Death: Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

Halifax 12% increase  ENC 15% increase  NC 11% increase

\[ R^2 = 0.51 \quad y = 5.71x + 1068 \]

\[ R^2 = 0.89 \quad y = 5.42x + 808 \]

\[ R^2 = 0.72 \quad y = 4.06x + 816 \]
Figure 7. All Causes of Death:
Trends in age-adjusted mortality rates by county, region, state and nation,
1979-2001 with projections to 2010

Halifax 13% decrease
ENC 14% decrease
NC 13% decrease
US 14% decrease

\[ R^2 = 0.62 \]
\[ y = -6.97x + 1224 \]

\[ R^2 = 0.88 \]
\[ y = -6.91x + 1145 \]

\[ R^2 = 0.90 \]
\[ y = -6.49x + 1058 \]

\[ R^2 = 0.94 \]
\[ y = -7.39x + 1032 \]
Figure 8. All Causes of Death: Trends in age-adjusted mortality rates by race and gender, 1979-2001 with projections to 2010

- NWM: 15% decrease, $R^2 = 0.23$, $y = -12.37x + 1861$
- WM: 18% decrease, $R^2 = 0.33$, $y = -12.42x + 1512$
- NWF: 6% decrease, $R^2 = 0.03$, $y = -2.64x + 977$
- WF: 8% decrease, $R^2 = 0.19$, $y = -3.15x + 843$

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th></th>
<th>NWM</th>
<th>WM</th>
<th>NWF</th>
<th>WF</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>19%</td>
<td>48%</td>
<td>55%</td>
<td>NWM</td>
</tr>
<tr>
<td>23%</td>
<td>35%</td>
<td>44%</td>
<td>WM</td>
<td></td>
</tr>
<tr>
<td>90%</td>
<td>90%</td>
<td>55%</td>
<td>NWF</td>
<td></td>
</tr>
<tr>
<td>121%</td>
<td>121%</td>
<td>16%</td>
<td>WF</td>
<td></td>
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</tbody>
</table>

Comparison of Fitted Rates in 2001

<table>
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<th>NWF</th>
<th>WF</th>
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</thead>
<tbody>
<tr>
<td>22%</td>
<td>22%</td>
<td>42%</td>
<td>51%</td>
<td>NWM</td>
</tr>
<tr>
<td>28%</td>
<td>26%</td>
<td>38%</td>
<td>WM</td>
<td></td>
</tr>
<tr>
<td>73%</td>
<td>73%</td>
<td>16%</td>
<td>NWF</td>
<td></td>
</tr>
<tr>
<td>105%</td>
<td>105%</td>
<td>19%</td>
<td>WF</td>
<td></td>
</tr>
</tbody>
</table>

Halifax County
Figure 9. All Causes of Death:
Trends in age-adjusted mortality rates by race,
1979-2001 with projections to 2010

NW
13% decrease
$R^2 = 0.34$
$y = -8.12x + 1363$

W
14% decrease
$R^2 = 0.50$
$y = -7.13x + 1110$

1979 Non-white rate is 23% greater than White
2001 Non-white rate is 24% greater than White

Age-adjusted mortality rate per 100,000 population
Figure 10. All Causes of Death: Disparity in mortality rates by race, 1979-2001 with projections to 2010

Race
0% increase
$R^2 = 0.00$
y = 0.00x + 24
All Causes of Premature Mortality
Figure 11. All Causes of Premature Mortality: Trends in premature mortality rates by county, region, and state, 1979-2001 with projections to 2010

Halifax 15% decrease  
$R^2 = 0.20$  
y = -9.83x + 1448

ENC 17% decrease  
$R^2 = 0.85$  
y = -8.86x + 1176

NC 19% decrease  
$R^2 = 0.86$  
y = -9.42x + 1080

1979 Halifax is 23% greater than ENC  
2001 Halifax is 25% greater than ENC
Figure 12. All Causes of Premature Mortality:
Trends in age-adjusted premature mortality rates by county, region, state, and nation, 1979-2001 with projections to 2010

Halifax
ENC
NC
US

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th></th>
<th>Halifax</th>
<th>ENC</th>
<th>NC</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21% LT</td>
<td>28% LT</td>
<td>32% LT</td>
<td>24% LT</td>
</tr>
<tr>
<td>27% GT</td>
<td>8% LT</td>
<td>14% LT</td>
<td>ENC</td>
<td>NC</td>
</tr>
<tr>
<td>38% GT</td>
<td>6% LT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47% GT</td>
<td>16% GT</td>
<td>6% GT</td>
<td>US</td>
<td></td>
</tr>
</tbody>
</table>
Figure 13. All Causes of Premature Mortality:
Trends in age-adjusted premature mortality rates by race and gender,
1979-2001 with projections to 2010

NWM 34% decrease  WM 29% decrease  NWF 8% decrease  WF 13% increase
\[ R^2 = 0.48 \]  \[ y = -45.18x + 2944 \]
\[ R^2 = 0.40 \]  \[ y = -19.36x + 1473 \]
\[ R^2 = 0.02 \]  \[ y = -4.10x + 1197 \]
\[ R^2 = 0.04 \]  \[ y = 3.65x + 611 \]
Figure 14. All Causes of Premature Mortality: Trends in age-adjusted premature mortality rates by race, 1979-2001 with projections to 2010

NW 26% decrease  W 16% decrease
R² = 0.38  R² = 0.19
y = -23.56x + 2007  y = -7.23x + 1023

1979 Non-white rate is 96% greater than White
2001 Non-white rate is 72% greater than White
Figure 15. All Causes of Premature Mortality: Disparity in premature mortality rates by race, 1979-2001 with projections to 2010

Halifax
29% decrease
$R^2 = 0.12$
y = -1.30x + 100
Heart Disease
Figure 16. Heart Disease:
Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

Halifax 382 381 427 356 428 437 414 417 402 392 345 423 380 402 363 393 419 391 390 362 338 331 368
ENC 28 31 28 24 29 26 26 24 29 27 23 22 22 23 21 23 20 20 22 21 22 20 21 22 20 21 22 20
NC 26 27 25 23 24 23 23 23 24 25 24 22 20 20 21 20 22 20 21 22 22 20 21 22 22 21

Actual Deaths

<table>
<thead>
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<th>NC</th>
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Comparison of Fitted Rates in 1979

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<th>NC</th>
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<tr>
<td>93% LT</td>
<td>12% GT</td>
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</tr>
<tr>
<td>1349% GT</td>
<td>18% decrease</td>
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</table>

Comparison of Fitted Rates in 2001

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<tr>
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<th>NC</th>
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<tbody>
<tr>
<td>94% LT</td>
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</tr>
<tr>
<td>1696% GT</td>
<td>1% GT</td>
<td>NC</td>
</tr>
</tbody>
</table>

Halifax County

Center for Health Services Research and Development, ECU
Figure 17. Heart Disease:
Trends in age-adjusted mortality rates by county, region, state, and nation, 1979-2001 with projections to 2010

Halifax 33% decrease
R² = 0.79
y = -7.34x + 483

ENC 35% decrease
R² = 0.75
y = -0.54x + 34

NC 29% decrease
R² = 0.75
y = -0.38x + 29

US 22% decrease
R² = 0.69
y = -0.27x + 24

1979 Halifax is 1330% greater than ENC
2001 Halifax is 1372% greater than ENC
Figure 18. Heart Disease: Trends in age-adjusted mortality rates by race and gender, 1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th>Race</th>
<th>5% GT</th>
<th>38% LT</th>
<th>39% LT</th>
<th>7% LT</th>
<th>43% LT</th>
<th>46% LT</th>
<th>8% GT</th>
<th>38% LT</th>
<th>42% LT</th>
<th>75% GT</th>
<th>62% GT</th>
<th>6% LT</th>
<th>75% GT</th>
<th>72% GT</th>
<th>6% GT</th>
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<tbody>
<tr>
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<td>64% GT</td>
<td>69% GT</td>
<td>1% LT</td>
<td>NWM</td>
<td>WM</td>
<td>NWF</td>
<td>WF</td>
<td>NWF</td>
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<td>WM</td>
<td>NWF</td>
<td>WF</td>
<td>NWF</td>
<td>WM</td>
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</table>

Comparison of Fitted Rates in 2001

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<tr>
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<th>5% GT</th>
<th>38% LT</th>
<th>39% LT</th>
<th>7% LT</th>
<th>43% LT</th>
<th>46% LT</th>
<th>8% GT</th>
<th>38% LT</th>
<th>42% LT</th>
<th>75% GT</th>
<th>62% GT</th>
<th>6% LT</th>
<th>75% GT</th>
<th>72% GT</th>
<th>6% GT</th>
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</thead>
<tbody>
<tr>
<td>NWM</td>
<td>64% GT</td>
<td>69% GT</td>
<td>1% LT</td>
<td>NWF</td>
<td>WF</td>
<td>NWF</td>
<td>WM</td>
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<td>WM</td>
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<td>WM</td>
<td>NWF</td>
<td>WF</td>
<td>NWF</td>
<td>WM</td>
</tr>
</tbody>
</table>
Figure 19. Heart Disease:
Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

NW 30% decrease
$R^2 = 0.44$
y = -6.59x + 476

W 37% decrease
$R^2 = 0.75$
y = -8.10x + 485

1979 Non-white rate is 2% less than White
2001 Non-white rate is 8% greater than White
Figure 20. Heart Disease: Disparity in mortality rates by race 1979-2001 with projections to 2010

Halifax
275% increase
$R^2 = 0.05$
y = 0.58x - 5
Stroke
Figure 21. Stroke:
Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

Halifax 19% decrease ENC 15% decrease NC 12% decrease
R² = 0.26  R² = 0.53  R² = 0.46
y = -1.05x + 120  y = -0.56x + 81  y = -0.41x + 77

1979 Halifax is 48% greater than ENC
2001 Halifax is 41% greater than ENC

Actual Deaths
| County | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 00  | 01  | 02  | 03  | 04  | 05  | 06  | 07  | 08  | 09  | 10 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Halifax| 114 | 111 | 116 | 116 | 122 | 114 | 115 | 115 | 118 | 121 | 110 | 112 | 112 | 89  | 112 | 112 | 89  | 113 | 82  | 107 | 100 | 85  | 103 | 81  | 87  | 82  | 77  | 76  | 79  | 73  | 74  | 78  | 74  | 69  | 69  | 68  | 67  | 75  | 74  | 73  | 71  | 74  | 74  | 72  | 66  |
| ENC    | 81  | 87  | 83  | 82  | 77  | 76  | 79  | 73  | 74  | 78  | 73  | 69  | 69  | 68  | 67  | 75  | 74  | 73  | 71  | 74  | 74  | 72  | 66  | 81  | 81  | 79  | 76  | 75  | 73  | 74  | 71  | 71  | 74  | 70  | 67  | 68  | 67  | 69  | 73  | 72  | 73  | 70  | 72  | 73  | 70  | 66  |
| NC     | 81  | 81  | 79  | 76  | 75  | 73  | 74  | 71  | 71  | 74  | 70  | 67  | 68  | 67  | 69  | 73  | 72  | 73  | 70  | 72  | 73  | 70  | 66  | 81  | 81  | 79  | 76  | 75  | 73  | 74  | 71  | 71  | 74  | 70  | 67  | 68  | 69  | 73  | 72  | 73  | 70  | 72  | 73  | 70  | 66  |

Comparison of Fitted Rates in 1979
<table>
<thead>
<tr>
<th>Halifax</th>
<th>ENC</th>
<th>NC</th>
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<tbody>
<tr>
<td>48% GT</td>
<td>36% LT</td>
<td>33% LT</td>
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Comparison of Fitted Rates in 2001
<table>
<thead>
<tr>
<th>Halifax</th>
<th>ENC</th>
<th>NC</th>
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<tbody>
<tr>
<td>43% GT</td>
<td>5% GT</td>
<td>56% GT</td>
</tr>
</tbody>
</table>

Halifax County
Figure 22. Stroke:
Trends in age-adjusted mortality rates by county, region, state, and nation,
1979-2001 with projections to 2010

Halifax 42% decrease
R² = 0.67
y = -2.76x + 144

ENC 43% decrease
R² = 0.91
y = -2.59x + 131

NC 40% decrease
R² = 0.89
y = -2.03x + 113

US 39% decrease
R² = 0.88
y = -1.87x + 92

1979 Halifax is 10% greater than ENC
2001 Halifax is 13% greater than ENC

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th></th>
<th>Halifax</th>
<th>ENC</th>
<th>NC</th>
<th>US</th>
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<tbody>
<tr>
<td>10% GT</td>
<td>9% LT</td>
<td>22% LT</td>
<td>36% LT</td>
<td>Halifax</td>
</tr>
<tr>
<td>27% GT</td>
<td>16% GT</td>
<td>19% LT</td>
<td>ENC</td>
<td></td>
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<tr>
<td>57% GT</td>
<td>42% GT</td>
<td>23% GT</td>
<td>US</td>
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Comparison of Fitted Rates in 2001

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<th>Halifax</th>
<th>ENC</th>
<th>NC</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>11% LT</td>
<td>11% LT</td>
<td>18% LT</td>
<td>39% LT</td>
<td>Halifax</td>
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<td>13% GT</td>
<td>13% GT</td>
<td>8% LT</td>
<td>31% LT</td>
<td>ENC</td>
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<tr>
<td>64% GT</td>
<td>64% GT</td>
<td>46% GT</td>
<td>34% GT</td>
<td>US</td>
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Figure 23. Stroke:
Trends in age-adjusted mortality rates by gender and race, 1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th>Race</th>
<th>NWM</th>
<th>WM</th>
<th>NWF</th>
<th>WF</th>
</tr>
</thead>
<tbody>
<tr>
<td>52%</td>
<td>34%</td>
<td>37%</td>
<td>51%</td>
<td>NWM</td>
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<tr>
<td>58%</td>
<td>4%</td>
<td>26%</td>
<td>WM</td>
<td></td>
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<tr>
<td>105%</td>
<td>35%</td>
<td>29%</td>
<td>NWF</td>
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Comparison of Fitted Rates in 2001

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<thead>
<tr>
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<th>NWM</th>
<th>WM</th>
<th>NWF</th>
<th>WF</th>
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</thead>
<tbody>
<tr>
<td>52%</td>
<td>11%</td>
<td>7%</td>
<td>28%</td>
<td>WM</td>
</tr>
<tr>
<td>58%</td>
<td>5%</td>
<td>33%</td>
<td>NWF</td>
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</tr>
<tr>
<td>105%</td>
<td>56%</td>
<td>39%</td>
<td>48%</td>
<td>WF</td>
</tr>
</tbody>
</table>

NWM: 55% decrease, $R^2 = 0.43$
y = -5.59x + 223

WM: 39% decrease, $R^2 = 0.29$
y = -2.63x + 147

NWF: 33% decrease, $R^2 = 0.16$
y = -2.09x + 141

WF: 41% decrease, $R^2 = 0.36$
y = -2.04x + 109
Figure 24. Stroke: Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

1979 Non-white rate is 41% greater than White
2001 Non-white rate is 35% greater than White

NW 45% decrease
$R^2 = 0.45$
y = -3.56x + 175

W 42% decrease
$R^2 = 0.47$
y = -2.37x + 124
Figure 25. Stroke: Disparity in mortality rates by race, 1979-2001 with projections to 2010.
Cancer -
Trachea, Bronchus, and Lung
Figure 26. Cancer - Trachea, Bronchus, and Lung:
Trends in mortality rates by county, region, and state,
1979-2001 with projections to 2010

Halifax 49% increase  
\( R^2 = 0.34 \)  
\( y = 1.12x + 50 \)

ENC 62% increase  
\( R^2 = 0.86 \)  
\( y = 1.19x + 42 \)

NC 56% increase  
\( R^2 = 0.83 \)  
\( y = 1.07x + 42 \)

1979 Halifax is 19% greater than ENC
2001 Halifax is 9% greater than ENC

Halifax County
Figure 27. Cancer - Trachea, Bronchus, and Lung:
Trends in age-adjusted mortality rates by county, region, and state,
1979-2001 with projections to 2010

Halifax
ENC
NC

1979 Halifax is 6% less than ENC
2001 Halifax is 6% less than ENC

Comparison of Fitted Rates in 1979
Halifax: 6% GT
ENC: 4% LT
NC: 4% GT

Comparison of Fitted Rates in 2001
Halifax: 6% GT
ENC: 3% LT
NC: 3% GT

Halifax: 34% increase
R² = 0.22
y = 0.77x + 50

ENC: 34% increase
R² = 0.68
y = 0.83x + 53

NC: 35% increase
R² = 0.71
y = 0.77x + 48

Halifax County
Center for Health Services Research and Development, ECU

Age-adjusted mortality rate per 100,000 population
Figure 28. Cancer - Trachea, Bronchus, and Lung: Trends in age-adjusted mortality rates by race and gender, 1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th>Race</th>
<th>1% Increase</th>
<th>2% Increase</th>
<th>523% Increase</th>
<th>197% Increase</th>
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<tbody>
<tr>
<td>NWM</td>
<td>R² = 0.00</td>
<td>y = 0.03x + 110</td>
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<tr>
<td>WM</td>
<td>R² = 0.00</td>
<td>y = 0.11x + 98</td>
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</tr>
<tr>
<td>NWF</td>
<td>R² = 0.38</td>
<td>y = 1.08x + 5</td>
<td>R² = 0.42</td>
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<tr>
<td>WF</td>
<td>R² = 0.42</td>
<td>y = 1.52x + 17</td>
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Comparison of Fitted Rates in 2001

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<th>Race</th>
<th>9% LT</th>
<th>74% LT</th>
<th>54% LT</th>
<th>10% GT</th>
<th>72% LT</th>
<th>50% LT</th>
<th>291% GT</th>
<th>255% GT</th>
<th>78% GT</th>
<th>119% GT</th>
<th>99% GT</th>
<th>44% LT</th>
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<td>11%</td>
<td>96%</td>
<td>85%</td>
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</tr>
<tr>
<td>WM</td>
<td>12%</td>
<td>95%</td>
<td>83%</td>
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<tr>
<td>NWF</td>
<td>2323%</td>
<td>2059%</td>
<td>274%</td>
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<tr>
<td>WF</td>
<td>547%</td>
<td>476%</td>
<td>73%</td>
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</table>
Figure 29. Cancer - Trachea, Bronchus, and Lung:
Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

NW 20% increase
$R^2 = 0.04$
y = 0.45x + 50

W 47% increase
$R^2 = 0.19$
y = 1.05x + 49

1979 Non-white rate is 2% greater than White
2001 Non-white rate is 17% less than White
Figure 30. Cancer - Trachea, Bronchus, and Lung: Disparity in mortality rates by race, 1979-2001 with projections to 2010

Halifax County

836% decrease

$R^2 = 0.04$

$y = -1.52x + 4$
Chronic Lower Respiratory Disease
Figure 31. Chronic Lower Respiratory Disease: 
Trends in mortality rates by county, region, and state, 
1979-2001 with projections to 2010

Halifax 125% increase 
$R^2 = 0.49$
$y = 1.36x + 24$

ENC 180% increase 
$R^2 = 0.96$
$y = 1.31x + 16$

NC 154% increase 
$R^2 = 0.96$
$y = 1.26x + 18$

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th>County</th>
<th>ENC</th>
<th>NC</th>
</tr>
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<tbody>
<tr>
<td>33% LT</td>
<td>25% LT</td>
<td>Halifax</td>
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Comparison of Fitted Rates in 2001

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<thead>
<tr>
<th>County</th>
<th>ENC</th>
<th>NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>17% LT</td>
<td>15% LT</td>
<td>Halifax</td>
</tr>
</tbody>
</table>

Halifax County
Figure 32. Chronic Lower Respiratory Disease: Trends in age-adjusted mortality rates by county, region, state, and nation, 1979-2001 with projections to 2010

Halifax 80% increase  ENC 111% increase  NC 101% increase  US 58% increase
$R^2 = 0.34$  
$y = 0.98x + 27$  

Halifax 17% greater than ENC  ENC 0%  NC 5% LT  US 8% GT
Figure 33. Chronic Lower Respiratory Disease: Trends in age-adjusted mortality rates by race and gender 1979-2001 with projections to 2010

- NWM: 214% increase, $R^2 = 0.21$, $y = 2.63x + 27$
- WM: 6% decrease, $R^2 = 0.00$, $y = -0.20x + 72$
- NWF: 166% increase, $R^2 = 0.11$, $y = 0.64x + 8$
- WF: 228% increase, $R^2 = 0.44$, $y = 1.35x + 13$

Comparison of Fitted Rates:

<table>
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<tr>
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<th>WM</th>
<th>NWF</th>
<th>WF</th>
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</thead>
<tbody>
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<td>167% GT</td>
<td>69% LT</td>
<td>52% LT</td>
<td>63% LT</td>
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<td>2001</td>
<td>219% GT</td>
<td>751% GT</td>
<td>54% GT</td>
<td>108% GT</td>
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Comparison of Fitted Rates in 2001:

<table>
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<tr>
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<th>WM</th>
<th>NWF</th>
<th>WF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>20% LT</td>
<td>73% LT</td>
<td>50% LT</td>
<td>26% GT</td>
</tr>
<tr>
<td>2010</td>
<td>276% GT</td>
<td>200% GT</td>
<td>89% GT</td>
<td>99% GT</td>
</tr>
<tr>
<td></td>
<td>454% GT</td>
<td>35% LT</td>
<td>58% GT</td>
<td>58% LT</td>
</tr>
</tbody>
</table>
Figure 34. Chronic Lower Respiratory Disease: Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

NW
163% increase
$R^2 = 0.25$
y = 1.26x + 17

W
47% increase
$R^2 = 0.23$
y = 0.72x + 34

1979 Non-white rate is 50% less than White
2001 Non-white rate is 10% less than White

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1979 Non-white rate is 50% less than White
2001 Non-white rate is 10% less than White
Figure 35. Chronic Lower Respiratory Disease: Disparity in mortality rates by race, 1979-2001 with projections to 2010

Halifax
87% increase
$R^2 = 0.12$
$y = 4.77x - 121$
Diabetes Mellitus
Figure 36. Diabetes Mellitus:
Trends in mortality rates by county, region, and state,
1979-2001 with projections to 2010

Halifax 111% increase
ENC 178% increase
NC 142% increase

Halifax: 
\[ R^2 = 0.44 \]
\[ y = 0.96x + 19 \]
ENC: 
\[ R^2 = 0.93 \]
\[ y = 0.89x + 11 \]
NC: 
\[ R^2 = 0.93 \]
\[ y = 0.71x + 11 \]
Figure 37. Diabetes Mellitus: Trends in age-adjusted mortality rates by county, region, state, and nation, 1979-2001 with projections to 2010

Halifax: 62% increase
R² = 0.26
y = 0.62x + 22

ENC: 103% increase
R² = 0.89
y = 0.75x + 16

NC: 84% increase
R² = 0.87
y = 0.57x + 15

US: 50% increase
R² = 0.86
y = 0.42x + 16

1979 Halifax is 38% greater than ENC
2001 Halifax is 10% greater than ENC
Figure 38. Diabetes Mellitus:
Trends in age-adjusted mortality rates by race and gender,
1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

Comparison of Fitted Rates in 2001

Halifax County

Center for Health Services Research and Development, ECU
Figure 39. Diabetes Mellitus:
Trends in age-adjusted mortality rates by race,
1979-2001 with projections to 2010

1979 Non-white rate is 150% greater than White
2001 Non-white rate is 37% greater than White

NW 22% increase
\[ R^2 = 0.03 \]
\[ y = 0.35x + 35 \]

W 123% increase
\[ R^2 = 0.24 \]
\[ y = 0.78x + 14 \]
Figure 40. Diabetes Mellitus: Disparity in mortality rates by race, 1979-2001 with projections to 2010

Halifax

57% decrease

$R^2 = 0.04$

$y = -3.77x + 146$
Unintentional Motor Vehicle Injuries
Figure 41. Unintentional Motor Vehicle Injuries: Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

Halifax: 11% increase
\[ R^2 = 0.02 \]
\[ y = 0.13x + 27 \]

ENC: 17% decrease
\[ R^2 = 0.46 \]
\[ y = -0.22x + 29 \]

NC: 25% decrease
\[ R^2 = 0.63 \]
\[ y = -0.29x + 26 \]

1979 Halifax is 7% less than ENC
2001 Halifax is 24% greater than ENC
Figure 42. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates by county, region, state, and nation, 1979-2001 with projections to 2010

Halifax 13% increase  
$R^2 = 0.03$  
$y = 0.16x + 27$

ENC 13% decrease  
$R^2 = 0.34$  
$y = -0.16x + 28$

NC 20% decrease  
$R^2 = 0.56$  
$y = -0.23x + 25$

US 27% decrease  
$R^2 = 0.79$  
$y = -0.31x + 22$

1979 Halifax is 4% less than ENC  
2001 Halifax is 25% greater than ENC  
2001 ENC is 24% greater than Halifax
Figure 43. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates by race and gender, 1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

NWM 0% increase
\[ R^2 = 0.00 \]
\[ y = 0.01x + 54 \]

WM 3% increase
\[ R^2 = 0.00 \]
\[ y = 0.05x + 37 \]

NWF 17% increase
\[ R^2 = 0.00 \]
\[ y = 0.12x + 16 \]

WF 220% increase
\[ R^2 = 0.29 \]
\[ y = 0.50x + 5 \]
Figure 44. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

- **NW**: 1% increase
  - $R^2 = 0.00$
  - $y = 0.01x + 34$
- **W**: 25% increase
  - $R^2 = 0.04$
  - $y = 0.24x + 21$

1979 Non-white rate is 62% greater than White
2001 Non-white rate is 30% greater than White
Figure 45. Unintentional Motor Vehicle Injuries: Disparity in mortality rates by race, 1979-2001 with projections to 2010

Halifax County

Halifax

70% decrease

$R^2 = 0.03$

$y = -3.03x + 95$
Influenza and Pneumonia
Figure 46. Influenza and Pneumonia: Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

- Halifax 48% greater than ENC
- 1989 Halifax is 48% greater than ENC
- 2001 Halifax is 10% greater than ENC

Comparison of Fitted Rates in 1979
- Halifax: 32% LT
- ENC: 26% LT
- NC: 9% LT

Comparison of Fitted Rates in 2001
- Halifax: 9% LT
- ENC: 10% LT
- NC: 11% LT

Actual Deaths

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Comparison of Fitted Rates in 1979
- Halifax: 32% LT
- ENC: 26% LT
- NC: 9% LT

Comparison of Fitted Rates in 2001
- Halifax: 9% LT
- ENC: 10% LT
- NC: 11% LT

Halifax County

Center for Health Services Research and Development, ECU
Figure 47. Influenza and Pneumonia:
Trends in age-adjusted mortality rates by county, region, state, and nation,
1979-2001 with projections to 2010

Halifax 25% decrease
R² = 0.10
y = -0.44x + 38

ENC 6% decrease
R² = 0.02
y = -0.10x + 35

NC 4% decrease
R² = 0.01
y = -0.06x + 34

US 20% increase
R² = 0.38
y = 0.32x + 30
Figure 48. Influenza and Pneumonia:
Trends in age-adjusted mortality rates by race and gender,
1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

- NWM: 46% decrease (R² = 0.11) y = -1.37x + 66
- WM: 61% decrease (R² = 0.30) y = -1.96x + 71
- NWF: 147% increase (R² = 0.13) y = 0.87x + 13
- WF: 6% decrease (R² = 0.00) y = -0.06x + 24

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Comparison of Fitted Rates in 2001

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Figure 49. Influenza and Pneumonia: 
Trends in age-adjusted mortality rates by race, 
1979-2001 with projections to 2010

NW 4% decrease  
R^2 = 0.00  
y = -0.07x + 35

W 41% decrease 
R^2 = 0.16  
y = -0.73x + 39

1979 Non-white rate is 10% less than White 
2001 Non-white rate is 46% greater than White
Halifax County

Influenza and Pneumonia:
Disparity in mortality rates by race, 1979-2001 with projections to 2010

Halifax

298% increase

$R^2 = 0.06$

$y = 3.93x - 29$
Cancer - Prostate
Figure 51. Cancer - Prostate:
Trends in mortality rates by county, region, and state,
1979-2001 with projections to 2010

Halifax 54% increase
$R^2 = 0.22$
y = 0.38x + 15
ENC 34% increase
$R^2 = 0.38$
y = 0.17x + 11
NC 26% increase
$R^2 = 0.29$
y = 0.13x + 11

1979 Halifax rate is 36% greater than ENC
2001 Halifax rate is 57% greater than ENC

Comparison of Fitted Rates in 1979
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<td>57% GT</td>
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Halifax County
Center for Health Services Research and Development, ECU
Figure 52. Cancer - Prostate: Trends in age-adjusted mortality rates by county, region, and state, 1979-2001 with projections to 2010

1979 Halifax rate is the same as ENC
2001 Halifax rate is 25% greater than ENC

Halifax
17% increase
$R^2 = 0.03$
y = 0.13x + 17

ENC
6% decrease
$R^2 = 0.04$
y = -0.05x + 17

NC
4% decrease
$R^2 = 0.03$
y = -0.03x + 15

Comparison of Fitted Rates in 1979
Halifax | ENC | NC
0% | 12% LT | Halifax

Comparison of Fitted Rates in 2001
Halifax | ENC | NC
25% GT | 10% LT | ENC
38% GT | 11% GT | NC
Figure 53. Cancer - Prostate: Trends in age-adjusted mortality rates by race and gender, 1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

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Comparison of Fitted Rates in 1979

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Figure 54. Cancer - Prostate: Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

Non-white rate 145% greater than White rate
2001 Non-white rate 194% greater than White rate

NW 22% increase
$R^2 = 0.04$
y = 0.27x + 27

W 2% increase
$R^2 = 0.00$
y = 0.01x + 11
Figure 55. Cancer - Prostate: Disparity in mortality rates by race, 1979-2001 with projections to 2010.

Halifax

165% increase

$R^2 = 0.04$

$y = 11.59x + 155$
Cancer - 
Colon, Rectum, and Anus
Figure 56. Cancer—Colon, Rectum, and Anus: Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

- **Halifax**: 35% increase, \( R^2 = 0.12 \), \( y = 0.32x + 20 \)
- **ENC**: 27% increase, \( R^2 = 0.63 \), \( y = 0.21x + 17 \)
- **NC**: 12% increase, \( R^2 = 0.33 \), \( y = 0.10x + 18 \)

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Halifax County

Center for Health Services Research and Development, ECU
Figure 57. Cancer—Colon, Rectum, and Anus:
Trends in age-adjusted mortality rates by county, region, state, and nation,
1979-2001 with projections to 2010

Halifax 2% increase
\[ R^2 = 0.00 \]
\[ y = 0.02x + 23 \]

ENC 6% decrease
\[ R^2 = 0.08 \]
\[ y = -0.06x + 24 \]

NC 12% decrease
\[ R^2 = 0.46 \]
\[ y = -0.13x + 23 \]

Halifax 1979 is 12% less than ENC
2001 Halifax is 34% greater than ENC

Comparison of Fitted Rates in 1979

Halifax | ENC | NC | US
---|---|---|---
13% GT | 20% GT | 27% GT | Halifax
12% LT | 12% GT | ENC
17% LT | 6% LT | 6% GT | NC
21% LT | 11% LT | 5% LT | US

Comparison of Fitted Rates in 2001

Halifax | ENC | NC | US
---|---|---|---
26% LT | 29% LT | 26% LT | Halifax
34% GT | 4% LT | 1% LT | ENC
41% GT | 5% GT | 3% GT | NC
36% GT | 1% GT | 3% LT | US
Figure 58. Cancer—Colon, Rectum, and Anus: Trends in age-adjusted mortality rates by gender and race 1979-2001 with projections to 2010

- NWM: 44% increase, $R^2 = 0.03$, $y = 0.40x + 20$
- WM: 9% decrease, $R^2 = 0.00$, $y = -0.13x + 33$
- NWF: 44% increase, $R^2 = 0.03$, $y = 0.40x + 20$
- WF: 44% decrease, $R^2 = 0.10$, $y = -0.42x + 21$
Figure 59: Cancer—Colon, Rectum, and Anus: Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

NW
45% increase
$R^2 = 0.07$
y = 0.41x + 20

W
26% decrease
$R^2 = 0.06$
y = -0.30x + 25
Figure 60. Cancer—Colon, Rectum, and Anus: Disparities in mortality rates by race, 1979-2001 with projections to 2010

Halifax

364% increase

$R^2 = 0.08$

$y = 4.63x - 28$
Cancer — Breast
Figure 61. Cancer — Breast:
Trends in mortality rates by county, region, and state, 1979-2001 with projections to 2010

Halifax: 72% increase
ENC: 27% increase
NC: 10% increase

R² = 0.24
R² = 0.42
R² = 0.10

\[ y = 0.46x + 14 \]
\[ y = 0.16x + 13 \]
\[ y = 0.07x + 15 \]

1979 Halifax is 8% greater than ENC
2001 Halifax is 46% greater than ENC

Comparison of Fitted Rates in 1979
Halifax ENC NC
7% LT 7% GT

Comparison of Fitted Rates in 2001
Halifax ENC NC
46% GT 0%
Figure 62. Cancer — Breast:
Trends in age-adjusted mortality rates by county, region, state, and nation,
1979-2001 with projections to 2010

Halifax 54% increase
\[ R^2 = 0.18 \]
\[ y = 0.37x + 15 \]
ENC 1% increase
\[ R^2 = 0.00 \]
\[ y = 0.01x + 17 \]
NC 9% decrease
\[ R^2 = 0.10 \]
\[ y = -0.07x + 18 \]
US 9% decrease
\[ R^2 = 0.32 \]
\[ y = -0.09x + 19 \]

1979 Halifax is 12% less than ENC
2001 Halifax is 34% greater than ENC

Comparison of Fitted Rates in 1979

<table>
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<tr>
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<th>NC</th>
<th>US</th>
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<td>21% LT</td>
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Comparison of Fitted Rates in 2001

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<th>NC</th>
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<td>36% GT</td>
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Figure 63. Cancer — Breast: Trends in age-adjusted mortality rates by race and gender, 1979-2001 with projections to 2010

Comparison of Fitted Rates in 1979

<table>
<thead>
<tr>
<th>Race</th>
<th>NWM</th>
<th>WM</th>
<th>NWF</th>
<th>WF</th>
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<tbody>
<tr>
<td>1979</td>
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Comparison of Fitted Rates in 2001

<table>
<thead>
<tr>
<th>Race</th>
<th>NWM</th>
<th>WM</th>
<th>NWF</th>
<th>WF</th>
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<tbody>
<tr>
<td>2001</td>
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NWM 440% increase
\[ R^2 = 0.18 \]
\[ y = 0.20x - 1 \]

WM 0% increase
\[ R^2 = 0.00 \]
\[ y = 0.00x + 0 \]

NWF 19% increase
\[ R^2 = 0.02 \]
\[ y = 0.27x + 32 \]

WF 62% increase
\[ R^2 = 0.12 \]
\[ y = 0.68x + 24 \]
Figure 64. Cancer — Breast: Trends in age-adjusted mortality rates by race, 1979-2001 with projections to 2010

- Non-white (NW) increase: 31% increase, \( R^2 = 0.04 \), \( y = 0.24x + 17 \)
- White (W) increase: 63% increase, \( R^2 = 0.12 \), \( y = 0.40x + 14 \)

1979 Non-white rate 21% greater than White rate
2001 Non-white rate 2% less than White rate
Figure 65. Cancer — Breast: Disparity in mortality rates by race, 1979-2001 with projections to 2010

Halifax
102% decrease
$R^2 = 0.03$
y = -2.79x + 60
Appendix

Heart Disease
Stroke
Atherosclerosis
Cancer - Lip, Oral Cavity, and Pharynx
Cancer - Stomach
  Cancer - Colon, Rectum, and Anus
  Cancer - Liver
  Cancer - Pancreas
  Cancer - Larynx
  Cancer - Trachea, Bronchus, and Lung
  Cancer - Malignant Melanoma of Skin
  Cancer - Breast
  Cancer - Cervix Uteri
  Cancer - Ovary
  Cancer - Prostate
  Cancer - Bladder
  Cancer - Brain
  Cancer - Non-Hodgkin's Lymphoma
  Cancer - Leukemia
  Human Immunodeficiency Virus (HIV) Disease
Septicemia
Diabetes Mellitus
Influenza and Pneumonia
Chronic Lower Respiratory Disease
Chronic Liver Disease and Cirrhosis
Nephritis, Nephrotic Syndrome, and Nephrosis
Unintentional Motor Vehicle Injuries
All Other Unintentional Injuries and Adverse Effects
Suicide
Homicide
Legal Intervention
Alzheimer's Disease