Trends and Disparities in Mortality in Eastern North Carolina
Total Deaths, Premature Mortality and Deaths for Ten Leading Causes; 1990-2017
Table of Contents

List of Figures ......................................................................................................................... iii

1. Introduction .......................................................................................................................... 1.1

2. Data Highlights .................................................................................................................... 2.1

3. Methods, Interpretation, and References ............................................................................ 3.1
   Data Sources ......................................................................................................................... 3.1
   Measures .............................................................................................................................. 3.1
   Interpreting the Pie Charts ................................................................................................. 3.1
   Interpreting the Trend Figures ......................................................................................... 3.2
   Caveats about the Concepts of Race, Gender, and Geography .......................................... 3.3
   References ......................................................................................................................... 3.6

4. Current Disparities in Mortality by Geography, Race and Gender, and Race: Total and Five General Leading Causes of Death .................................................................................. 4

   All Causes of Death ............................................................................................................. 5.1
   All Causes of Premature Mortality .................................................................................... 5.7

   Diseases of Heart ............................................................................................................... 6.1
   Cancer - Trachea, Bronchus, Lung ..................................................................................... 6.7
   Chronic Lower Respiratory Diseases ................................................................................ 6.13
   Cerebrovascular Disease .................................................................................................... 6.19
   All Other Unintentional Injuries and Adverse Effects ....................................................... 6.25
   Alzheimer’s Disease .......................................................................................................... 6.31
   Diabetes Mellitus ............................................................................................................... 6.37
   Pneumonia and Influenza ................................................................................................. 6.43
   Nephritis, Nephrotic Syndrome, and Nephrosis .............................................................. 6.49
   Unintentional Motor Vehicle Injuries .............................................................................. 6.55

7. Trends and Disparities in Mortality in ENC41: Cancer - All Sites and HIV Disease, 1990-2017 .................................................................................................................. 7
   Cancer - All Sites ................................................................................................................ 7.1
   HIV Disease ....................................................................................................................... 7.7

8. Appendix .............................................................................................................................. 8
List of Figures

Figure 4.1 i. General leading causes of death for ENC41 (2017), NC (2017), and US (2016). Mortality rate per 100,000 population ...... 4.1
Figure 4.1 ii. General leading causes of death for ENC41 (2017), NC (2017), and US (2016). Age-adjusted mortality rate per 100,000 population ................................................. 4.2
Figure 4.2 i. General leading causes of death for ENC41 by race and gender, (2017). Mortality rate per 100,000 population ............ 4.3
Figure 4.2 ii. General leading causes of death for ENC41 by race and gender, (2017). Age-adjusted mortality rate per 100,000 population ........................................................................ 4.4
Figure 4.3 i. General leading causes of death for ENC41 by race, (2017). Mortality rate per 100,000 population .......................... 4.5
Figure 4.3 ii. General leading causes of death for ENC41 by race, (2017). Age-adjusted mortality rate per 100,000 population 4.6
Figure 5.1 i. All Causes of Death: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 .......... 5.2
Figure 5.1 ii. All Causes of Death: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 .......................................................... 5.3
Figure 5.1 iii. All Causes of Death: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 5.4
Figure 5.1 iv. All Causes of Death: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ... 5.5
Figure 5.1 v. All Causes of Death: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 .......................................................... 5.6
Figure 5.2 i. All Causes of Premature Mortality: Trends in premature mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ......................................................... 5.8
Figure 5.2 ii. All Causes of Premature Mortality: Trends in age-adjusted premature mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 .......................... 5.9
Figure 5.2 iii. All Causes of Premature Mortality: Trends in age-adjusted premature mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 .................................. 5.10
Figure 5.2 iv. All Causes of Premature Mortality: Trends in age-adjusted premature mortality rates by race for ENC41, 1990-2017 with projections to 2030 .................................................. 5.11
Figure 5.2 v. All Causes of Premature Mortality: Measuring disparity in age-adjusted premature mortality rates by race for ENC41, 1990-2017 with projections to 2030 ..................................... 5.12
Figure 6.1 i. Diseases of Heart: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ............... 6.2
Figure 6.1 ii. Diseases of Heart: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 6.3
Figure 6.1 iii. Diseases of Heart: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ........................................................................... 6.4
Figure 6.1 iv. Diseases of Heart: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 .......... 6.5
Figure 6.1 v. Diseases of Heart: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ........................................................................ 6.6
Figure 6.2 i. Cancer - Trachea, Bronchus, Lung: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 6.8
Figure 6.2 ii. Cancer - Trachea, Bronchus, Lung: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ........................................... 6.9
Figure 6.2 iii. Cancer - Trachea, Bronchus, Lung: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.10
Figure 6.2 iv. Cancer - Trachea, Bronchus, Lung: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.11
Figure 6.2 v. Cancer - Trachea, Bronchus, Lung: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.12
Figure 6.3 i. Chronic Lower Respiratory Diseases: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 6.14
Figure 6.3 ii. Chronic Lower Respiratory Diseases: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 6.15
Figure 6.3 iii. Chronic Lower Respiratory Diseases: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.16
Figure 6.3 iv. Chronic Lower Respiratory Diseases: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.17
Figure 6.3 v. Chronic Lower Respiratory Diseases: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.18
Figure 6.4 i. Cerebrovascular Disease: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 6.20
Figure 6.4 ii. Cerebrovascular Disease: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 6.21
Figure 6.4 iii. Cerebrovascular Disease: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.22
Figure 6.4 iv. Cerebrovascular Disease: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.23
Figure 6.4 v. Cerebrovascular Disease: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.24
Figure 6.5 i. All Other Injuries and Unintentional Effects: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 6.26
Figure 6.5 ii. All Other Injuries and Unintentional Effects: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 6.27
Figure 6.5 iii. All Other Injuries and Unintentional Effects: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.28
Figure 6.5 iv. All Other Injuries and Unintentional Effects: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.29
Figure 6.5 v. All Other Injuries and Unintentional Effects: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.30
Figure 6.6 i. Alzheimer’s Disease: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 6.32
Figure 6.6 ii. Alzheimer’s Disease: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 6.33
Figure 6.6 iii. Alzheimer’s Disease: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.34
Figure 6.10 v. Unintentional Motor Vehicle Injuries: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 6.60
Figure 7.1 i. Cancer - All Sites: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 7.2
Figure 7.1 ii. Cancer - All Sites: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 7.3
Figure 7.1 iii. Cancer - All Sites: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 7.4
Figure 7.1 iv. Cancer - All Sites: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 7.5
Figure 7.1 v. Cancer - All Sites: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 7.6
Figure 7.2 i. HIV Disease: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030 ................................................................. 7.8
Figure 7.2 ii. HIV Disease: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030 ................................................................. 7.9
Figure 7.2 iii. HIV Disease: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030 ................................................................. 7.10
Figure 7.2 iv. HIV Disease: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 7.11
Figure 7.2 v. HIV Disease: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030 ................................................................. 7.12
1. Introduction

Health Indicators Series:
A Resource for Healthy Communities
February 2021


Health Indicators is a series of reports describing community health at the state, regional, and county level. Health Indicators supplements the North Carolina Health Data Explorer published by the center for Health Systems 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 Eastern North Carolina’s population 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, State Center for Health Statistics, 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, mortality (crude) and age-adjusted mortality for leading causes of death, and measures of race disparities or inequalities in mortality rate.

Report Series #2 of the series focuses attention on two overarching goals—to increase the span and quality of life, and to eliminate health disparities. Using rate comparisons, this report describes the inequalities in mortality among Eastern North Carolina and other regions, and among four demographic groups. 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 a 28-year period (1990-2017), as well as the most recent 13 year period (2005 to 2017). 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 following section presents both the overall and five leading contributors to mortality for the state by race and gender. In this section, pie charts describe the relative contribution of each of five leading contributors to the overall, general rate. These charts also make regional and demographic comparisons. The next section charts recent trends and disparities in mortality and provides projections to the year 2030. These charts place Eastern North Carolina’s health status in a historical context and provide a glimpse into the future.
The region *Eastern North Carolina* is comprised of 41 counties located in the extreme east of North Carolina and approximates the coastal plain physiographic province of the state. It includes all counties east of I-95. This region is characterized by its rurality, poverty, and some of the highest mortality rates in the nation. The name of the region is abbreviated as ENC41 or ENC. The rest of North Carolina is the remaining 59 counties; abbreviated as RNC59 or RNC.
2. Data Highlights

Trends and Disparities in Mortality in Eastern North Carolina

The following highlights of mortality in the 41 counties of Eastern North Carolina (ENC41) describe current status and trends in the causes of death from major diseases and how they vary across different population groups. The graphs, charts, and tables paint a picture of the region’s health with a broad brush. The study of mortality in populations should include consideration of time and geographic space as well as underlying demographic, political-economic, and socio-cultural conditions. Readers are encouraged to think of these factors as they consider the data presented in this report, formulate their own questions about the causes of mortality, and think about strategies to reduce mortality in the population described.

Current Disparities in Mortality by Geography, Race, and Gender

In 2017, age-adjusted mortality rate for Eastern North Carolina is 828 deaths per 100,000. This rate is 5% higher than the state rate. Within Eastern North Carolina, the non-White rate is 14% higher than the White rate. The non-White male rate is 23% higher than the rate for White males. The non-White female rate is 9% higher than the rate for White females.

The five general leading causes of mortality in Eastern North Carolina (2017) are:
1. Disease of Heart
2. Cancer - All Sites
3. Chronic Lower Respiratory Diseases
4. Cerebrovascular Disease
5. All Other Unintentional Injuries and Adverse Effects

The five general leading causes of mortality in Eastern North Carolina by race and gender (2017) are:

<table>
<thead>
<tr>
<th>Race and Gender</th>
<th>non-White Males</th>
<th>White Males</th>
<th>non-White Females</th>
<th>White Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Diseases of Heart</td>
<td>Diseases of Heart</td>
<td>Cancer - All Sites</td>
<td>Diseases of Heart</td>
</tr>
<tr>
<td>2nd</td>
<td>Cancer - All Sites</td>
<td>Cancer - All Sites</td>
<td>Diseases of Heart</td>
<td>Cancer - All Sites</td>
</tr>
<tr>
<td>3rd</td>
<td>Cerebrovascular Disease</td>
<td>All Other Unintentional Injuries and Adverse Effects</td>
<td>Cerebrovascular Disease</td>
<td>Chronic Lower Respiratory Diseases</td>
</tr>
<tr>
<td>4th</td>
<td>Diabetes Mellitus</td>
<td>Chronic Lower Respiratory Diseases</td>
<td>Diabetes Mellitus</td>
<td>Cerebrovascular Disease</td>
</tr>
<tr>
<td>5th</td>
<td>All Other Unintentional Injuries and Adverse Effects</td>
<td>Cerebrovascular Disease</td>
<td>Nephritis, Nephrotic Syndrome, and Nephrosis</td>
<td>Alzheimer's Disease</td>
</tr>
</tbody>
</table>

Trends in Mortality from All Causes

- ENC’s all-cause mortality rate trend is increasing, and in 2017 is 8% greater than RNC and 6% greater than NC. The ENC rate has increased 9% over the 13-year period.
- The age-adjusted all-cause mortality rate for ENC had decreased 11% over the 13-year period. ENC’s rate remains 8% greater than RNC for 2017.
The non-White male rate remains higher than the other demographic groups. The non-White female rate is projected to converge with the White female rate in the near future.

The trends for all-cause mortality rates for both non-White and White are decreasing. The non-White rate is 13% greater than the White rate in 2017. They are projected to converge in the distant future.

Over the recent 13-year period there is a 43% decrease in racial disparity.

**Trends in Premature Mortality from All Causes of Death**

- ENC’s premature mortality rate is 23% greater than RNC and 15% greater than NC. ENC’s rate trend is unreliable.
- The ENC age-adjusted premature mortality trend for the 13-year period has decreased 6%. It is 25% higher than the RNC rate in 2017.
- The non-White male rate is higher than the rates for any other demographic group. The rate for non-White females has the greatest rate of decrease (16% over 13 years).
- The non-White rate remains 42% greater than the White rate. Both are decreasing but the non-White rate is decreasing more quickly.
- A decrease in the premature mortality rate trend for non-Whites and a leveling of the rate for Whites suggests a reduction in racial disparity.

**Diseases of the Heart**

- ENC’s heart disease rate trend had decreased 6% over the 13-year period. The rates for NC and RNC are 13% and 19% lower respectively and are decreasing faster.
- ENC’s age-adjusted heart disease rate is 13% greater than NC and 10% greater than the US rate. All 3 rates have decreased at a similar pace over the recent 13-year period.
- The rate for non-White males is the highest and is decreasing at about the same pace as the White male rate. The non-White female rate is decreasing the most and is set to converge with the White female rate.
- The non-White rate is 11% higher than the White rate in 2017. The 13-year trend for both is decreasing.
- The trend for racial disparity is not reliable.

**Cancer – Trachea, Bronchus, Lung**

- The cancer-TBL rate trend for ENC has decreased 5% over the recent 13-year period. The ENC rate is 19% greater than the RNC rate. The RNC rate has decreased 16%.
- In 2017 the age-adjusted rate for ENC was 16% above the RNC rate. The ENC rate decreased 27% over the 13-year period, while the RNC rate decreased 32%.
- In 2017 the non-White male rate was the highest but is only 6% higher than the White male rate, is decreasing, and will likely converge soon. The mortality rate for White females is 48% higher than the rate for non-White females. Both are decreasing.
- The non-White mortality rate is 14% less than the White rate. Both are decreasing over the 13-year period at about the same pace.
- The 13-year rate trend for racial disparity is unreliable.

**Chronic Lower Respiratory Disease**

- In 2017 the CLRD mortality rate for ENC, RNC and NC are virtually equal. The ENC rate trend has increased 28% over the 13-year period, compared to 14% for RNC and 18% for NC.
- The age-adjusted rate for 2017 for ENC, RNC and NC are equal. The US rate is 7% lower. The rate trend for ENC is unreliable.
The age-adjusted rate for White males is the highest, followed by White females, then non-White males. The rates for White males and non-White males are decreasing. The rates for White females and non-White females are increasing.

The non-White rate is 42% less than the White rate. Both rate trends are flat, but neither is reliable.

The racial disparity trend is unreliable.

**Cerebrovascular Disease**
- ENC’s cerebrovascular disease mortality rate trend is flat, but the trend is unreliable. It is 13% greater than the RNC rate and 9% greater than the NC rate.
- The age-adjusted rate has decreased 18% over the 13-year period. It is 13% greater than the RNC rate and 30% greater than the US rate.
- The non-White male rate is the highest and has decreased 23% over the 13-year period. The non-White female rate has decreased 35% and is converging with White males and White females.
- The non-White rate in 2017 is 27% greater than the White rate but is decreasing more rapidly (30% over the 13-year period). Both rates are projected to converge in the future.
- There is a 55% decrease in racial disparity between Whites and non-Whites over the 13-year period.

**All Other Unintentional Injuries and Adverse Effects**
- Mortality from unintentional injuries and adverse effects is increasing in ENC (70% increase over 13 years). The trends for RNC and NC are also increasing, but the ENC rate is increasing faster.
- The age-adjusted mortality rate trend for ENC, RNC, NC and the US are all increasing. ENC’s rate trend increased the most, 59% over the 13-year trend.
- The 13-year trends for White males and White females are increasing significantly (70% and 79% respectively). The rates for non-White males and non-White females are increasing, but not as much.
- White rates have increased 71% over the 13-year period. Non-White rates have increased 24% in a moderately reliable trend.
- Racial disparity has decreased 169% over the 13-year period in a trend that favors non-Whites.

**Alzheimer’s Disease**
- The Alzheimer’s mortality rate for ENC shows a 119% increase over the recent 13-year period. ENC’s rate is 22% less than RNC and 17% less than NC but ENC’s rate of increase was larger than both RNC and NC.
- In 2016 the age-adjusted rate for ENC was even with the US rate. The ENC rate is lower than the NC rate, but has a higher rate of increase over the 13-year period.
- The mortality rates for females, both White and non-White, are greater than for males. Non-White males have the highest rate of increase (150% over 13 years) and are projected to converge with the White female rate in the future.
- The non-White mortality rate for Alzheimer’s has increased 106% over the 13-year trend. In 2017 the non-White rate is 7% greater than the White rate.
- The racial disparity favors Whites and has increased 155% over the 13-year period.
Diabetes Mellitus
- ENC’s diabetes mortality rate is 30% greater than RNC in 2017. The rate for ENC increased 9% over the 13-year period in a moderately reliable trend.
- ENC’s age-adjusted rate has decreased 14% over the 13-year period. It is 30% greater than the RNC rate and 34% greater than the US rate.
- The rate for non-White males is the highest and is increasing (10% increase over the 13-year period). The non-White female rate has decreased 35% and the White female rate has decreased 17%. The White male rate is unreliable.
- The non-White mortality rate decreased 19% over the 13-year period but remains 124% greater than the White rate.
- The trend for racial disparity is moderately reliable and suggests a 14% decrease in racial disparity.

Pneumonia and Influenza
- The mortality rate trend for pneumonia and influenza for ENC has increased 11% over the 13-year period. The trends for RNC and NC are flat and unreliable. The ENC rate is 8% less than RNC.
- The age-adjusted rate trends for all NC regions are similar and are decreasing at about the same pace. The ENC rate is 19% greater than the US rate.
- The age-adjusted rate trends for White males and White females are decreasing. The trends for non-White males and non-White females are unreliable.
- The White rate trend has decreased 19% over the 13-year period. The non-White rate is unreliable.
- Racial disparity has increased 142% over the 13-year period and favors Whites in a moderately reliable trend.

Nephritis, Nephrotic syndrome, and Nephrosis
- Mortality due to nephritis, nephrotic syndrome, and nephrosis in ENC has decreased 11% over 13 years in a moderately reliable trend. The 2017 rate for ENC, NC and RNC were equal.
- The age-adjusted ENC rate is equal to the NC rate but the 13-year rate trend for ENC has decreased 29% and is set to drop below the NC rate.
- The 13-year trends for non-White males and females are higher than those for White males and females. Non-White females show the greatest decrease, 39% over 13 years. White females have the lowest rates.
- In 2017 the non-White rate was 107% greater than the White rate but declined 35% over 13 years. The White rate declined 25%.
- Racial disparity shows a 24% decrease over the 13-year period in a moderately reliable trend.

Unintentional Motor Vehicle Injuries
- ENC’s unintentional motor vehicle injury mortality rate trend is decreasing but is still 39% greater than RNC in 2017.
- The ENC age-adjusted rate is 41% greater than RNC and 62% greater than the US. The rates for ENC, RNC, NC and the US are all decreasing.
- The rates for non-White males and non-White females are not reliable. The trends for White males and White females are declining.
- The White rate trend has decreased 45% over the 13-year period. The non-White rate is unreliable.
- Racial disparity has increased significantly over the 13-year period.
Caner - All Sites
- The cancer - all sites mortality rate trends for ENC, NC and RNC are unreliable.
- The age-adjusted cancer - all sites mortality rate trends for ENC, RNC, NC and the US are all decreasing at about the same pace. The ENC rate trend is 8% greater than RNC and 9% greater than the US.
- The rate for non-White males has decreased 28% over 13 years and the White male rate has decreased 21%. The non-White male and White male rates are the highest.
- Both White and non-White cancer – all sites mortality rates are decreasing over the 13-year period, although non-White rates are 9% greater than Whites.
- The moderately reliable 13-year trend for racial disparity shows a 62% decrease.

HIV Disease
- The HIV mortality rate for ENC has decreased 69% over the past 13 years but was still 30% higher than RNC in 2017.
- The 13-year age-adjusted rate trend for ENC has been decreasing over the past 13 years, but still was 38% greater than RNC.
- Non-White males continue to have the highest rate of age-adjusted mortality, but this rate has decreased 74% in a 13-year reliable trend. The rate for White males decreased 69% and non-White females decreased 77%. A convergence of the non-White and White rate is expected in the future.
- The 13-year non-White age-adjusted HIV mortality rate has decreased by 75%; the White rate has decreased by 59%. The 2 rates are expected to converge.
- Racial disparity has decreased 40% over the 13-year period in a moderately reliable trend.
3. Methods, Interpretation, and References

Data Sources
The data for mortality and premature mortality in Eastern North Carolina 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, called mortality rate, is a rate based on the number of deaths per population (or, deaths normalized by the population that produced them) for a given unit area, such as the county, region, or state over a specified time interval. The mortality rate is expressed in two ways, the basic true (actual or observed) rate, and an age-adjusted rate (see below). Mortality rates are used to evaluate the impact and burden of mortality on a population and to make comparisons, where appropriate, among populations. Like the mortality rate, the second type, called premature mortality rate, is also a density measure, but instead of deaths, it is the number of person-years lost in a population before a specified age. In this report mortality rates are emphasized with premature mortality (YLL-75) shown only for the total number of deaths from all causes (general mortality). Premature mortality in detail is the focus of Report Series #1.

A simple count of deaths occurring in an area for a given time interval is useful for identifying potential problems or issues of public concern—particularly if the deaths result from a rare cause or they are believed to be an emerging problem for at-risk socio-demographic groups. In this sense, count data are used for sentinel surveillance. Because counts reveal nothing about the underlying population base from which deaths arise, the analytical or practical utility of count data is limited. The size of the underlying population will have an expected effect on the numbers of deaths that occur. Deaths measured in relation to a population, are an expression of density. When measured over a given interval of time (usually 1 to 5 years), the density is called a rate. (The rate is typically multiplied by 100,000 for ease in interpreting the usually small resultant value.) The mortality rate is an improvement over simple count data because it accounts for the relative size and effect of the underlying population. The chief advantage of the mortality rate is that it is useful for focusing attention on the burden of public health problems more rigorously than simple counts. However, the mortality rate is also affected by the age structure of the population, which can confound interpretation when making comparisons of rates among different areas.

Because aging is the greatest risk factor for death, the age structure of a population will have a substantial effect on the mortality rate. For example, two counties may have similar population sizes but one has a larger number of people over the age of 45 than the other. It is more likely that the older population will generate more deaths over an interval of time and this will be reflected in a higher mortality rate. Differing age structures among populations will confound any comparisons of mortality rates among those populations. Therefore, a method for controlling the effects of age structure on the mortality rate is required if any meaningful comparisons are to be made.

Age-adjustment to control 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 (SMP) is used as the external reference. The US 2000 SMP is divided into a number of age groups whose sizes or proportions serve as weights to be applied to the corresponding age groups of the study population. This proportional redistribution generates new numbers of expected deaths in each of the corresponding age groups of the study population. These expected deaths are the number of deaths we would expect if the study population had the same age structure as the US 2000 SMP. The expected number of deaths are summed and normalized by the total population yielding an age-adjusted death rate. Once the effects of age structure are controlled, the way is paved for making comparisons among populations (Buescher, 1998).
The second measure, premature mortality, focuses on the burden of disease and death expressed in terms of accumulated person years lost 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. It considers only deaths of people who die before age 75. To calculate the number of years lost, the mid-point age of the age group to which each decedent belongs is subtracted from 75 and the differences (the lost years) are summed. After all lost years are summed; the result is normalized by the population under age 75 and multiplied by 10,000. Premature mortality is expressed as a rate measured over a time interval, and it can also be age-adjusted.

Age-adjusted rates for both mortality and premature mortality have little intrinsic meaning, however, and can mask the burden and trends of mortality (or health event) 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 basic non-adjusted mortality rate first, and then use the adjusted rate only if one wishes to factor out age in understanding the pattern of mortality among populations and regions. For regions with larger populations the statistics presented here are for the year 2017. Smaller areas like counties will usually be aggregated into 5-year intervals (e.g., 2013 to 2017). A five-year interval is 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. They 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. Each regional and demographic set of pie charts is based on the observed mortality rate and the age-adjusted (expected) mortality rate.

The first two pie chart figures compare the proportions of leading causes of death across regions at the national, state, and regional/county level. The first figure in this set compares absolute mortality (the burden) using mortality rates, which sheds light on any differences in the burden of mortality by disease intrinsic to each region. The second figure, which is age-adjusted, allows for direct comparisons among regions. The same pattern is repeated in the following figures that show differences among demographic groups.

While comparing the pie charts, the reader should remember that the slices of the pie show differences in how much of the mortality rate (including age-adjusted) is accounted for by a specific cause. Finally, the reader will see that some pies are composed of different leading causes of 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 types of figures are used to show trends in mortality, for all causes combined, and for each of the ten leading causes in the region/county over a 28-year period. Premature mortality is described for deaths by all causes only. The first of the four types of figures depicts the observed mortality rates for the region/county and state. The second figure type shows age-adjusted mortality rates for the region/county, state, and nation allowing comparisons among geographical areas. The third figure type compares trends in age-adjusted mortality rates by race and gender. Adjustment is made for age structure differences among demographic groups, which permits observation on the effects of race and gender on these groups. The last figure type depicts racial differences (or disparities) expressed as a ratio (in percent) of age-adjusted mortality for non-Whites to the age-adjusted rates for Whites over the 28 year time series. Trend lines provide historical depth to mortality processes and a basis for prediction, future comparisons, and action.
Trends and Disparities in Mortality in Eastern North Carolina-41 Counties

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 (indicating high variability), then there is less dependence and less of a trend in the observations. We use trend lines to uncover any general patterns found in the data for the purpose of assisting the investigator in understanding the underlying processes which generate them.

The equation of the line is 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 expected rates to the year 2030 from known historical values (2005 to 2017) 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 for any given year, x. For example, in figure 6.4 ii the year 2013 is the 9th year in the series, so 9 would be substituted for x in the equation of the line derived from ENC41’s age-adjusted mortality rate series for a selected cause of death. For cerebrovascular disease (2005 to 2017), the 2013 expected or fitted age-adjusted rate is calculated to be 47.4 deaths per 100,000 people. The observed age-adjusted rate for 2013 is 45 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.) The numeric difference between the expected and observed rates for 2013 is 2.4—the model (the equation of the line) overestimates the observed value by 2.4 deaths. Each previous and subsequent year’s difference between the expected and observed rates will vary to a greater or lesser degree depending on the size of the population under study (see below). This variation can be measured to determine how well the line fits or models the observed data.

In the time series figures, the investigator will find several statistical tools to assist in the analyses of trend lines and fitted rates. These tools include the coefficient of determination, percent change values, and slope coefficients. These tools enable the investigator to form not only a mental picture of the comparative impact of mortality by cause on a region and population but to also gain insight into what the near demographic future holds for them.

Coefficients of determination ($R^2$) are provided to indicate how well the fitted line predicts or explains the observed rates. When variation in the observed rates is relatively high (the fitted trend line does not correspond well to the observed trend line) $R^2$ approaches 0.0, when the variation is low, $R^2$ approaches 1.0. A low $R^2$ implies low reliability and a larger $R^2$ indicates that a greater degree of confidence can be placed in the trend line. The trend lines are generally unreliable when $R^2$ is less than 0.10, moderately reliable when $R^2$ is between 0.10 and 0.35, and most reliable when $R^2$ is equal to or greater than 0.35. Graphically, data points, data lines and trend lines are weighted according to their reliability and significance. The thinnest, trend lines are for those where $R^2$ is less than 0.10 and should be considered not reliable. The thickest lines are used for trends where the $R^2$ is equal to or greater than 0.35. 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 several instances a non-linear trend may be present. It should be noted that the linear trend modeling undertaken here is a major simplification of real world processes. These processes are dynamical in nature and can be modeled and fitted with certain limitations and assumptions. Time series of epidemic infectious disease mortality rates typically exhibit a curvilinear pattern. A marked curvilinear pattern is seen in the mortality series for HIV/AIDS mortality, general cancer mortality, and several others which can be approximated into at least two sequential linear segments. Each segment is joined to another in the sequence at a point in time or year. In this series (#2), we begin to explore alternative methods for examining trends that show discontinuities and reversals within the set of time series observations, particularly within the mortality time series for HIV/AIDS.
Percent change provides a measure of the estimated change in mortality over the most recent period (2005-2017). The percent value is followed by the term increase or decrease to help denote the direction of the overall trend. This information is in boldface and included with the $R^2$ value and the equation of the line. Percent change and the direction of that change is provided on the graphs for trends where $R^2$ is greater than 0.10.

Another tool is the equation of the line that fits a trend among the observed data point (the rates). The slope coefficient of this equation, $b$, is the estimated/expected number of deaths per unit of time ($x$) or the rate of change in deaths per annum. The direction of change is indicated with a negative sign preceding the $b$ and if positive, $b$ is unsigned. Visually, a negative slope shows a trend decreasing in annual rates from left to right and a positive slope will be rising (increasing) from left to right. An examination of the different slopes for regional or demographic group trends will quickly reveal that they are not equal. Visual inspection combined with slope coefficients also provides a means for making comparisons between any two trend line series in the time series figure. Trends will diverge, converge, or run parallel with one another indicating, respectively, increasing separation, decreasing separation, or very little change in rates between two trend lines. Setting two equations of the line equal to one another can yield an estimated year of convergence in the future (or the year the two trends diverged in the past). However, the investigator is cautioned to not put too much stock in the results if the forward or backward projections are very distant in time, especially when $R^2$ is low. Recent (or temporally adjacent) short term trends with good correspondence between the fitted trend line and observed trend line will be better indicators of rates in the near future or past (if historical rates are unknown).

The final tool is the pair of comparison tables located in the lower portion of the page. The tables, found in every time series figure (except the ones showing comparisons by race and disparity) are structured so that the reader can make comparisons of rates derived from the equation of the line (i.e., the fitted rates) among all regions or demographic groups portrayed in the figure. The 2005 and 2017 tables compare the fitted rates calculated for the beginning and end of the observed time series in terms of percent difference. Returning to figure 6.4 ii, ENC41’s age-adjusted fitted rate for cerebrovascular disease in 2005 is 5% greater than (GT) RNC’s fitted rate. In 2017, ENC41’s fitted rate is 13% greater than (GT) RNC’s fitted rate. The tables permit a quick assessment of trends calculated from observed time series data.

The reader should 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. The reader should evaluate all available data carefully before drawing conclusions about current, past and future mortality patterns.

**Caveats about the Concepts of Race, Gender, and Geography**

Several caveats are offered 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
and larger regions composed of 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 2030*, 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.
Trends and Disparities in Mortality in Eastern North Carolina-41 Counties

General References


Cited References

4. Current Disparities in Mortality by Geography, Race and Gender, and Race: Total and Five Leading Causes of Death
Figure 4.1 i. General leading causes of death for ENC41 (2017), NC (2017), and US (2016). Mortality rate per 100,000 population.

2017 NC rate is 7% higher than 2016 US rate

Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 4.1 ii. General leading causes of death for ENC41 (2017), NC (2017), and US (2016). Age-adjusted mortality rate per 100,000 population.

ENC41

828 deaths/100,000

North Carolina

786 deaths/100,000

United States

729 deaths/100,000

2017 NC age-adj. rate is 8% higher than US

Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 4.2 i. General leading causes of death for ENC41 (2017) by race and gender. Mortality rate per 100,000 population.

2017 ENC41 NWM rate is 3% lower than 2017 ENC41 WM rate

983 deaths/100,000

21% Diseases of Heart
43% Cancer - All Sites
22% Cerebrovascular Disease
5% Chronic Lower Respiratory Diseases
5% Diabetes Mellitus
5% Alzheimers Disease
5% All Other Unintentional Injuries and Adverse Effects
5% All Other Deaths

2017 ENC41 NWF rate is 14% lower than 2017 ENC41 WF rate

835 deaths/100,000

21% Diseases of Heart
43% Cancer - All Sites
22% Cerebrovascular Disease
7% Chronic Lower Respiratory Diseases
6% Diabetes Mellitus
6% Alzheimers Disease
6% All Other Unintentional Injuries and Adverse Effects
6% All Other Deaths

Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 4.2 ii. General leading causes of death for ENC41 (2017) by race and gender. Age-adjusted mortality rate per 100,000 population.

Non-White Males

2017 ENC41 NWM age-adjusted rate is 23% higher than 2017 ENC41 WM age-adjusted rate

1130 deaths/100,000

Non-White Females

2017 ENC41 NWF age-adjusted rate is 9% higher than 2017 ENC41 WF age-adjusted rate

736 deaths/100,000

White Males

918 deaths/100,000

White Females

Slices without percentages constitute less than 5% of the deaths within that chart.

Diseases of Heart
Cancer - All Sites
Cerebrovascular Disease
Chronic Lower Respiratory Diseases
Diabetes Mellitus
Alzheimers Disease
All Other Unintentional Injuries and Adverse Effects
All Other Deaths
Figure 4.3 i. General leading causes of death for ENC41 (2017) by race. Mortality rate per 100,000 population.

<table>
<thead>
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<th>Cause</th>
<th>Non-White</th>
<th>White</th>
<th>Difference</th>
</tr>
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<tbody>
<tr>
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<td>44%</td>
<td>22%</td>
<td>22%</td>
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<tr>
<td>Diseases of Heart</td>
<td>21%</td>
<td>22%</td>
<td>1%</td>
</tr>
<tr>
<td>Cerebrovascular Disease</td>
<td>5%</td>
<td>7%</td>
<td>2%</td>
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<tr>
<td>Diabetes Mellitus</td>
<td>6%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>3%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>All Other Unintentional Injuries and Adverse Effects</td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>All Other Deaths</td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
</tr>
</tbody>
</table>

2017 ENC41 NW rate is 9% lower than 2017 ENC41 W rate.

906 deaths/100,000

991 deaths/100,000

Slices without percentages constitute less than 5% of the deaths within that chart.
Figure 4.3 ii. General leading causes of death for ENC41 (2017) by race. Age-adjusted mortality rate per 100,000 population.

Non-White:
- Cancer - All Sites: 44%
- Diseases of Heart: 21%
- Cerebrovascular Disease: 6%
- Diabetes Mellitus: 3%
- Chronic Lower Respiratory Diseases: 5%
- All Other Unintentional Injuries and Adverse Effects: 5%
- All Other Deaths: 7%

2017 ENC41 NW age-adjusted rate is 14% higher than 2017 ENC41 W age-adjusted rate.

White:
- Cancer - All Sites: 22%
- Diseases of Heart: 22%
- Cerebrovascular Disease: 7%
- Diabetes Mellitus: 5%
- Chronic Lower Respiratory Diseases: 5%
- All Other Unintentional Injuries and Adverse Effects: 7%
- All Other Deaths: 39%

903 deaths/100,000

Slices without percentages constitute less than 5% of the deaths within that chart.

790 deaths/100,000
5. Trends and Disparities in Mortality in ENC41:
All Causes of Death and All Causes of Premature Mortality; 1990-2017
All Causes of Death

- ENC's all-cause mortality rate trend is increasing, and in 2017 is 8% greater than RNC and 6% greater than NC. The ENC rate has increased 9% over the 13-year period.

- The age-adjusted all-cause mortality rate for ENC had decreased 11% over the 13-year period. ENC’s rate remains 8% greater than RNC for 2017.

- The non-White male rate remains higher than the other demographic groups. The non-White female rate is projected to converge with the White female rate in the near future.

- The trends for all-cause mortality rates for both non-White and White are decreasing. The non-White rate is 13% greater than the White rate in 2017. They are projected to converge in the distant future.

- Over the recent 13-year period there is a 43% decrease in racial disparity.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 5.1 i. All Causes of Death:
Trends in mortality rates for ENC41, RNC59, and NC
1990-2017 with projections to 2030

- **ENC41 13-yr trendline**
  - 9% increase
  - $R^2 = 0.48$
  - $y = 5.94x + 854.66$

- **RNC59 13-yr trendline**
  - 7% increase
  - $R^2 = 0.48$
  - $y = 4.56x + 802.15$

- **NC 13-yr trendline**
  - 8% increase
  - $R^2 = 0.49$
  - $y = 4.91x + 817.38$

2005 ENC41 rate is 7% greater than RNC59
2017 ENC41 rate is 8% greater than RNC59

Comparison of Fitted Rates in 2005
- ENC41: 6% LT
- RNC59: 4% LT
- NC: ENC41

Comparison of Fitted Rates in 2017
- ENC41: 7% LT
- RNC59: 5% LT
- NC: ENC41

6% LT
4% LT
ENC41
7% GT
2% LT
NC
5% GT
2% LT
NC
8% GT
2% LT
NC
Figure 5.1 ii. All Causes of Death:

ENC41 13-yr trendline
RNC59 13-yr trendline
NC 13-yr trendline
US 12-yr trendline
11% decrease
9% decrease
10% decrease
11% decrease
R2 = 0.79
R2 = 0.69
R2 = 0.75
R2 = 0.84
y = -8.05x + 911.24
y = -5.55x + 822.05
y = -6.31x + 847.66
y = -7.36x + 801.63

2005 ENC41 rate is 11% greater than RNC59
2017 ENC41 rate is 8% greater than RNC59
Figure 5.1 iii. All Causes of Death:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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<th>WM</th>
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Comparison of Fitted Rates in 2017

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<td>36% GT</td>
<td>8% GT</td>
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Figure 5.1 iv. All Causes of Death: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

NW 13-yr trendline
17% decrease
R² = 0.76
y = -13.23x + 1,041.35

W 13-yr trendline
10% decrease
R² = 0.80
y = -6.30x + 856.33

2005 non-White rate is 22% greater than White
2017 non-White rate is 13% greater than White
Figure 5.1 v. All Causes of Death: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
43% decrease
R2 = 0.52
y = -0.71x + 21.69
All Causes of Premature Mortality

- ENC's premature mortality rate is 23% greater than RNC and 15% greater than NC. ENC's rate trend is unreliable.

- The ENC age-adjusted premature mortality trend for the 13-year period has decreased 6%. It is 25% higher than the RNC rate in 2017.

- The non-White male rate is higher than the rates for any other demographic group. The rate for non-White females has the greatest rate of decrease (16% over 13 years).

- The non-White rate remains 42% greater than the White rate. Both are decreasing but the non-White rate is decreasing more quickly.

- A decrease in the premature mortality rate trend for non-Whites and a leveling of the rate for Whites suggests a reduction in racial disparity.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 5.2 i. All Causes of Premature Mortality: Trends in premature mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

- ENC41 13-yr trendline: 4% decrease, \( R^2 = 0.06 \), \( y = -2.38x + 932.85 \)
- RNC59 13-yr trendline: 4% decrease, \( R^2 = 0.10 \), \( y = -2.52x + 768.10 \)
- NC 13-yr trendline: 4% decrease, \( R^2 = 0.10 \), \( y = -2.60x + 815.83 \)

2005 ENC41 rate is 21% greater than RNC59
2017 ENC41 rate is 23% greater than RNC59

ENC41 RNC59 NC ENC41 RNC59 NC
18% LT 13% LT ENC41 18% LT 13% LT ENC41
21% GT 6% GT RNC59 23% GT 6% GT RNC59
14% GT 6% LT NC 15% GT 6% LT NC
Figure 5.2 ii. All Causes of Premature Mortality:

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<td>2017</td>
<td>6% decrease</td>
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Comparison of Fitted Rates in 2005

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Comparison of Fitted Rates in 2017

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Report #2.203, February 2021
Health Systems Research and Development, Dept. of Public Health, ECU
Figure 5.2 iii. All Causes of Premature Mortality:
Trends in age-adjusted premature mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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Comparison of Fitted Rates in 2017

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<td>57%</td>
<td>NWM</td>
</tr>
<tr>
<td>GT</td>
<td>49%</td>
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<td>36%</td>
<td>WM</td>
</tr>
<tr>
<td></td>
<td>72%</td>
<td>15%</td>
<td>26%</td>
<td>NWF</td>
</tr>
<tr>
<td></td>
<td>133%</td>
<td>56%</td>
<td>36%</td>
<td>WF</td>
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\[ y = -14.50x + 1,523.43 \]
\[ y = -5.97x + 978.30 \]
\[ y = -10.99x + 917.11 \]
\[ y = 2.26x + 552.24 \]
Figure 5.2 v. All Causes of Premature Mortality: Measuring disparity in age-adjusted premature mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
28% decrease
\[ R^2 = 0.23 \]
\[ y = -1.21x + 56.32 \]
Diseases of Heart

- ENC’s heart disease rate trend had decreased 6% over the 13-year period. The rates for NC and RNC are 13% and 19% lower respectively and are decreasing faster.

- ENC’s age-adjusted heart disease rate is 13% greater than NC and 10% greater than the US rate. All 3 rates have decreased at a similar pace over the recent 13-year period.

- The rate for non-White males is the highest and is decreasing at about the same pace as the White male rate. The non-White female rate is decreasing the most and is set to converge with the White female rate.

- The non-White rate is 11% higher than the White rate in 2017. The 13-year trend for both is decreasing.

- The trend for racial disparity is not reliable.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.1 i. Diseases of Heart:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

2005 ENC41 rate is 12% greater than RNC59
2017 ENC41 rate is 19% greater than RNC59

Comparison of Fitted Rates in 2005

<table>
<thead>
<tr>
<th>ENC41</th>
<th>RNC59</th>
<th>NC</th>
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<tr>
<td>12% GT</td>
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</tr>
<tr>
<td>9% GT</td>
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Comparison of Fitted Rates in 2017

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<tr>
<td>13% GT</td>
<td>5% LT</td>
<td>NC</td>
</tr>
</tbody>
</table>

ENC41 13-yr trendline
6% decrease
R² = 0.19
y = -0.92x + 211.72

RNC59 13-yr trendline
12% decrease
R² = 0.62
y = -1.69x + 188.28

NC 13-yr trendline
10% decrease
R² = 0.51
y = -1.49x + 195.09
Figure 6.1 ii. Diseases of Heart:

ENC41 13-yr trendline
RNC59 13-yr trendline
NC 13-yr trendline
US 12-yr trendline

26% decrease
26% decrease
26% decrease
25% decrease

\[ \text{ENC41: } y = -4.47x + 227.79 \]
\[ \text{RNC59: } y = -3.82x + 191.96 \]
\[ \text{NC: } y = -4.00x + 202.03 \]
\[ \text{US: } y = -4.39x + 210.82 \]

2005 ENC41 rate is 19% greater than RNC59
2017 ENC41 rate is 19% greater than RNC59

Comparison of Fitted Rates in 2005
<table>
<thead>
<tr>
<th>ENC41</th>
<th>RNC59</th>
<th>NC</th>
<th>US</th>
</tr>
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<td>11% LT</td>
<td>7% LT</td>
<td>ENC41</td>
</tr>
<tr>
<td>19% GT</td>
<td>5% GT</td>
<td>10% GT</td>
<td>RNC59</td>
</tr>
<tr>
<td>13% GT</td>
<td>5% LT</td>
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</tr>
<tr>
<td>8% GT</td>
<td>9% LT</td>
<td>4% LT</td>
<td>US</td>
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Comparison of Fitted Rates in 2017
<table>
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<th>RNC59</th>
<th>NC</th>
<th>US</th>
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<tbody>
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<td>RNC59</td>
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<tr>
<td>10% GT</td>
<td>8% LT</td>
<td>3% LT</td>
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Figure 6.1 iii. Diseases of Heart:
Trends in age-adjusted mortality rates by race and gender for ENC41,
1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

<table>
<thead>
<tr>
<th></th>
<th>NWM 13-yr trendline</th>
<th>WM 13-yr trendline</th>
<th>NWF 13-yr trendline</th>
<th>WF 13-yr trendline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23% decrease</td>
<td>26% decrease</td>
<td>33% decrease</td>
<td>25% decrease</td>
</tr>
<tr>
<td>R2</td>
<td>0.70</td>
<td>0.87</td>
<td>0.87</td>
<td>0.86</td>
</tr>
<tr>
<td>y</td>
<td>-5.44x + 311.00</td>
<td>-5.66x + 277.99</td>
<td>-5.21x + 206.31</td>
<td>-3.31x + 172.29</td>
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Comparison of Fitted Rates in 2017

<table>
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<tr>
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<th>NWM 13-yr trendline</th>
<th>WM 13-yr trendline</th>
<th>NWF 13-yr trendline</th>
<th>WF 13-yr trendline</th>
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<td>51% GT</td>
<td>35% GT</td>
<td>16% LT</td>
<td>NWF</td>
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<tr>
<td></td>
<td>81% GT</td>
<td>61% GT</td>
<td>20% GT</td>
<td>WF</td>
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</table>

NWM 13-yr trendline: 23% decrease, R2 = 0.70, y = -5.44x + 311.00
WM 13-yr trendline: 26% decrease, R2 = 0.87, y = -5.66x + 277.99
NWF 13-yr trendline: 33% decrease, R2 = 0.87, y = -5.21x + 206.31
WF 13-yr trendline: 25% decrease, R2 = 0.86, y = -3.31x + 172.29
Figure 6.1 iv. Diseases of Heart:
Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

- 28% decrease
- 25% decrease
- $R^2 = 0.87$
- $y = -5.31x + 249.58$
- $R^2 = 0.89$
- $y = -4.28x + 218.91$

2005 non-White rate is 14% greater than White
2017 non-White rate is 11% greater than White
Figure 6.1 v. Diseases of Heart:
Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity

\[ R^2 = 0.08 \]
\[ y = -0.26x + 14.12 \]
Cancer - Trachea, Bronchus, Lung

- The cancer-TBL rate trend for ENC has decreased 5% over the recent 13-year period. The ENC rate is 19% greater than the RNC rate. The RNC rate has decreased 16%.

- In 2017 the age-adjusted rate for ENC was 16% above the RNC rate. The ENC rate decreased 27% over the 13-year period, while the RNC rate decreased 32%.

- In 2017 the non-White male rate was the highest but is only 6% higher than the White male rate, is decreasing, and will likely converge soon. The mortality rate for White females is 48% higher than the rate for non-White females. Both are decreasing.

- The non-White mortality rate is 14% less than the White rate. Both are decreasing over the 13-year period at about the same pace.

- The 13-year rate trend for racial disparity is unreliable.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.2 i. Cancer - Trachea, Bronchus, Lung: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

ENC41 13-yr trendline
5% decrease  R2 = 0.33
y = -0.26x + 64.05

RNC59 13-yr trendline
16% decrease  R2 = 0.85
y = -0.73x + 59.89

NC 13-yr trendline
13% decrease  R2 = 0.89
y = -0.60x + 61.11

Comparison of Fitted Rates in 2005
ENC41  6% LT  NC
RNC59  5% LT  ENC41
NC

Comparison of Fitted Rates in 2017
ENC41  16% LT  12% LT  ENC41
RNC59  19% GT  5% GT  RNC59
NC

2005 ENC41 rate is 7% greater than RNC59
2017 ENC41 rate is 19% greater than RNC59

ENC41
RNC59
NC
6% LT
5% LT
ENC41
7% GT
2% GT
RNC59
5% GT
2% LT
NC

Figure 6.2 ii. Cancer - Trachea, Bronchus, Lung:

ENC41 13-yr trendline  RNC59 13-yr trendline  NC 13-yr trendline  US 12-yr trendline
27% decrease  32% decrease  30% decrease  28% decrease
R² = 0.94  R² = 0.97  R² = 0.98  R² = 0.99
y = -1.35x + 65.53  y = -1.48x + 60.48  y = -1.45x + 61.92  y = -1.26x + 54.45

2005 ENC41 rate is 8% greater than RNC59
2017 ENC41 rate is 16% greater than RNC59

Comparison of Fitted Rates in 2005
ENC41 RNC59 NC US
8% LT 6% LT 17% LT ENC41
6% GT 2% GT 10% LT RNC59
20% GT 11% GT 14% GT US

Comparison of Fitted Rates in 2017
ENC41 RNC59 NC US
16% GT 4% GT 8% LT ENC41
11% GT 4% LT 12% LT NC
25% GT 8% GT 13% GT US
Figure 6.2 iii. Cancer - Trachea, Bronchus, Lung:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

- **NWM 13-yr trendline**: 35% decrease
  - $R^2 = 0.78$
  - $y = -2.70x + 100.33$

- **WM 13-yr trendline**: 32% decrease
  - $R^2 = 0.87$
  - $y = -2.25x + 91.31$

- **NWF 13-yr trendline**: 16% decrease
  - $R^2 = 0.28$
  - $y = -0.41x + 32.68$

- **WF 13-yr trendline**: 20% decrease
  - $R^2 = 0.74$
  - $y = -0.76x + 50.18$
Figure 6.2 iv. Cancer - Trachea, Bronchus, Lung: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030.

- NW 13-yr trendline: 28% decrease, $R^2 = 0.76$, \(y = -1.25x + 59.00\)
- W 13-yr trendline: 26% decrease, $R^2 = 0.91$, \(y = -1.37x + 67.68\)

2005 non-White rate is 13% less than White
2017 non-White rate is 14% less than White
Figure 6.2 v. Cancer - Trachea, Bronchus, Lung: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity

\[ R^2 = 0.00 \]

\[ y = -0.11x - 15.26 \]
Chronic Lower Respiratory Diseases

- In 2017 the CLRD morality rate for ENC, RNC and NC are virtually equal. The ENC rate trend has increased 28% over the 13-year period, compared to 14% for RNC and 18% for NC.

- The age-adjusted rate for 2017 for ENC, RNC and NC are equal. The US rate is 7% lower. The rate trend for ENC is unreliable.

- The age-adjusted rate for White males is the highest, followed by White females, then non-White males. The rates for White males and non-White males are decreasing. The rates for White females and non-White females are increasing.

- The non-White rate is 42% less than the White rate. Both rate trends are flat, but neither is reliable.

- The racial disparity trend is unreliable.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.3 i. Chronic Lower Respiratory Diseases:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

ENC41 13-yr trendline 28% increase R2 = 0.74 y = 0.88x + 41.29
RNC59 13-yr trendline 14% increase R2 = 0.75 y = 0.50x + 46.47
NC 13-yr trendline 18% increase R2 = 0.81 y = 0.61x + 44.99

2005 ENC41 rate is 11% less than RNC59
2017 ENC41 rate is 1% less than RNC59

Comparison of Fitted Rates in 2005
ENC41 RNC59 NC
13% GT 9% GT ENC41
11% LT 3% LT RNC59
8% LT 3% GT NC

Comparison of Fitted Rates in 2017
ENC41 RNC59 NC
1% GT 1% GT ENC41
1% LT 0% LT RNC59
1% LT 0% GT NC
Figure 6.3 ii. Chronic Lower Respiratory Diseases:

ENC41 13-yr trendline RNC59 13-yr trendline NC 13-yr trendline US 12-yr trendline
7% decrease 6% decrease 5% decrease
R2 = 0.05 R2 = 0.44 R2 = 0.42 R2 = 0.28
y = -0.08x + 45.22 y = -0.27x + 48.88 y = -0.22x + 47.85 y = -0.19x + 43.25

2005 ENC41 rate is 7% less than RNC59
2017 ENC41 rate is 3% less than RNC59
Figure 6.3 iii. Chronic Lower Respiratory Diseases: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

NWM 13-yr trendline
19% decrease
R² = 0.34
y = -0.72x + 50.09

WM 13-yr trendline
15% decrease
R² = 0.42
y = -0.74x + 62.43

NWF 13-yr trendline
33% increase
R² = 0.43
y = 0.42x + 16.86

WF 13-yr trendline
8% increase
R² = 0.20
y = 0.25x + 44.05

Comparison of Fitted Rates in 2005

<table>
<thead>
<tr>
<th>Race</th>
<th>NWM</th>
<th>WM</th>
<th>NWF</th>
<th>WF</th>
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<td>20% LT</td>
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<td>161% GT</td>
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<tr>
<td>NWM</td>
<td>WM</td>
<td>NWF</td>
<td>WF</td>
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Comparison of Fitted Rates in 2017

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<th>NWF</th>
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<td>89% GT</td>
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<td>NWM</td>
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<td>NWF</td>
<td>WF</td>
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</table>
Figure 6.3 iv. Chronic Lower Respiratory Diseases:
Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

- NW 13-yr trendline
- W 13-yr trendline

R² = 0.01
\( y = 0.03x + 28.47 \)

R² = 0.07
\( y = -0.12x + 51.22 \)

2005 non-White rate is 44% less than White
2017 non-White rate is 42% less than White
Figure 6.3 v. Chronic Lower Respiratory Diseases:
Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity

R² = 0.07
y = 0.67x - 80.66
Cerebrovascular Disease

- ENC's cerebrovascular disease mortality rate trend is flat, but the trend is unreliable. It is 13% greater than the RNC rate and 9% greater than the NC rate.

- The age-adjusted rate has decreased 18% over the 13-year period. It is 13% greater than the RNC rate and 30% greater than the US rate.

- The non-White male rate is the highest and has decreased 23% over the 13-year period. The non-White female rate has decreased 35% and is converging with White males and White females.

- The non-White rate in 2017 is 27% greater than the White rate but is decreasing more rapidly (30% over the 13-year period). Both rates are projected to converge in the future.

- There is a 55% decrease in racial disparity between Whites and non-Whites over the 13-year period

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.4 i. Cerebrovascular Disease:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

ENC41 13-yr trendline  RNC59 13-yr trendline  NC 13-yr trendline

11% decrease  7% decrease

R2 = 0.02  R2 = 0.28  R2 = 0.11

y = 0.13x + 49.57  y = -0.42x + 50.17  y = -0.27x + 50.02

Comparison of Fitted Rates in 2005

<table>
<thead>
<tr>
<th>ENC41</th>
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Comparison of Fitted Rates in 2017

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<tbody>
<tr>
<td>13% LT</td>
<td>4% LT</td>
<td>RNC59</td>
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</table>

2005 ENC41 rate is 1% less than RNC59
2017 ENC41 rate is 13% greater than RNC59
Figure 6.4 ii. Cerebrovascular Disease: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030.

Comparison of Fitted Rates in 2005

<table>
<thead>
<tr>
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<th>US</th>
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<tr>
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Comparison of Fitted Rates in 2017

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<tr>
<td>30% GT</td>
<td>14% GT</td>
<td>19% GT</td>
<td>US</td>
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Figure 6.4 iii. Cerebrovascular Disease:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

- **NWM 13-yr trendline**: 23% decrease
  - $R^2 = 0.35$
  - $y = -1.41x + 78.62$
- **WM 13-yr trendline**: 10% decrease
  - $R^2 = 0.17$
  - $y = -0.37x + 46.51$
- **NWF 13-yr trendline**: 35% decrease
  - $R^2 = 0.76$
  - $y = -1.87x + 68.62$
- **WF 13-yr trendline**: 13% decrease
  - $R^2 = 0.18$
  - $y = -0.47x + 46.02$
Figure 6.4 iv. Cerebrovascular Disease:
Trends in age-adjusted mortality rates by race for ENC41,
1990-2017 with projections to 2030

- 30% decrease
  - NW 13-yr trendline
  - W 13-yr trendline
  - $R^2 = 0.65$
  - $y = -1.71x + 73.40$
  - 12% decrease
  - $R^2 = 0.20$
  - $y = -0.43x + 46.79$

2005 non-White rate is 57% greater than White
2017 non-White rate is 27% greater than White
Figure 6.4 v. Cerebrovascular Disease: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
55% decrease
R2 = 0.70
y = -2.43x + 57.22
Mortality from unintentional injuries and adverse effects is increasing in ENC (70% increase over 13 years). The trends for RNC and NC are also increasing, but the ENC rate is increasing faster.

The age-adjusted mortality rate trend for ENC, RNC, NC and the US are all increasing. ENC’s rate trend increased the most, 59% over the 13-year trend.

The 13-year trends for White males and White females are increasing significantly (70% and 79% respectively). The rates for non-White males and non-White females are increasing, but not as much.

White rates have increased 71% over the 13-year period. Non-White rates have increased 24% in a moderately reliable trend.

Racial disparity has decreased 169% over the 13-year period in a trend that favors non-Whites.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.5 i. All Other Unintentional Injuries and Adverse Effects:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

ENC41 13-yr trendline
70% increase
R2 = 0.74
y = 1.24x + 22.89

RNC59 13-yr trendline
49% increase
R2 = 0.64
y = 0.95x + 25.12

NC 13-yr trendline
55% increase
R2 = 0.69
y = 1.03x + 24.48

2005 ENC41 rate is 9% less than RNC59
2017 ENC41 rate is 4% greater than RNC59
Figure 6.5 ii. All Other Unintentional Injuries and Adverse Effects:
Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US,
1990-2017 with projections to 2030

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
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Comparison of Fitted Rates in 2005

- ENC41: 6% GT
- RNC59: 4% GT
- NC: 5% LT
- US: ENC41

Comparison of Fitted Rates in 2017

- ENC41: 6% LT
- RNC59: 5% LT
- NC: 13% LT
- US: ENC41
Figure 6.5 iii. All Other Unintentional Injuries and Adverse Effects: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

- NWM: 19% increase, R² = 0.17, y = 0.46x + 31.94
- WM: 70% increase, R² = 0.66, y = 1.75x + 32.75
- NWF: 79% increase, R² = 0.74, y = 1.10x + 18.10
- WF: 21% increase, R² = 0.22, y = 0.22x + 13.72

Comparison of Fitted Rates in 2017

- NWM: 13% increase, R² = 0.29, y = 0.63x + 31.62
- WM: 50% increase, R² = 0.76, y = 2.18x + 32.75
- NWF: 91% increase, R² = 0.86, y = 2.10x + 18.10
- WF: 38% increase, R² = 0.46, y = 1.52x + 13.72
Figure 6.5 iv. All Other Unintentional Injuries and Adverse Effects: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

- NW 13-yr trendline
  - 24% increase
  - R² = 0.27
  - y = 0.39x + 21.14

- W 13-yr trendline
  - 74% increase
  - R² = 0.70
  - y = 1.44x + 25.15

2005 non-White rate is 16% less than White
2017 non-White rate is 39% less than White
Figure 6.5 v. All Other Unintentional Injuries and Adverse Effects: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
169% decrease
\[ R^2 = 0.40 \]
\[ y = -3.25x - 25.01 \]
Alzheimer’s Disease

- The Alzheimer’s mortality rate for ENC shows a 119% increase over the recent 13-year period. ENC’s rate is 22% less than RNC and 17% less than NC but ENC’s rate of increase was larger than both RNC and NC.
- In 2016 the age-adjusted rate for ENC was even with the US rate. The ENC rate is lower than the NC rate, but has a higher rate of increase over the 13-year period.
- The mortality rates for females, both White and non-White, are greater than for males. Non-White males have the highest rate of increase (150% over 13 years) and are projected to converge with the White female rate in the future.
- The non-White mortality rate for Alzheimer’s has increased 106% over the 13-year trend. In 2017 the non-White rate is 7% greater than the White rate.
- The racial disparity favors Whites and has increased 155% over the 13-year period.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.6 i. Alzheimer’s Disease:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

Comparison of Fitted Rates in 2017

2005 ENC41 rate is 44% less than RNC59
2017 ENC41 rate is 22% less than RNC59
Figure 6.6 ii. Alzheimer’s Disease: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030.

- ENC41 13-yr trendline: 65% increase
  - R2 = 0.71
  - $y = 0.89x + 17.92$
- RNC59 13-yr trendline: 32% increase
  - R2 = 0.54
  - $y = 0.68x + 27.94$
- NC 13-yr trendline: 38% increase
  - R2 = 0.62
  - $y = 0.74x + 25.24$
- US 12-yr trendline: 22% increase
  - R2 = 0.45
  - $y = 0.42x + 22.61$

Comparison of Fitted Rates in 2005:
- ENC41: 56% GT
- RNC59: 41% GT
- NC: 26% GT
- US: ENC41

Comparison of Fitted Rates in 2017:
- ENC41: 21% LT
- RNC59: 16% LT
- NC: 19% LT
- US: 4% GT

2005 ENC41 rate is 36% less than RNC59
2017 ENC41 rate is 21% less than RNC59
Figure 6.6 iii. Alzheimer’s Disease:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

Comparison of Fitted Rates in 2017

Report #2.203, February 2021
Health Systems Research and Development, Dept. of Public Health, ECU
Figure 6.6 iv. Alzheimer’s Disease:
Trends in age-adjusted mortality rates by race for ENC41,
1990-2017 with projections to 2030

2005 non-White rate is 19% less than White
2017 non-White rate is 7% greater than White

NW 13-yr trendline
106% increase
R2 = 0.74
y = 1.25x + 15.23

W 13-yr trendline
53% increase
R2 = 0.67
y = 0.76x + 18.92
Figure 6.6 v. Alzheimer's Disease:
Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity

155% increase

R2 = 0.54

y = 2.15x - 18.02
Diabetes Mellitus

- ENC’s diabetes mortality rate is 30% greater than RNC in 2017. The rate for ENC increased 9% over the 13-year period in a moderately reliable trend.

- ENC’s age-adjusted rate has decreased 14% over the 13-year period. It is 30% greater than the RNC rate and 34% greater than the US rate.

- The rate for non-White males is the highest and is increasing (10% increase over the 13-year period). The non-White female rate has decreased 35% and the White female rate has decreased 17%. The White male rate is unreliable.

- The non-White mortality rate decreased 19% over the 13-year period but remains 124% greater than the White rate.

- The trend for racial disparity is moderately reliable and suggests a 14% decrease in racial disparity.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.7 i. Diabetes Mellitus: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

ENC41 13-yr trendline
9% increase
R2 = 0.16
y = 0.21x + 29.49

RNC59 13-yr trendline
24% increase
R2 = 0.41
y = 0.38x + 20.02

NC 13-yr trendline
18% increase
R2 = 0.35
y = 0.32x + 22.76

2005 ENC41 rate is 47% greater than RNC59
2017 ENC41 rate is 30% greater than RNC59

Comparison of Fitted Rates in 2005
ENC41 32% LT
RNC59 23% LT
NC ENC41

Comparison of Fitted Rates in 2017
ENC41 30% GT
RNC59 8% GT
NC ENC41

ENC41 23% LT
RNC59 17% LT
NC ENC41

Report #2.203, February 2021
Health Systems Research and Development, Dept. of Public Health, ECU
Figure 6.7 ii. Diabetes Mellitus:

ENC41 13-yr trendline
14% decrease
R2 = 0.42
y = -0.33x + 31.23

RNC59 13-yr trendline
14% decrease
R2 = 0.00
y = 0.02x + 20.66

NC 13-yr trendline
14% decrease
R2 = 0.05
y = -0.08x + 23.63

US 12-yr trendline
R2 = 0.62
y = -0.28x + 23.68

2005 ENC41 rate is 51% greater than RNC59
2017 ENC41 rate is 30% greater than RNC59

Comparison of Fitted Rates in 2005

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Figure 6.7 iii. Diabetes Mellitus:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030
**Figure 6.7 iv. Diabetes Mellitus:**
Trends in age-adjusted mortality rates by race for ENC41,
1990-2017 with projections to 2030

NW 13-yr trendline
- 19% decrease
  - R² = 0.52
  - \( y = -0.78x + 54.42 \)

W 13-yr trendline
- 11% decrease
  - R² = 0.29
  - \( y = -0.19x + 22.36 \)

2005 non-White rate is 143% greater than White
2017 non-White rate is 124% greater than White
Figure 6.7 v. Diabetes Mellitus: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
14% decrease
\[ R^2 = 0.21 \]
\[ y = -1.60x + 143.85 \]
Pneumonia and Influenza

- The mortality rate trend for pneumonia and influenza for ENC has increased 11% over the 13-year period. The trends for RNC and NC are flat and unreliable. The ENC rate is 8% less than RNC.

- The age-adjusted rate trends for all NC regions are similar and are decreasing at about the same pace. The ENC rate is 19% greater than the US rate.

- The age-adjusted rate trends for White males and White females are decreasing. The trends for non-White males and non-White females are unreliable.

- The White rate trend has decreased 19% over the 13-year period. The non-White rate is unreliable.

- Racial disparity has increased 142% over the 13-year period and favors Whites in a moderately reliable trend.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.8 i. Pneumonia and Influenza:
  Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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ENC41 13-yr trendline  RNC59 13-yr trendline  NC 13-yr trendline

11% increase
R2 = 0.15  
y = 0.14x + 16.51

R2 = 0.00  
y = 0.00x + 19.68

R2 = 0.01  
y = 0.04x + 18.77

2005 ENC41 rate is 16% less than RNC59
2017 ENC41 rate is 8% less than RNC59
Figure 6.8 ii. Pneumonia and Influenza:

ENC41 13-yr trendline: 14% decrease
R2 = 0.27
y = -0.19x + 18.43

RNC59 13-yr trendline: 16% decrease
R2 = 0.38
y = -0.26x + 20.37

NC 13-yr trendline: 16% decrease
R2 = 0.42
y = -0.24x + 19.85

US 12-yr trendline: 30% decrease
R2 = 0.73
y = -0.48x + 19.35

2005 ENC41 rate is 10% less than RNC59
2017 ENC41 rate is 7% less than RNC59
Figure 6.8 iii. Pneumonia and Influenza:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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Figure 6.8 iv. Pneumonia and Influenza: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

2005 non-White rate is 11% less than White
2017 non-White rate is 5% greater than White

NW 13-yr trendline
W 13-yr trendline

19% decrease
R2 = 0.00
y = -0.03x + 16.90

R2 = 0.41
y = -0.27x + 18.98
Figure 6.8 v. Pneumonia and Influenza: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
142% increase
\[ R^2 = 0.13 \]
\[ y = 1.60x - 14.61 \]
Nephritis, Nephrotic Syndrome, and Nephrosis

- Mortality due to nephritis, nephrotic syndrome, and nephrosis in ENC has decreased 11% over 13 years in a moderately reliable trend. The 2017 rate for ENC, NC and RNC were equal.

- The age-adjusted ENC rate is equal to the NC rate but the 13-year rate trend for ENC has decreased 29% and is set to drop below the NC rate.

- The 13-year trends for non-White males and females are higher than those for White males and females. Non-White females show the greatest decrease, 39% over 13 years. White females have the lowest rates.

- In 2017 the non-White rate was 107% greater than the White rate but declined 35% over 13 years. The White rate declined 25%.

- Racial disparity shows a 24% decrease over the 13-year period in a moderately reliable trend.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.9 i. Nephritis, Nephrotic Syndrome, and Nephrosis: Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

- ENC41 13-yr trendline: 11% decrease
  - $R^2 = 0.25$
  - $y = -0.17x + 21.28$
- RNC59 13-yr trendline: 10% increase
  - $R^2 = 0.22$
  - $y = 0.13x + 17.10$
- NC 13-yr trendline: 3% increase
  - $R^2 = 0.03$
  - $y = 0.04x + 18.30$

- 2005 ENC41 rate is 24% greater than RNC59
- 2017 ENC41 rate is 3% greater than RNC59

Comparison of Fitted Rates in 2005:
- ENC41: 24% GT, 16% LT
- RNC59: 7% GT, 9% LT
- NC: 6% GT, 14% LT

Comparison of Fitted Rates in 2017:
- ENC41: 3% GT, 2% LT
- RNC59: 1% GT, 9% LT
- NC: 2% GT, 1% LT
Figure 6.9 ii. Nephritis, Nephrotic Syndrome, and Nephrosis: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030.

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Comparison of Fitted Rates in 2005

ENC41: 29% decrease
RNC59: 8% decrease
NC: 15% decrease
US: 16% decrease

Comparison of Fitted Rates in 2017

ENC41: 23% LT
RNC59: 2% LT
NC: 1% GT
US: 48% GT
Figure 6.9 iii. Nephritis, Nephrotic Syndrome, and Nephrosis: Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

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Comparison of Fitted Rates in 2005

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Comparison of Fitted Rates in 2017

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</table>
Figure 6.9 iv. Nephritis, Nephrotic Syndrome, and Nephrosis: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

NW 13-yr trendline
35% decrease
R² = 0.64
y = -1.05x + 39.11

W 13-yr trendline
25% decrease
R² = 0.62
y = -0.32x + 16.62

2005 non-White rate is 135% greater than White
2017 non-White rate is 107% greater than White
Figure 6.9 v. Nephritis, Nephrotic Syndrome, and Nephrosis: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
24% decrease
R² = 0.20
y = -2.61x + 138.50
Unintentional Motor Vehicle Injuries

- ENC’s unintentional motor vehicle injury mortality rate trend is decreasing but is still 39% greater than RNC in 2017.
- The ENC age-adjusted rate is 41% greater than RNC and 62% greater than the US. The rates for ENC, RNC, NC and the US are all decreasing.
- The rates for non-White males and non-White females are not reliable. The trends for White males and White females are declining.
- The White rate trend has decreased 45% over the 13-year period. The non-White rate is unreliable.
- Racial disparity has increased significantly over the 13-year period.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 6.10 i. Unintentional Motor Vehicle Injuries:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

- ENC41 13-yr trendline: 32% decrease, \( R^2 = 0.59 \), \( y = -0.59x + 24.15 \)
- RNC59 13-yr trendline: 26% decrease, \( R^2 = 0.38 \), \( y = -0.31x + 16.03 \)
- NC 13-yr trendline: 28% decrease, \( R^2 = 0.48 \), \( y = -0.40x + 18.37 \)

2005 ENC41 rate is 51% greater than RNC59
2017 ENC41 rate is 39% greater than RNC59

Comparison of Fitted Rates in 2005

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Comparison of Fitted Rates in 2017

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<td>25% GT</td>
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Figure 6.10 ii. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates for ENC41, RNC59, NC, and US, 1990-2017 with projections to 2030

ENC41 13-yr trendline  RNC59 13-yr trendline  NC 13-yr trendline  US 12-yr trendline
32% decrease  28% decrease  30% decrease  29% decrease
R2 = 0.60  R2 = 0.44  R2 = 0.52  R2 = 0.62
y = -0.60x + 24.04  y = -0.35x + 16.10  y = -0.43x + 18.40  y = -0.36x + 14.68

2005 ENC41 rate is 49% greater than RNC59
2017 ENC41 rate is 41% greater than RNC59
Figure 6.10 iii. Unintentional Motor Vehicle Injuries:
Trends in age-adjusted mortality rates by race and gender for ENC41,
1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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Comparison of Fitted Rates in 2017

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<td>263% GT</td>
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R² = 0.07
y = -0.42x + 37.38

R² = 0.78
y = -1.18x + 34.38

R² = 0.01
y = 0.03x + 11.24

R² = 0.73
y = -0.52x + 15.18
Figure 6.10 iv. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

- 45% decrease
- R2 = 0.02
  \[ y = -0.12x + 22.84 \]
- R2 = 0.82
  \[ y = -0.87x + 24.86 \]

2005 non-White rate is 8% less than White
2017 non-White rate is 48% greater than White
Figure 6.10 v. Unintentional Motor Vehicle Injuries: Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
424% increase
\[ R^2 = 0.58 \]
\[ y = 5.18x - 15.87 \]
7. Trends and Disparities in Mortality in ENC41: Cancer - All Sites and HIV Disease; 1990-2017
Cancer - All Sites

- The cancer - all sites mortality rate trends for ENC, NC and RNC are unreliable.
- The age-adjusted cancer - all sites mortality rate trends for ENC, RNC, NC and the US are all decreasing at about the same pace. The ENC rate trend is 8% greater than RNC and 9% greater than the US.
- The rate for non-White males has decreased 28% over 13 years and the White male rate has decreased 21%. The non-White male and White male rates are the highest.
- Both White and non-White cancer – all sites mortality rates are decreasing over the 13-year period, although non-White rates are 9% greater than Whites.
- The moderately reliable 13-year trend for racial disparity shows a 62% decrease.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 7.1 i. Cancer - All Sites:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

ENC41 13-yr trendline  RNC59 13-yr trendline  NC 13-yr trendline

R2 = 0.9  R2 = 0.6  R2 = 0.0
y = 0.33x + 200.34  y = -0.16x + 187.13  y = -0.04x + 190.97

Comparison of Fitted Rates in 2005
ENC41  RNC59  NC
7% LT  5% LT  ENC41

Comparison of Fitted Rates in 2017
ENC41  RNC59  NC
10% GT  3% GT  RNC59
7% GT  3% LT  NC
Figure 7.1 ii. Cancer - All Sites:

- ENC41 13-yr trendline: 19% decrease, R2 = 0.95, y = -3.11x + 207.61
- RNC59 13-yr trendline: 19% decrease, R2 = 0.96, y = -2.74x + 190.02
- NC 13-yr trendline: 19% decrease, R2 = 0.97, y = -2.86x + 195.08
- US 12-yr trendline: 17% decrease, R2 = 1.00, y = -2.62x + 187.27

Comparison of Fitted Rates in 2005:

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Figure 7.1 iii. Cancer - All Sites:
Trends in age-adjusted mortality rates by race and gender for ENC41, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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R2 = 0.82
y = -6.96x + 319.49

R2 = 0.94
y = -3.95x + 248.78

R2 = 0.63
y = -2.61x + 177.60

R2 = 0.87
y = -2.17x + 164.06

28% decrease

21% decrease

19% decrease

17% decrease

22% LT

44% LT

49% LT

NWM

28% GT

29% LT

34% LT

WM

80% GT

52% GT

8% GT

WF

95% GT

22% LT

44% LT

49% LT

NWM

28% GT

29% LT

34% LT

WM

80% GT

52% GT

8% GT

WF
Figure 7.1 iv. Cancer - All Sites:
Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

NW 13-yr trendline
23% decrease
\[ R^2 = 0.81 \]
\[ y = -4.08x + 229.39 \]

W 13-yr trendline
18% decrease
\[ R^2 = 0.97 \]
\[ y = -2.77x + 198.54 \]

2005 non-White rate is 16% greater than White
2017 non-White rate is 9% greater than White
Figure 7.1 v. Cancer - All Sites:
Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
44% decrease
$R^2 = 0.19$
y = -0.53x + 15.66
HIV Disease

- The HIV mortality rate for ENC has decreased 69% over the past 13 years but was still 30% higher than RNC in 2017.
- The 13-year age-adjusted rate trend for ENC has been decreasing over the past 13 years, but still was 38% greater than RNC.
- Non-White males continue to have the highest rate of age-adjusted mortality, but this rate has decreased 74% in a 13-year reliable trend. The rate for White males decreased 69% and non-White females decreased 77%. A convergence of the non-White and White rate is expected in the future.
- The 13-year non-White age-adjusted HIV mortality rate has decreased by 75%; the White rate has decreased by 59%. The 2 rates are expected to converge.
- Racial disparity has decreased 40% over the 13-year period in a moderately reliable trend.

Unless otherwise noted, trends are considered reliable if $R^2 \geq 0.35$, moderately reliable if $0.35 > R^2 \geq 0.10$, and unreliable if $R^2 < 0.10$. 
Figure 7.2 i. HIV Disease:
Trends in mortality rates for ENC41, RNC59, and NC, 1990-2017 with projections to 2030

Comparison of Fitted Rates in 2005

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Comparison of Fitted Rates in 2017

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<tr>
<td>23% LT</td>
<td>17% LT</td>
<td>ENC41</td>
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ENC41 13-yr trendline
RNC59 13-yr trendline
NC 13-yr trendline

69% decrease
R2 = 0.93
y = -0.35x + 6.51

63% decrease
R2 = 0.87
y = -0.21x + 4.32

66% decrease
R2 = 0.95
y = -0.25x + 4.95
Trends and Disparities in Mortality in Eastern North Carolina-41 Counties

Figure 7.2 ii. HIV Disease:

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Comparison of Fitted Rates in 2005

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<th>ENC41</th>
<th>RNC59</th>
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<tbody>
<tr>
<td>57% GT</td>
<td>36% LT</td>
<td>26% LT</td>
<td>26% LT</td>
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<tr>
<td>36% GT</td>
<td>16% GT</td>
<td>2% GT</td>
<td>35% LT</td>
</tr>
<tr>
<td>55% GT</td>
<td>2% LT</td>
<td>14% GT</td>
<td>US</td>
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</table>

Comparison of Fitted Rates in 2017

<table>
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<th>ENC41</th>
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<tbody>
<tr>
<td>38% GT</td>
<td>36% LT</td>
<td>28% LT</td>
<td>20% LT</td>
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<tr>
<td>25% GT</td>
<td>14% GT</td>
<td>16% GT</td>
<td>12% LT</td>
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<tr>
<td>50% GT</td>
<td>2% LT</td>
<td>9% GT</td>
<td>14% GT</td>
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Note: LT = Less Than, GT = Greater Than
Figure 7.2 iii. HIV Disease:
Figure 7.2 iv. HIV Disease:
Trends in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030
Figure 7.2 v. HIV Disease:
Measuring disparity in age-adjusted mortality rates by race for ENC41, 1990-2017 with projections to 2030

Racial Disparity
40% decrease
R² = 0.27
y = -30.01x + 973.06
## 8. Appendix

<table>
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<tr>
<th>Disease</th>
<th>ICD 10 Code</th>
<th>ICD 9 Code</th>
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<tbody>
<tr>
<td>Diseases of Heart</td>
<td>I00-I09, I11, I13, I20-I51</td>
<td>390-398, 402, 404, 410-429</td>
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<tr>
<td>Cerebrovascular Disease</td>
<td>I60-I69</td>
<td>430-434, 436-438</td>
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<tr>
<td>Atherosclerosis</td>
<td>I70</td>
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<tr>
<td>Cancer - All Sites</td>
<td>C00-C97</td>
<td>140-208</td>
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<tr>
<td>Cancer - Lip, Oral Cavity, and Pharynx</td>
<td>C00-C14</td>
<td>140-149</td>
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<td>Cancer - Stomach</td>
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<td>Cancer - Colon, Rectum, and Anus</td>
<td>C18-C21</td>
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<td>Cancer - Liver</td>
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<td>Cancer - Pancreas</td>
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<td>Cancer - Larynx</td>
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<td>Cancer - Trachea, Bronchus, and Lung</td>
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<td>Cancer - Malignant Melanoma of Skin</td>
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<td>Cancer - Breast</td>
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<td>Cancer - Bladder</td>
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<td>Cancer - Brain</td>
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<td>Cancer - Non-Hodgkin's Lymphoma</td>
<td>C82-C85</td>
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<td>Cancer - Leukemia</td>
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<td>HIV Disease</td>
<td>B20-B24</td>
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<td>Diabetes Mellitus</td>
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<td>Chronic Lower Respiratory Diseases</td>
<td>J40-J47</td>
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<td>Chronic Liver Disease and Cirrhosis</td>
<td>K70, K73-K74</td>
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<tr>
<td>Nephritis, Nephrotic Syndrome, and Nephrosis</td>
<td>N00-N07, N17-N19, N25-N27</td>
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<td>Unintentional Motor Vehicle Injuries</td>
<td>V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2</td>
<td>E810-E825</td>
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<tr>
<td>All Other Unintentional Injuries and Adverse Effects</td>
<td>V01, V05-V06, V09.1, V09.3-V09.9, V10-V11, V15-V18, V19.3, V19.8-V19.9, V80.0-V80.2, V80.6-V80.9, V81.2-V81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9, V90-V99, W00-X59, Y85, Y86</td>
<td>E800-E807,E826-E829,E830-E848,E929.0,E929.1,E850-E869,E880-E928,E929.2-E929.9</td>
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<td>Homicide</td>
<td>X85-Y09, Y87.1</td>
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<td>Legal Intervention</td>
<td>Y35, Y89.0</td>
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