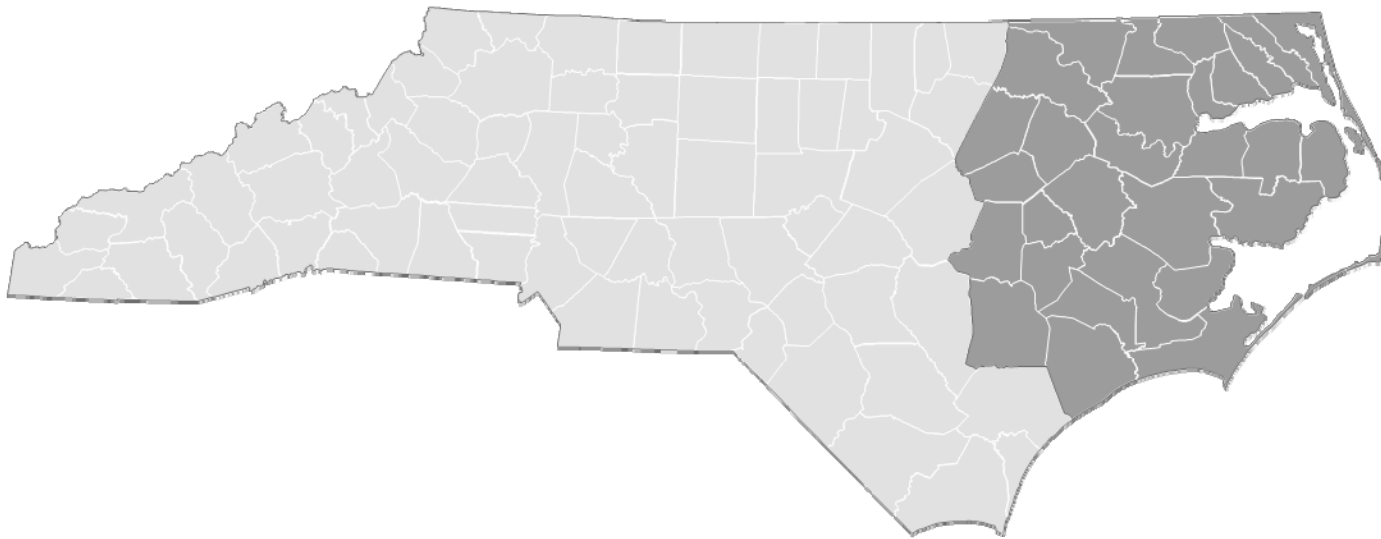


Trends and Disparities in Mortality in Eastern North Carolina

Total Deaths, Premature Mortality and Deaths for Ten Leading Causes; 1979-2008



A Resource for Healthy Communities

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1. Introduction

**Health Indicators Series:
A Resource for Healthy Communities
April 2011**

Report Series #2: Mortality Trends for Eastern North Carolina - (1979 to 2008)

Health Indicators is a series of reports describing community health at the state, regional, and county level. *Health Indicators* supplements the *Eastern North Carolina Health Care Atlas* published by the Center for Health Services Research and Development at East Carolina University. These reports are intended to provide state policy makers, local health departments, hospitals, and community-based health planning groups with a wide range of information useful for diagnosing the health of 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*, produced by the North Carolina Office of Healthy Carolinians, as part of the Community Health Assessment Process. Individual reports in ECU's Health Indicator Series are custom made for the counties of North Carolina. Reports in this series will describe trends in mortality, including premature mortality for all causes of death, 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 the two overarching goals of *Healthy People 2020*, the national blueprint for health improvement. The first goal is to increase the span and quality of life and the second is to eliminate health disparities. North Carolina's companion plan, *Healthy Carolinians 2020*, has also embraced these two goals. 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 29-year period (1979 to 2008), as well as the most recent ten year period (1999-2008). 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. Making the area of each pie chart equivalent to the rate for the population group helps convey the dimension of disparity across population groups. The next section charts recent trends and disparities in mortality and provides projections to the year 2020. 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 29 counties located in the extreme east of North Carolina and approximates the coastal plain physiographic province of the state. It includes the northern 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 ENC29 or ENC. The rest of North Carolina is the remaining 71 counties; abbreviated as RNC71 or RNC.

2. Data Highlights

Trends and Disparities in Mortality in Eastern North Carolina

The following highlights of mortality in Eastern North Carolina (ENC29) 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 2008, age-adjusted mortality rate for Eastern North Carolina is 878 deaths per 100,000. This rate is 6% higher than the state rate. Within Eastern North Carolina, the non-White rate is 16% higher than the White rate. The non-White male rate is 28% higher than the rate for White males. The non-White female rate is 11% higher than the rate for White females.

The five specific leading causes of cancer mortality in Eastern North Carolina (2008) are:

1. Diseases of Heart
2. Cancer - All Sites
3. Cerebrovascular Disease
4. Chronic Lower Respiratory Diseases
5. Diabetes Mellitus

The five specific leading causes of mortality in Eastern North Carolina by race and gender (2008) are:

	Race and Gender			
	non-White Males	White Males	non-White Females	White Females
1st	Diseases of Heart	Cancer - All Sites	Diseases of Heart	Diseases of Heart
2nd	Cancer - All Sites	Diseases of Heart	Cancer - All Sites	Cancer - All Sites
3rd	Cerebrovascular Disease	Chronic Lower Respiratory Diseases	Cerebrovascular Disease	Chronic Lower Respiratory Diseases
4th	Diabetes Mellitus	Cerebrovascular Disease	Diabetes Mellitus	Cerebrovascular Disease
5th	Chronic Lower Respiratory Diseases	All Other Unintentional Injuries and Adverse Effects	Nephritis, Nephrotic Syndrome, and Nephrosis	Alzheimers Disease

Trends in Mortality from All Causes

- While the 30-year ENC trend line shows all-cause mortality rates are increasing and diverging from RNC and NC trends, the 10-year trend line shows that all three trends have been decreasing. The ENC all-cause mortality rates are still diverging slightly from RNC and NC 10-year trends.
- The age-adjusted, all-cause mortality rates are decreasing for all four 30-year trends with ENC remaining above the rest. The 10-year trends suggest convergence of ENC with RNC and NC in the future.
- The non-White male mortality rate remains higher than other demographic groups, although convergence in the future is suggested.
- The non-White mortality rate remains 20% higher than Whites in 2008 but the 10-year trends suggest convergence in the future, as both are decreasing.
- The 10-year trend for racial disparity shows a 28% decrease in a moderately reliable trend.

Trends in Premature Mortality from All Causes (years of life lost before age 75)

- ENC's premature mortality rate has decreased by 3% since 1999. However, this trend is diverging from both RNC and NC, which have decreased 8% and 7% respectively since 1999.
- The age-adjusted premature mortality trend for ENC continues to decrease but at a slower decline than RNC, NC, and US. ENC remains 20% greater than RNC in 2008.
- The non-White male rates of premature mortality are significantly higher than other demographic groups but also have the greatest rate of decrease (slope of trend). White females have the lowest rate of premature mortality.
- The non-White rate remains 57% greater than the White rate but is decreasing at a rate of 17% in the 10-year trend compared to 4% for the White 10-year trend.
- The 10-year trend for racial disparity shows a 31% decrease in a reliable trend.

Diseases of Heart

- Based on the 10 year trend line, ENC's heart disease mortality rate is decreasing, but not as quickly as RNC and NC, resulting in an increased geographical disparity. In 1999, ENC's rate was 11% greater than RNC; by 2008, the disparity between the two was 19%.
- ENC's age-adjusted mortality rate is decreasing more quickly than RNC, NC and the US. The ENC rate was 15% greater than RNC in 2008 and convergence in the future appears likely.
- The trend for males, both non-White and White, are converging with those of non-White and White females. Non-White males continue to have the highest rate for all demographic groups.
- The 10-year trend lines by race show an estimated 57% decrease in heart disease mortality rates for Whites versus a 47% decrease for non-Whites.
- The 10-year increasing trend line for racial disparity is unreliable.

Cancer - Trachea, Bronchus, Lung

- The 10-year trend line for ENC crude mortality of Cancer – TBL is unreliable though continually higher than the rates of RNC and NC. In 2008, the ENC rate was 13% greater than RNC.
- During the period 1999-2008, the age-adjusted rate for ENC is decreasing at a greater rate than RNC, US, and NC and convergence in the near future is suggested. All four rates remain significantly higher than the goal set by *Healthy People 2010* of less than 44.9 deaths per 100,000.

- The mortality rate trends for males are decreasing; convergence with the increasing female trends is suggested in the future. Non-white males continue to have the highest rates in 2008.
- The non-White mortality rate for this cancer continues to decrease over the 10-year period and is diverging from the White rate. In 2008, the non-White rate was 11% less than the White rate.
- The moderately reliable trend for racial disparity has continued to decrease significantly over the 10 year period.

Cerebrovascular Disease

- ENC's cerebrovascular disease mortality trend line is decreasing but is diverging slightly from both RNC and NC. In 2008, the ENC rate was 20% greater than RNC.
- The ENC age-adjusted cerebrovascular disease mortality rate is decreasing and converging on the RNC and NC rates. Projected to 2020, the *Healthy People 2010* goal of less than 48 deaths per 100,000 could be achieved in the region.
- Although both non-White males and non-White females continue to have the highest cerebrovascular disease mortality rates, the rates are decreasing and converging on White male and White female rates. The non-White male rate in 2008 was 78% greater than the rate for White males; the non-White female rate was 37% greater than the rate for White females.
- The cerebrovascular disease mortality rate for non-Whites is decreasing and converging with that of Whites but remains 52% greater than Whites in 2008.
- The trend for racial disparity from 1999-2008 shows a 35% increase in a moderately reliable trend.

Chronic Lower Respiratory Diseases

- The 30-year CLRD mortality rate for ENC is increasing substantially at an annual rate of 5.5%. However, the 10-year trend for ENC appears to be decreasing, but the trend is not reliable. In 2008, the ENC rate was 1% less than RNC, decreasing below RNC for the first time.
- The 10-year CLRD age-adjusted rate for ENC is decreasing and converging with the US rate, remaining lower than RNC and NC. The ENC rate in 2008 was 8% less than RNC, whereas in 1999 the ENC rate was 9% greater than RNC.
- Fitted rates for non-White male, White male, and White female mortality have decreased over 10 years by 28%, 26%, and 6%, respectively, and are converging. Non-White males have the greatest rates of decrease. The 10-year trend for non-White females is unreliable.
- The 10-year White mortality rate trend is higher than the non-White trend, but the white trend is decreasing at a greater rate, although convergence is not suggested in the near future. The non-White rate remains 41% less than the White rate in 2008.
- The trend for racial disparity is not reliable.

Diabetes Mellitus

- The 30-year CLRD mortality rate for ENC is increasing substantially at an annual rate of 5.5%. However, the 10-year trend for ENC appears to be decreasing, but the trend is not reliable. In 2008, the ENC rate was 1% less than RNC, decreasing below RNC for the first time.
- The 10-year CLRD age-adjusted rate for ENC is decreasing and converging with the US rate, remaining lower than RNC and NC. The ENC rate in 2008 was 8% less than RNC, whereas in 1999 the ENC rate was 9% greater than RNC.
- Fitted rates for non-White male, White male, and White female mortality have decreased over 10 years by 28%, 26%, and 6%, respectively, and are converging. Non-White males have the greatest rates of decrease. The 10-year trend for non-White females is unreliable.
- The 10-year White mortality rate trend is higher than the non-White trend, but the white trend is decreasing at a greater rate, although convergence is not suggested in the near future. The non-White rate remains 41% less than the White rate in 2008.
- The trend for racial disparity is not reliable.

All Other Unintentional Injuries and Adverse Effects

- Mortality from unintentional injuries and adverse effects has increased substantially in ENC (29% over 10 years). In 1999, ENC was 5% greater than RNC. In 2008, ENC is 4% less than RNC, suggesting a regional disparity that favors the ENC region.
- The age-adjusted mortality 10-year trend lines also suggest a regional disparity that favors ENC. The ENC rate is 6% less than the RNC rate in 2008. The ENC rate has increased 20% over 10 years. All trends are higher than the *Healthy People 2010* projected goal of less than 17.5 deaths per 100,000.
- The non-White male rates continue to decrease at a greater rate (39%) than other demographic groups and convergence with White female and non-White female rates is suggested in the future. The White male rate is now the highest rate of all demographic groups and has increased 32% over 10 years. White females had the greatest rate of increase (90%) over 10 years.
- Non-White rates have decreased by 31% over 10 years, whereas white rates have increased 52%, causing these two rates to diverge significantly. In 2008, the non-White rate is 35% less than the White rate.
- The racial disparity associated with deaths from unintentional injuries has decreased by 304% between 1999 and 2008, eliminating the unfavorable disparity in relation to Whites, and favoring non-Whites.

Alzheimers Disease

- The Alzheimer's mortality rate is increasing at a rate of 4.6% per year, showing a 46% increase over the 10-year period, about the same rate of increase as RNC and NC.
- In 2008, the age-adjusted rate for ENC is on par with the US (2006) rate. The rate of increase for ENC is below the US and NC rates of increase.
- The mortality rate for females, both White and non-White, is greater than that of non-White and White males.
- The non-White mortality rate for Alzheimer's has been increasing continually but remains less than the White mortality rate by 22% in 2008.
- The trend for racial disparity is not reliable, but currently favors non-Whites in a moderately reliable trend.

Nephritis, Nephrotic Syndrome, and Nephrosis

- Mortality due to nephritis, nephrotic syndrome, and nephrosis in ENC has increased by 29% over 10 years, a rate divergent from those of RNC and NC. While other regions have also experienced large increases, ENC rate of increase remains the greatest.
- With age-adjustment, ENC has increased by 13% contrasting to the 21% rate increase for RNC. This suggests convergence of ENC with RNC and NC in the near future.
- The 10-year trend for non-White males is unreliable but continues to remain the demographic group with the highest mortality rates. Non-white females have the greatest rate of decline, 12% decrease over 10 years, suggesting convergence with White males in the near future.
- In 2008, the non-White rate was 116% greater than the White rate.
- A reliable trend shows a 41% decrease in racial disparity over the 10-year period.

Pneumonia and Influenza

- The mortality rates for pneumonia and influenza have all been decreasing over the 1999-2008 period. ENC is decreasing less (18% over the 10-year period) and therefore diverging from RNC and NC.
- The age-adjusted mortality rates for all NC regions are decreasing at very similar rates (decreasing approximately 3.1% annually), all declining at a rate slightly greater than the US (2.5% decrease annually).
- The age-adjusted mortality rates for both genders of both races appear to be decreasing with Non-White males and White males remaining

the highest. Non-White females have seen the greatest decrease, 39% from 1999-2008.

- White mortality rates remain higher and diverging from non-Whites rates. Non-white rates were 10% less than White rates in 2008.
- The decreasing 10-year trend in racial disparity is not reliable.

Unintentional Motor Vehicle Injuries

- ENC's unintentional motor vehicle injury rate is unreliable but is continually higher than the RNC rate (29% greater than RNC in 2008).
- There is a similar unreliable trend in the age-adjusted mortality rate for ENC. The ENC age-adjusted rate is 28% greater than RNC and 49% greater than the US rate in 2008. Regardless of reliability, the trends indicate that the *HP2010* target will not be met soon.
- All 10-year trends for males are unreliable though rates are continually higher in men, both White and non-White. Non-White female mortality rate has decreased 41% over the 10-year period and has achieved the *HP2010* goal of less than 9.2 deaths per 100,000.
- The non-White rates have decreased by 10% and converged with the White rates suggesting a reversal in disparity within ENC. In 2008, the non-White rate was 9% less than the White rate compared to 1999 when the non-White rate was 7% greater than the White rate.
- Recent observed rates and fitted rates suggest that the racial disparity in ENC is eliminated, and may actually be favoring non-Whites. With a moderately reliable trend, the racial disparity has decreased by 259% over the 10-year period.

Cancer - All Sites

- The cancer – all sites mortality rate trend for ENC is unreliable but continuously higher than both RNC and NC rate trends. The 30-year trend shows ENC as increasingly divergent from RNC and NC rate trends. In 2008, the ENC rate was 17% greater than RNC.
- The age-adjusted cancer – all sites mortality trends for all regions are decreasing with ENC decreasing at the fastest rate (12% over 10 years) but continuing to have the highest rates. All regions are not projected to achieve the *Healthy People 2010* goal of less than 159.9 deaths per 100,000.
- The cancer – all sites mortality rates for White and non-White males are decreasing. Non-White males have seen the greatest decrease from 1999-2008 (24% decrease) while White females have reached the *HP2010* goal of fewer than 159.9 deaths per 100,000.
- Both Whites and non-White cancer mortality trends have been decreasing over the 10-year period (11% and 16% decreases, respectively) but the non-White rate remains 18% greater than the White rate in 2008.
- The decreasing 10-year trend for racial disparity is not reliable.

HIV Disease

- According to the 10-year trend lines for HIV mortality, rates are decreasing for all regions but ENC has the greater rate of decrease suggesting convergence with RNC and NC in the future. Although the ENC rate has been decreasing, it is still 33% greater than RNC in 2008.
- The age-adjusted rates for all NC regions are similar and are decreasing, suggesting convergence in the future. Based on current projections, the goal set by *Healthy People 2010* of 0.7 deaths per 100,000 will not be met by any region in NC.
- Non-White males continue to have the highest rates of age-adjusted mortality for all demographic groups. White males had the greatest rate of decline (52% over 10 years) of all groups. Convergence of all trends is projected in the future.
- From 1999-2008, the non-White age-adjusted HIV mortality rate has decreased by 38% but remains 1138% greater than the White rate. Age-adjusted mortality rates for Whites decreased by 45% in a reliable trend.
- In a moderately reliable trend, the 10 year period shows a 129% increase in racial disparity.

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 2008. Smaller areas like counties will usually be aggregated into 5-year intervals (e.g., 2003 to 2007). 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 area of each pie is based on the age-adjusted mortality rate for the year 2008—larger pie charts will represent larger mortality rates. For purposes of presentation, we set the smallest area of a circle on the lowest meaningful rate as a benchmark, the age-adjusted rate for White females in North Carolina. We then scaled up the circles for all other groups proportionately based on their rates.

The first two pie chart figures compare the proportions of leading causes of death across regions at the national, state, and 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 29-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 29 year time series. Trend lines provide historical depth to mortality processes and a basis for prediction, future comparisons, and action.

The trend line concept is borrowed from statistical modeling. However, unlike true modeling, we are not assuming the statistical independence of each sequential observation (the rate at time interval x). Instead, our assumption is that each observation is dependent to some degree on previous observations, forming a trend. If the degree of dependence is high, then the observations (rates) should lie close to the trend line. If observations appear to bounce around the fitted line in a random fashion (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 2020 from known historical values (1979 to 2008) 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 1990 is the 12th year in the series, so 12 would be substituted for x in the equation of the line derived from ENC29’s age-adjusted mortality rate series for a selected cause of death. For chronic lower respiratory diseases (1979 to 2008), the 1990 *expected* or *fitted* age-adjusted rate is calculated to be a little more than 36 deaths per 100,000 people. The *observed* age-adjusted rate for 1990 is 38 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 1990 is 2—the model (the equation of the line) *underestimates* the observed value by 2 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, dashed trend lines are for those where R^2 is less than 0.10 and should be considered not reliable. The thickest dotted 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 ten year period (1999-2008). 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 1999 and 2008 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, ENC29's age-adjusted fitted rate for chronic lower respiratory diseases in 1999 is 9% greater than (GT) RNC's fitted rate. In 2008, ENC29's fitted rate is 8% less than (LT) 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 2020*, 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.

General References

Fastrup, J., Vinkenness, M., & O'Dell, M. (1996). *Public Health: A Health Status Indicator for Targeting Federal Aid to States*. Washington, DC: US General Accounting Office.

Office of Healthy Carolinians/Health Education. *Healthy Carolinians 2020: North Carolina's Plan for Health and Safety*. Conference Ed.

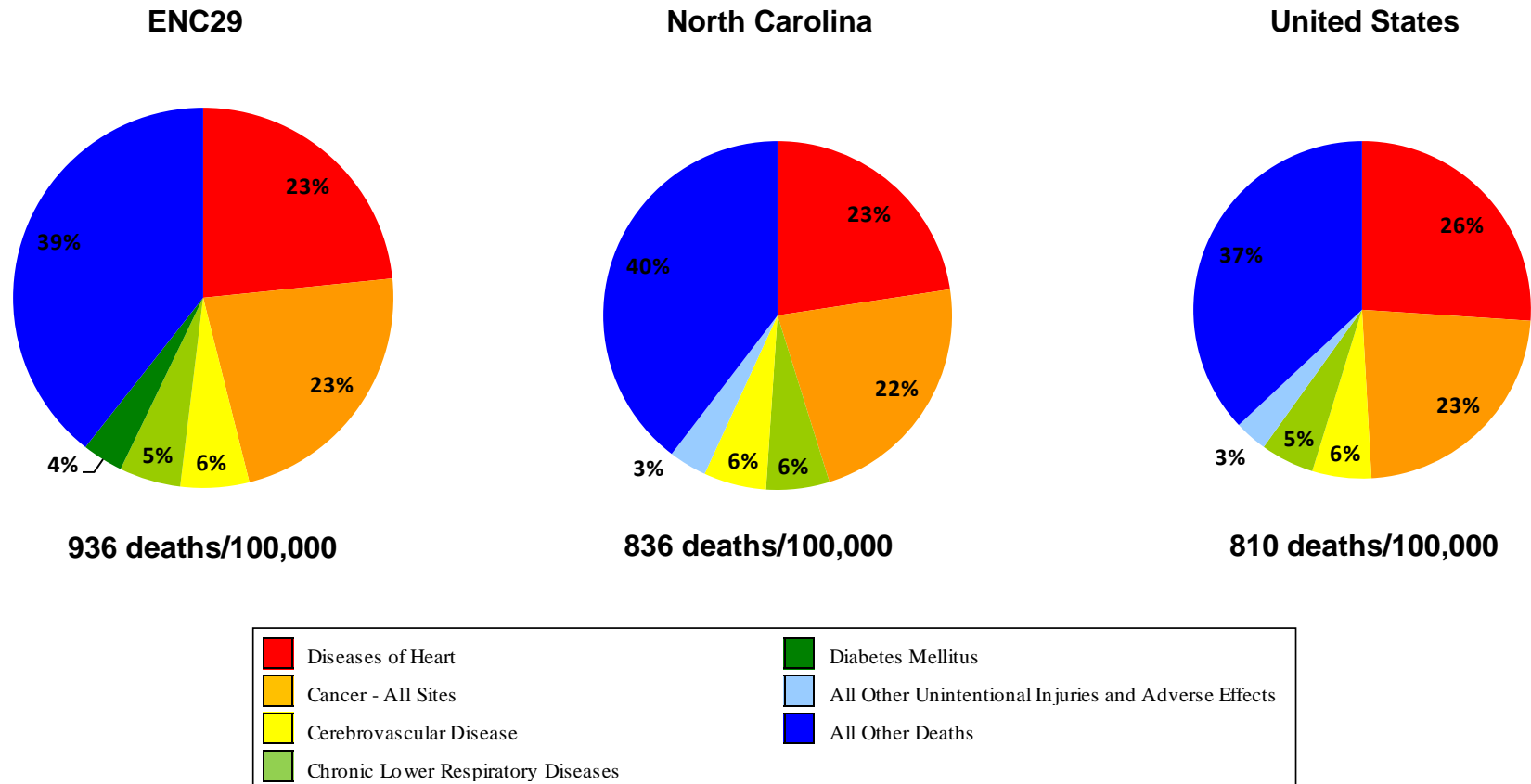
United States Department of Health and Human Services. *Healthy People 2020*. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington D.C.: US Government Printing Office, November 2000.

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Buescher, P. A. (1998). Age-adjusted death rates (13th ed.). Raleigh, North Carolina: North Carolina Center for Health Statistics.

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

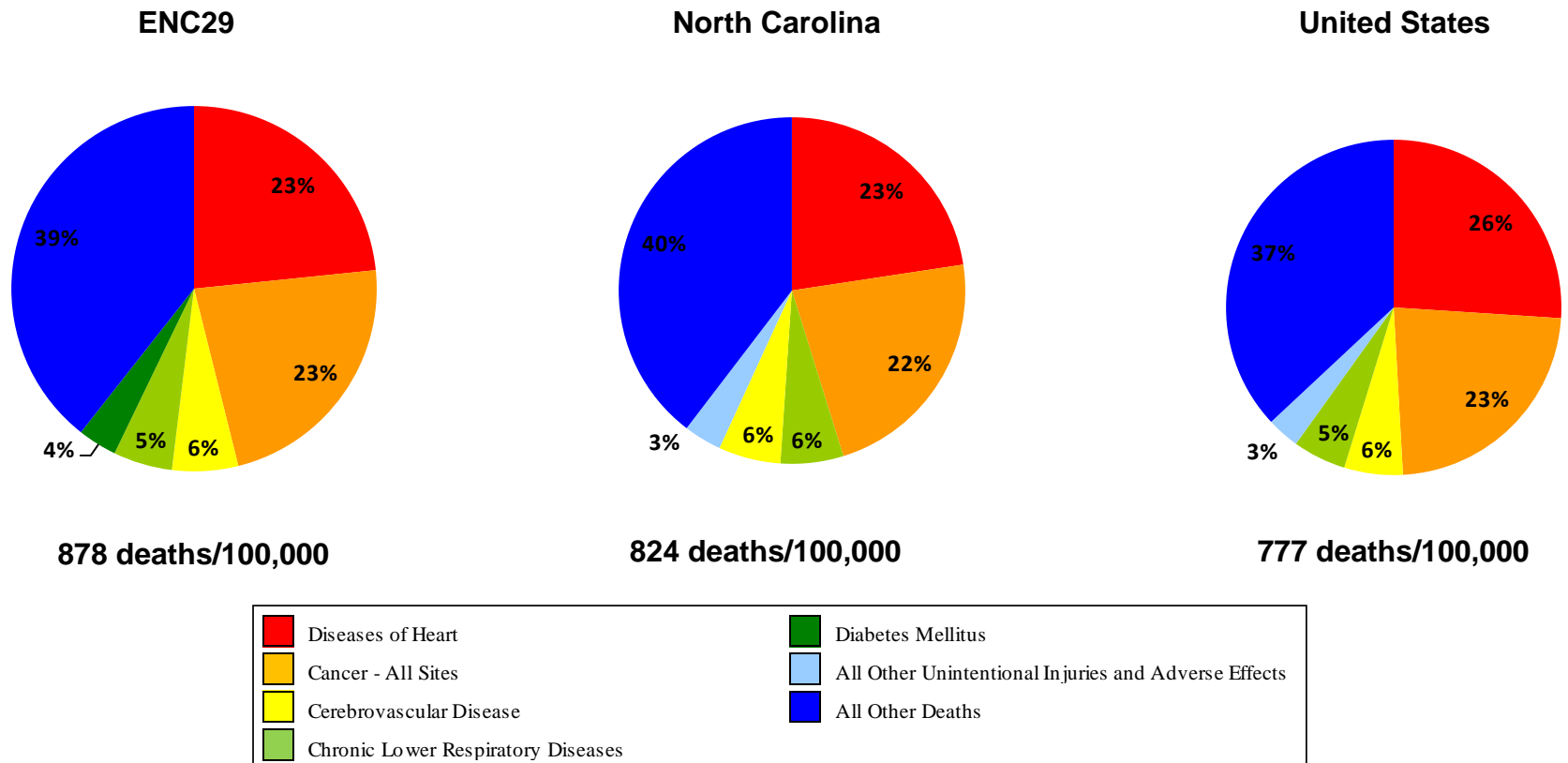
Figure 4.1 i. General leading causes of death for ENC29 (2008), NC (2008), and US (2006). Mortality rate per 100,000 population.



2008 NC rate is 3% higher than 2006 US rate

Pie Charts are Proportionately scaled using the state age-adjusted mortality rate of white females (702 deaths/100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.

Figure 4.1 ii. General leading causes of death for ENC29 (2008), NC (2008), and US (2006). Age-adjusted mortality rate per 100,000 population.



2008 NC age-adjusted rate is 6% higher than 2006 US age-adjusted rate

Pie Charts are Proportionately scaled using the state age-adjusted mortality rate of white females (702 deaths/100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.

Figure 4.2 i. General leading causes of death for ENC29 (2008) by race and gender. Mortality rate per 100,000 population.

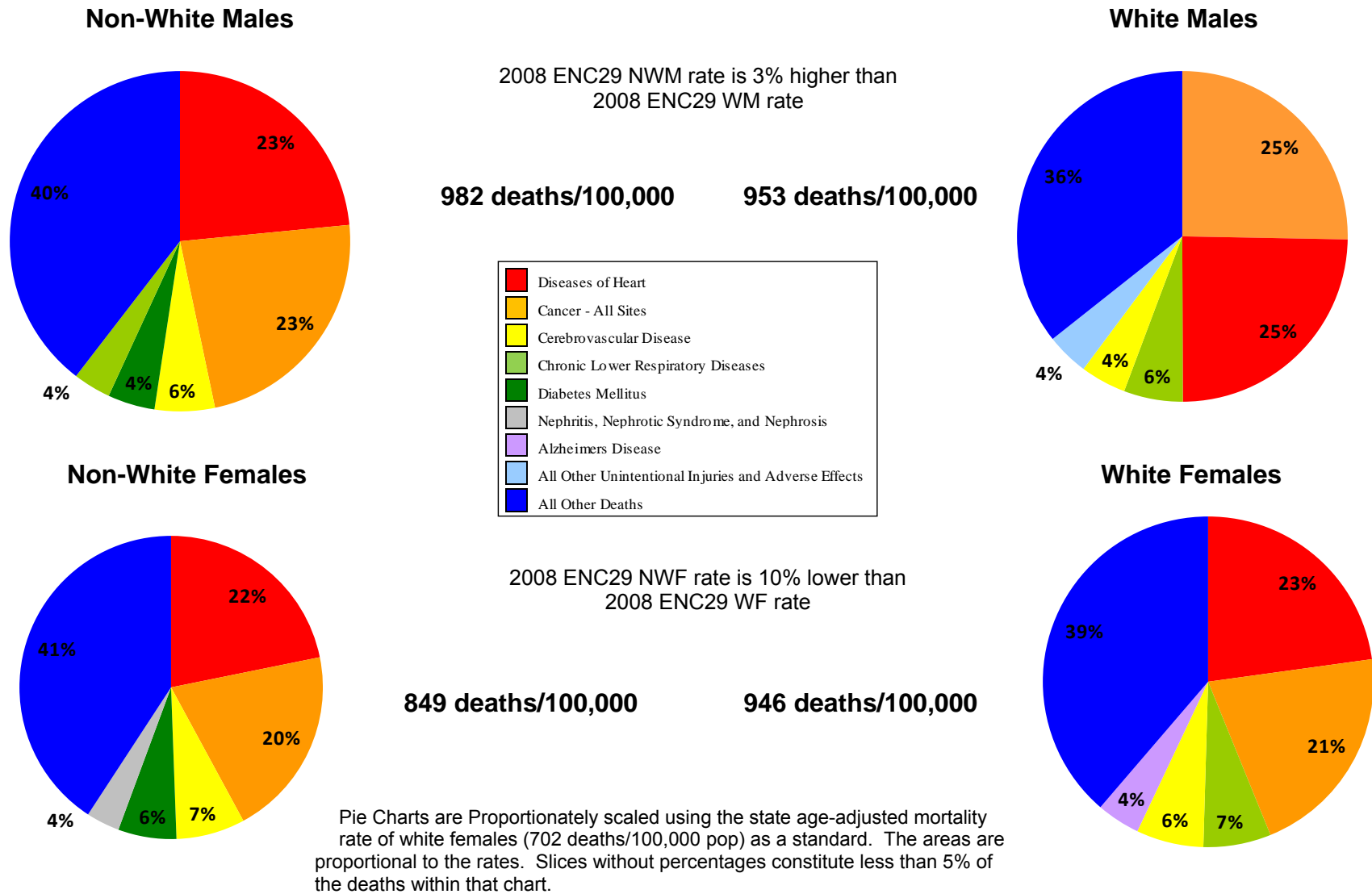


Figure 4.2 ii. General leading causes of death for ENC29 (2008) by race and gender. Age-adjusted mortality rate per 100,000 population.

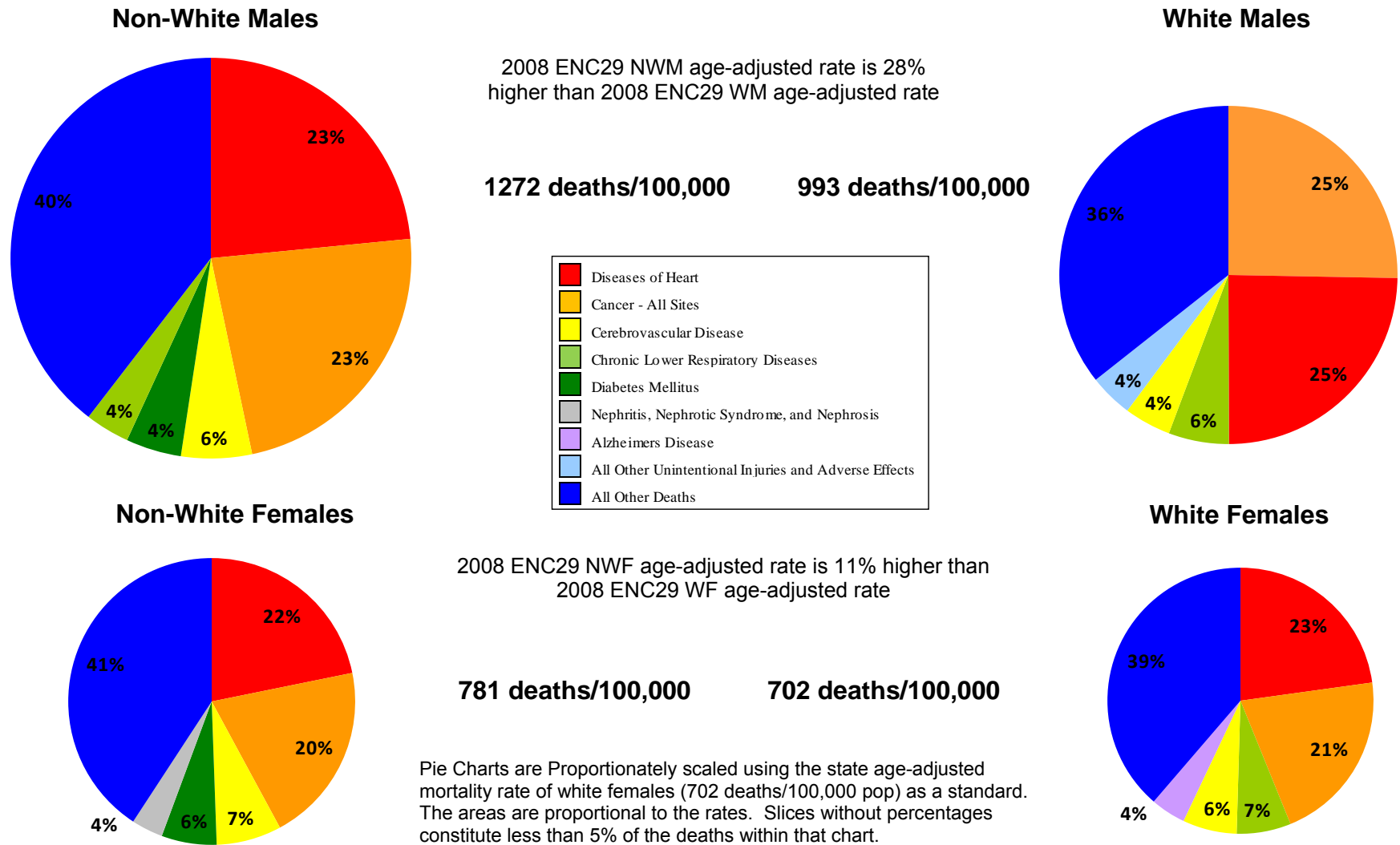
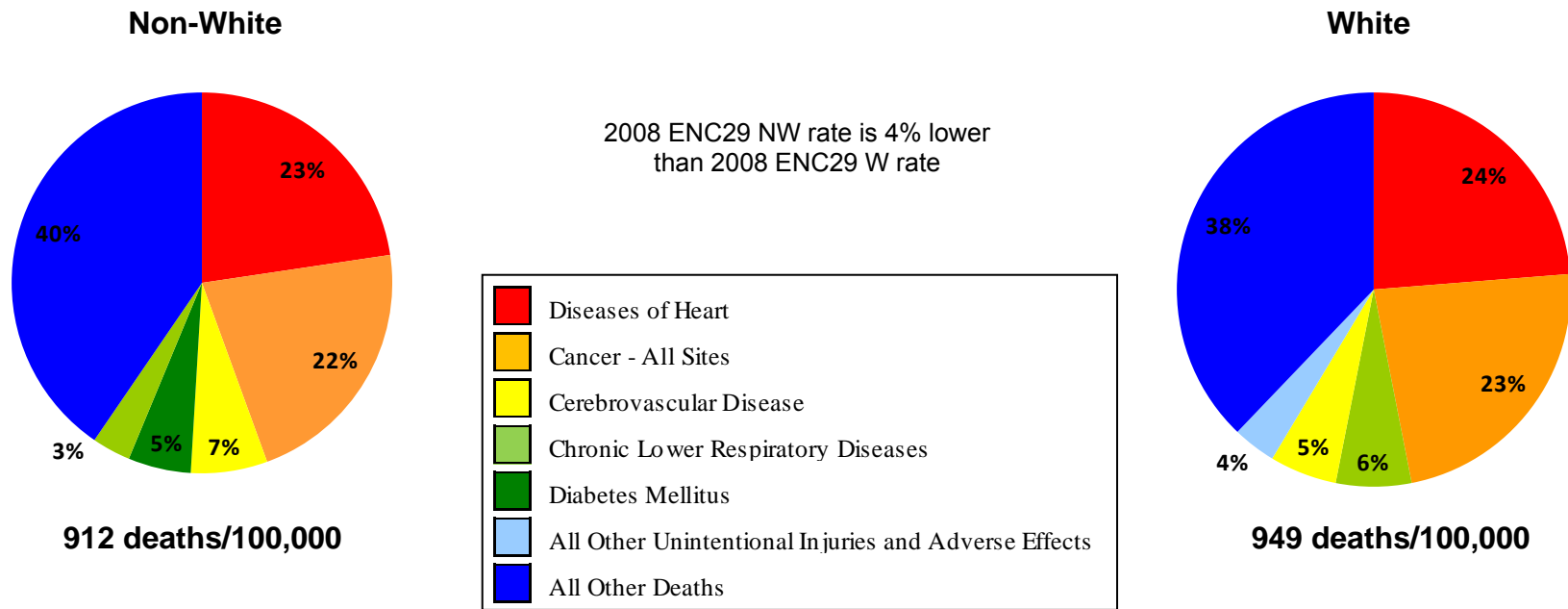
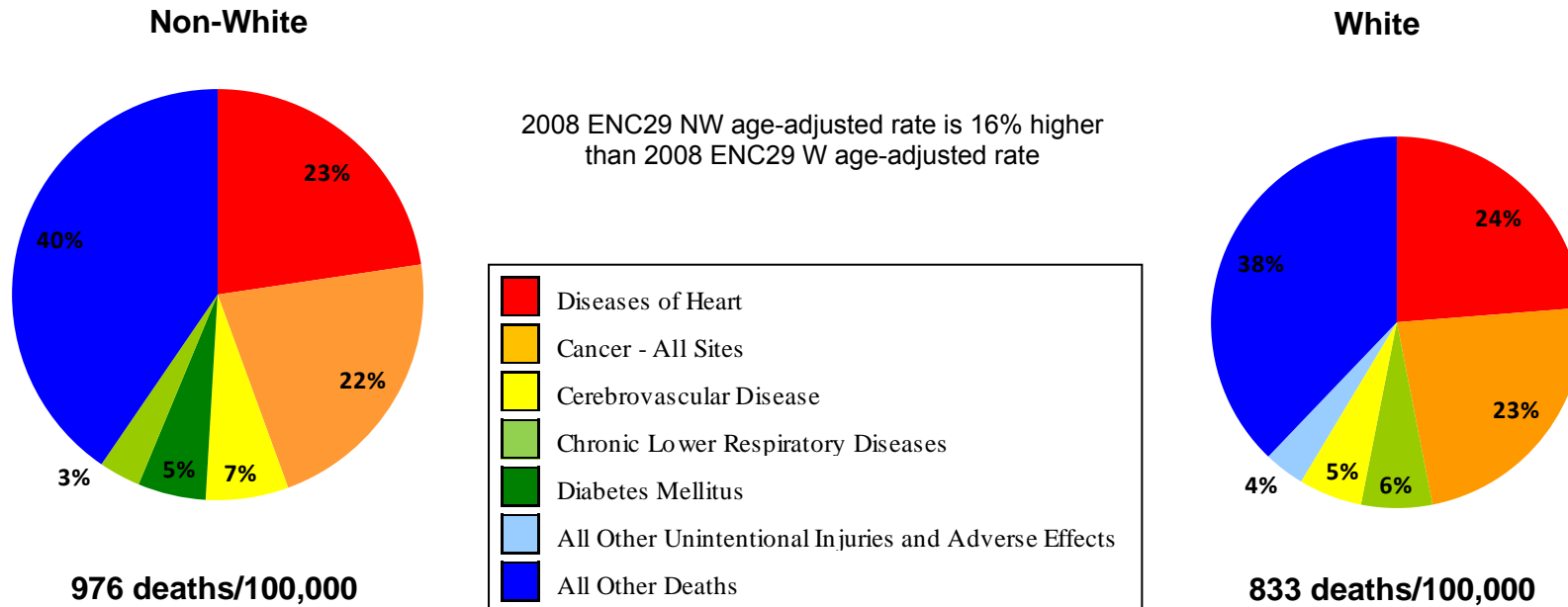


Figure 4.3 i. General leading causes of death for ENC29 (2008) by race.
Mortality rate per 100,000 population.



Pie Charts are Proportionately scaled using the state age-adjusted mortality rate of white females (702 deaths/100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.

Figure 4.3 ii. General leading causes of death for ENC29 (2008) by race. Age-adjusted mortality rate per 100,000 population.



Pie Charts are Proportionately scaled using the state age-adjusted mortality rate of white females (702 deaths/100,000 pop) as a standard. The areas are proportional to the rates. Slices without percentages constitute less than 5% of the deaths within that chart.

5. Trends and Disparities in Mortality
in ENC29:
All Causes of Death and
All Causes of Premature Mortality;
1979-2008

All Causes of Death

- While the 30-year ENC trend line shows all-cause mortality rates are increasing and diverging from RNC and NC trends, the 10-year trend line shows that all three trends have been decreasing. The ENC all-cause mortality rates are still diverging slightly from RNC and NC 10-year trends.
- The age-adjusted, all-cause mortality rates are decreasing for all four 30-year trends with ENC remaining above the rest. The 10-year trends suggest convergence of ENC with RNC and NC in the future.
- The non-White male mortality rate remains higher than other demographic groups, although convergence in the future is suggested.
- The non-White mortality rate remains 20% higher than Whites in 2008 but the 10-year trends suggest convergence in the future, as both are decreasing.
- The 10-year trend for racial disparity shows a 28% decrease 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 5.1 i. All Causes of Death:
Trends in mortality rates for ENC29, RNC71, and NC
1979-2008 with projections to 2020

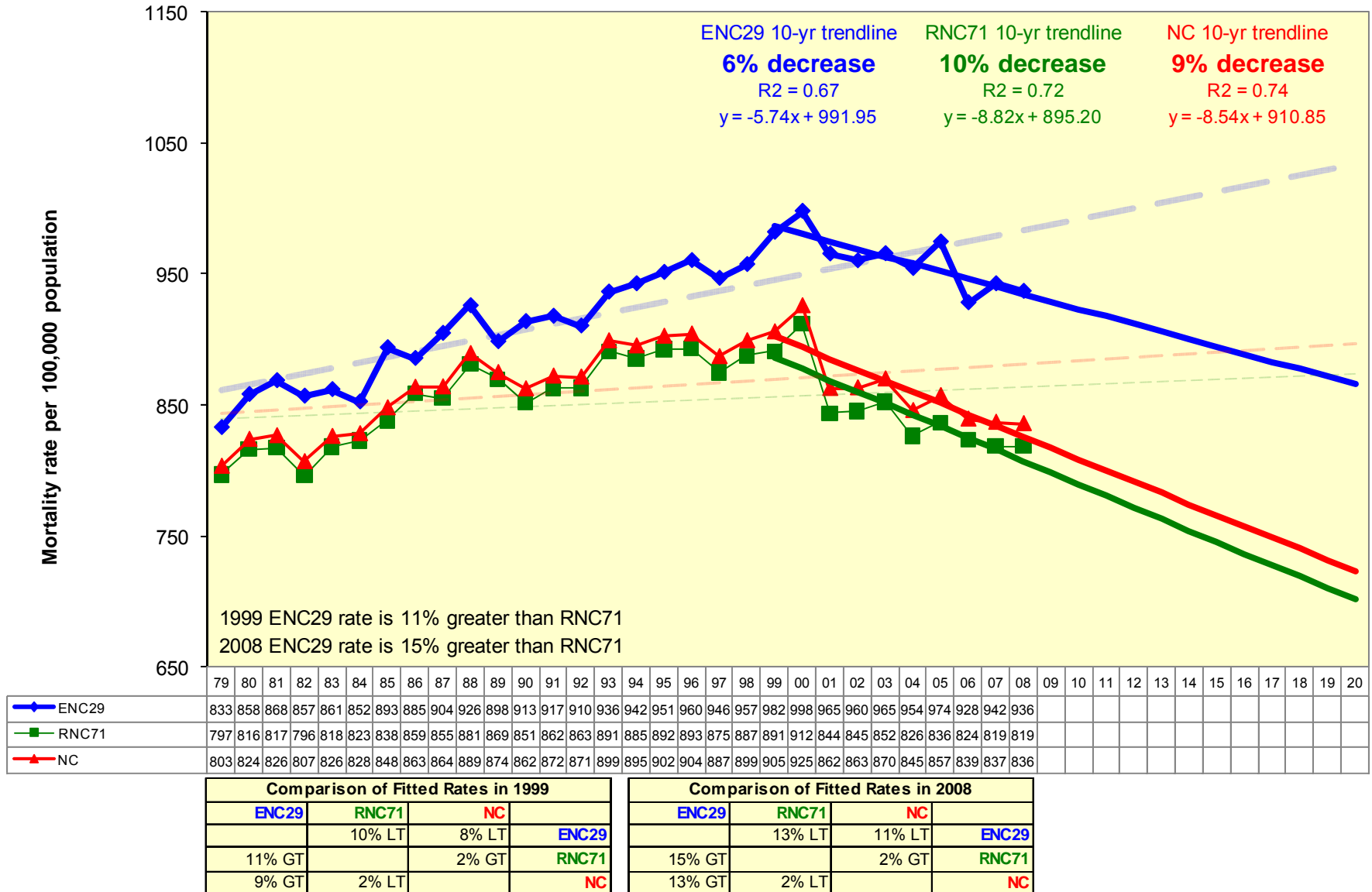


Figure 5.1 iv. All Causes of Death:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

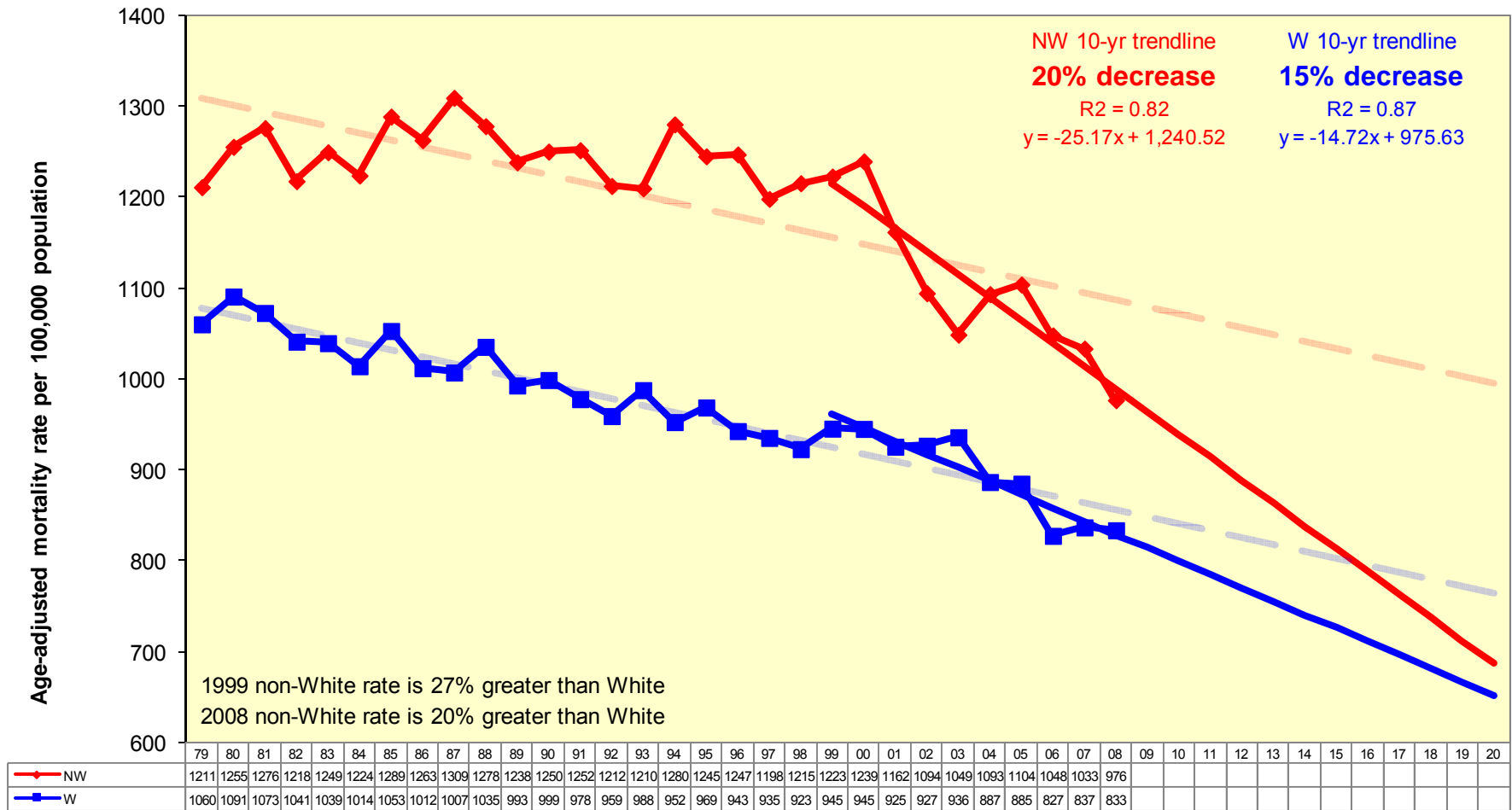
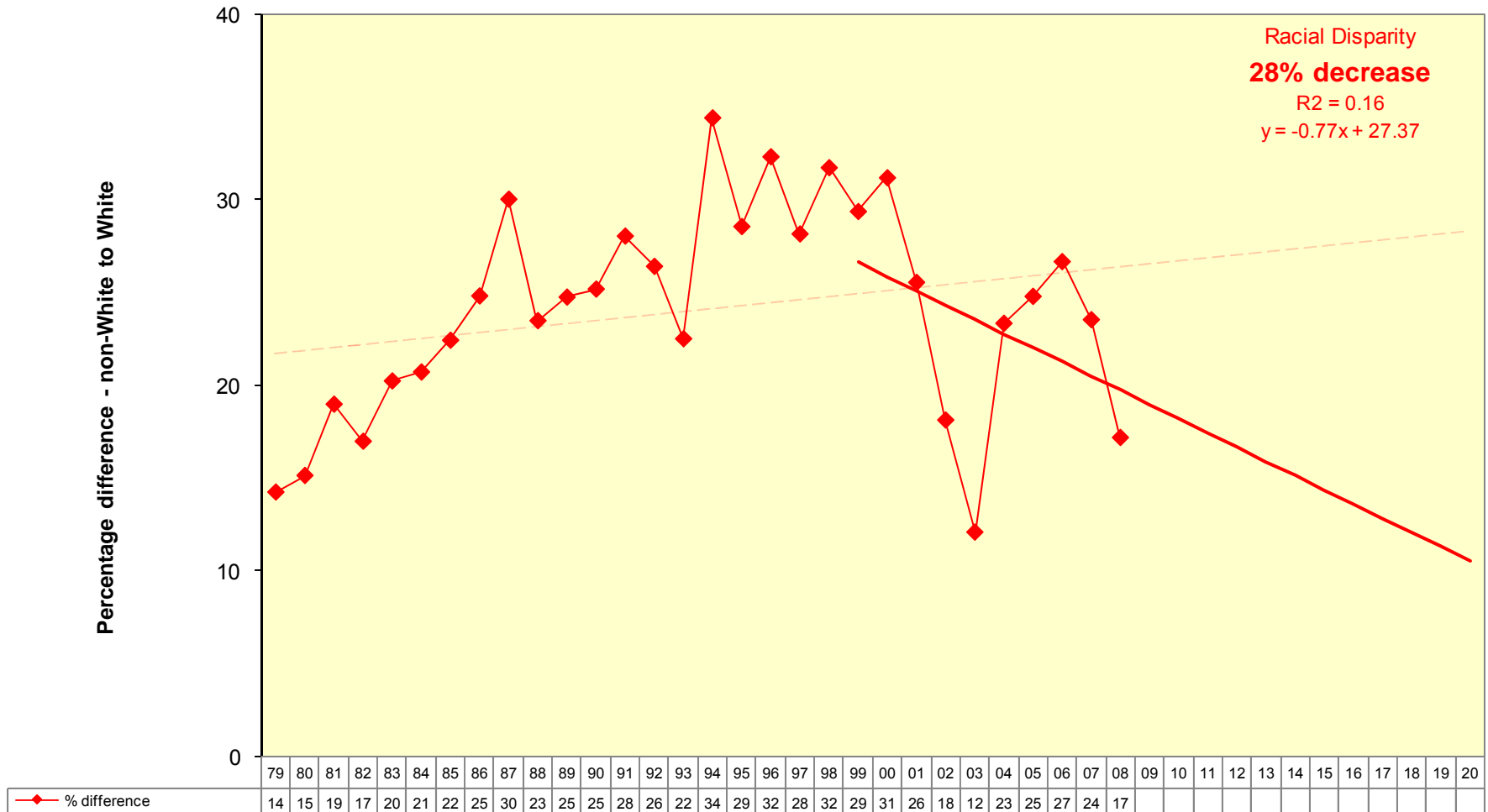


Figure 5.1 v. All Causes of Death:
 Measuring disparity in age-adjusted mortality rates by race for ENC29,
 1979-2008 with projections to 2020



All Causes of Premature Mortality

- ENC's premature mortality rate has decreased by 3% since 1999. However, this trend is diverging from both RNC and NC, which have decreased 8% and 7% respectively since 1999.
- The age-adjusted premature mortality trend for ENC continues to decrease but at a slower decline than RNC, NC, and US. ENC remains 20% greater than RNC in 2008.
- The non-White male rates of premature mortality are significantly higher than other demographic groups but also have the greatest rate of decrease (slope of trend). White females have the lowest rate of premature mortality.
- The non-White rate remains 57% greater than the White rate but is decreasing at a rate of 17% in the 10-year trend compared to 4% for the White 10-year trend.
- The 10-year trend for racial disparity shows a 31% decrease in a 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 5.2 iv. All Causes of Premature Mortality:
Trends in age-adjusted premature mortality rates by race for ENC29,
1979-2008 with projections to 2020

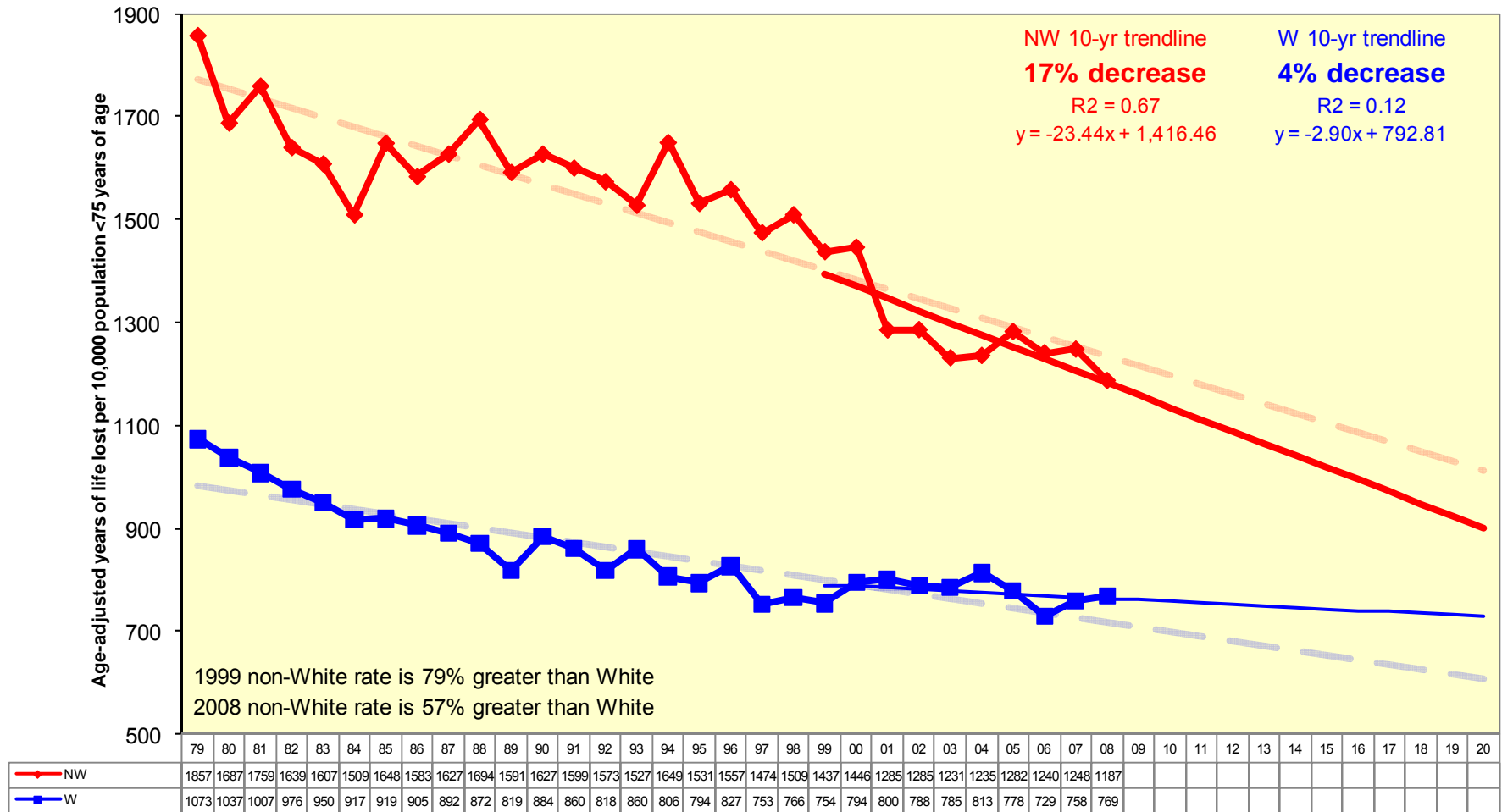
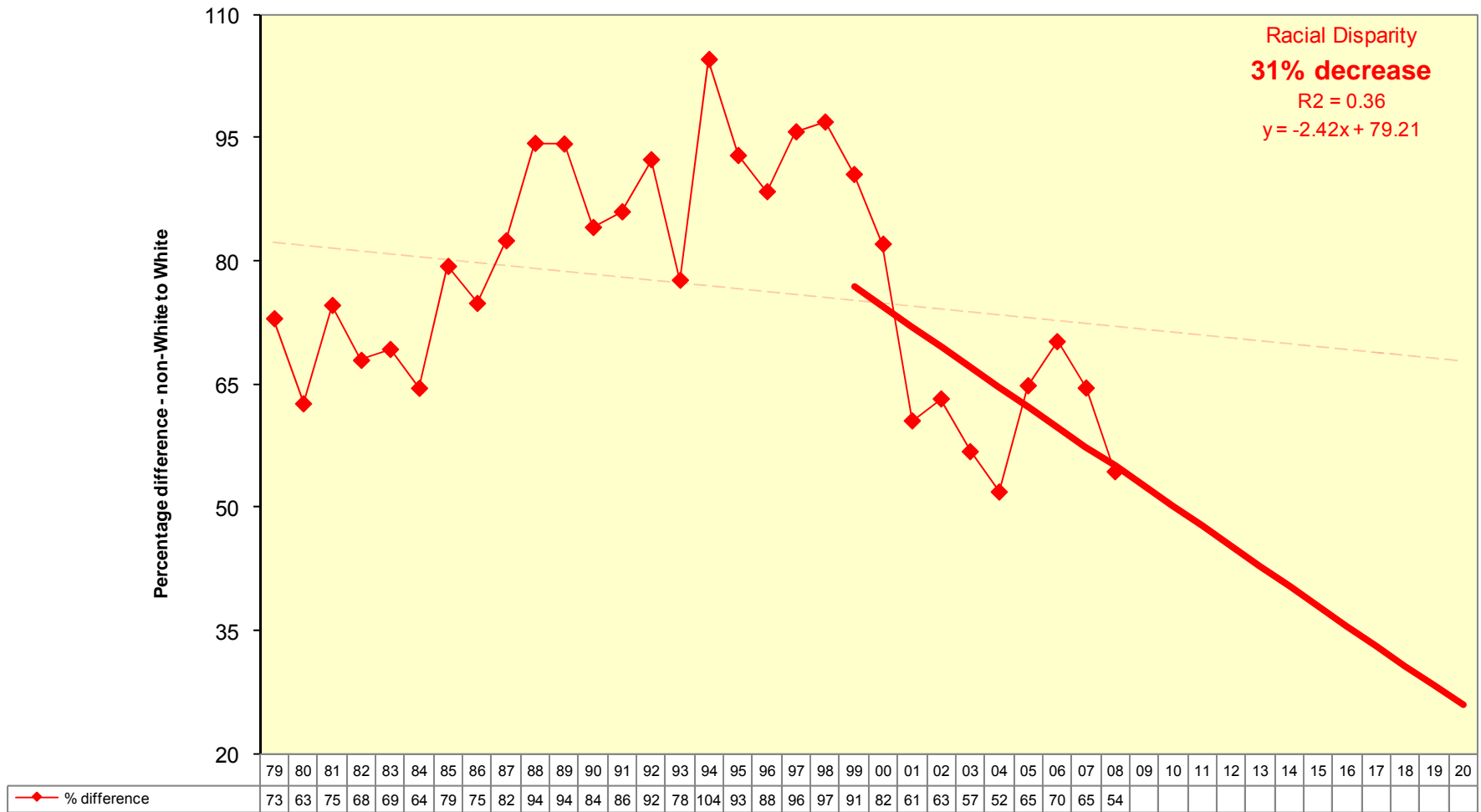


Figure 5.2 v. All Causes of Premature Mortality:
 Measuring disparity in age-adjusted premature mortality rates by race for ENC29,
 1979-2008 with projections to 2020



6. Trends and Disparities in Mortality in ENC29: Ten Specific Leading Causes of Death, 1979-2008

Diseases of Heart

- Based on the 10 year trend line, ENC's heart disease mortality rate is decreasing, but not as quickly as RNC and NC, resulting in an increased geographical disparity. In 1999, ENC's rate was 11% greater than RNC; by 2008, the disparity between the two was 19%.
- ENC's age-adjusted mortality rate is decreasing more quickly than RNC, NC and the US. The ENC rate was 15% greater than RNC in 2008 and convergence in the future appears likely.
- The trend for males, both non-White and White, are converging with those of non-White and White females. Non-White males continue to have the highest rate for all demographic groups.
- The 10-year trend lines by race show an estimated 57% decrease in heart disease mortality rates for Whites versus a 47% decrease for non-Whites.
- The 10-year increasing trend line 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 $R^2 < 0.10$.

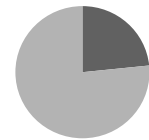


Figure 6.1 ii. Diseases of Heart:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US,
1979-2008 with projections to 2020

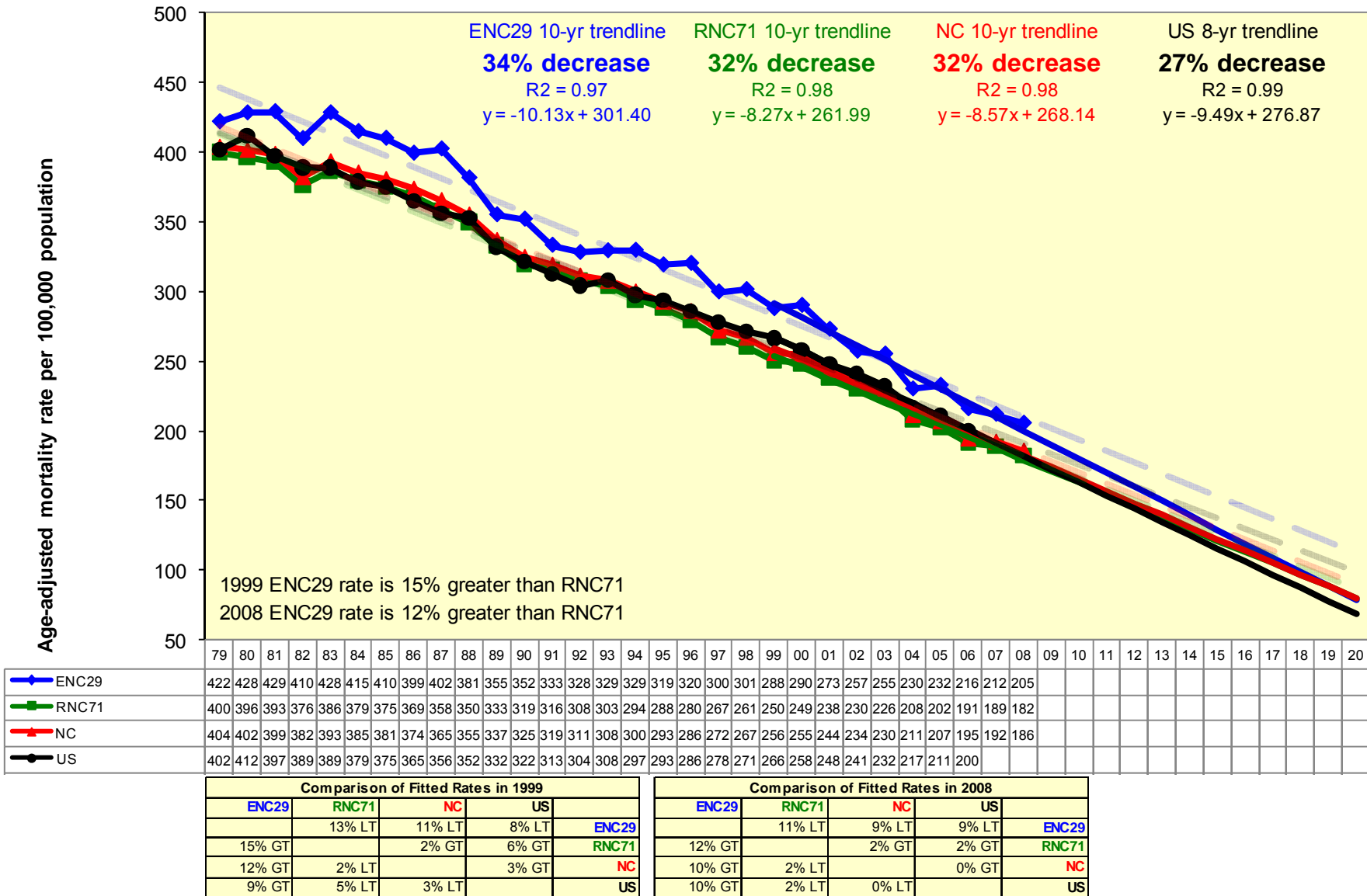
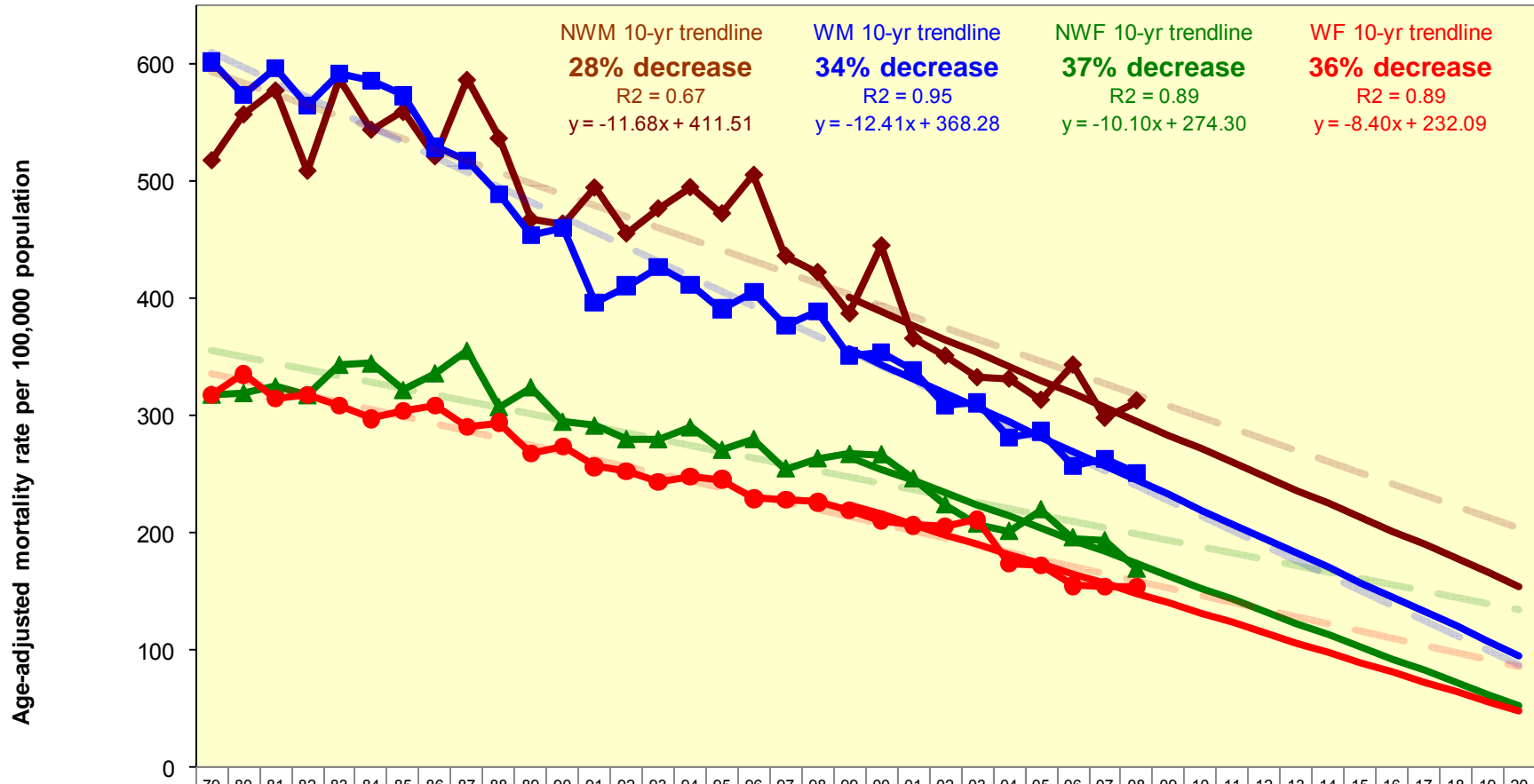
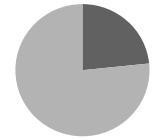


Figure 6.1 iii. Diseases of Heart:
Trends in age-adjusted mortality rates by race and gender for ENC29,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20											
NWM	517	557	577	508	587	543	559	521	586	536	467	463	494	455	476	494	472	505	436	422	386	444	365	350	332	331	313	343	297	312																							
WM	601	573	596	564	591	585	572	528	517	488	453	459	396	410	426	411	391	405	377	388	351	354	339	309	311	281	286	257	263	251																							
NWF	317	319	324	317	343	344	321	336	355	307	324	294	291	279	279	289	270	279	254	263	267	266	246	224	207	201	219	195	193	169																							
WF	317	335	314	318	309	297	304	308	290	294	267	273	256	252	243	248	245	229	228	226	219	210	206	205	211	173	172	155	153	154																							

Comparison of Fitted Rates in 1999					Comparison of Fitted Rates in 2008				
NWM	WM	NWF	WF		NWM	WM	NWF	WF	
	11% LT	33% LT	44% LT	NWM		16% LT	40% LT	49% LT	NWM
12% GT		26% LT	37% LT	WM	19% GT		29% LT	39% LT	WM
50% GT	34% GT		15% LT	NWF	67% GT	40% GT		15% LT	NWF
77% GT	59% GT	18% GT		WF	96% GT	64% GT	17% GT		WF

Figure 6.1 iv. Diseases of Heart:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

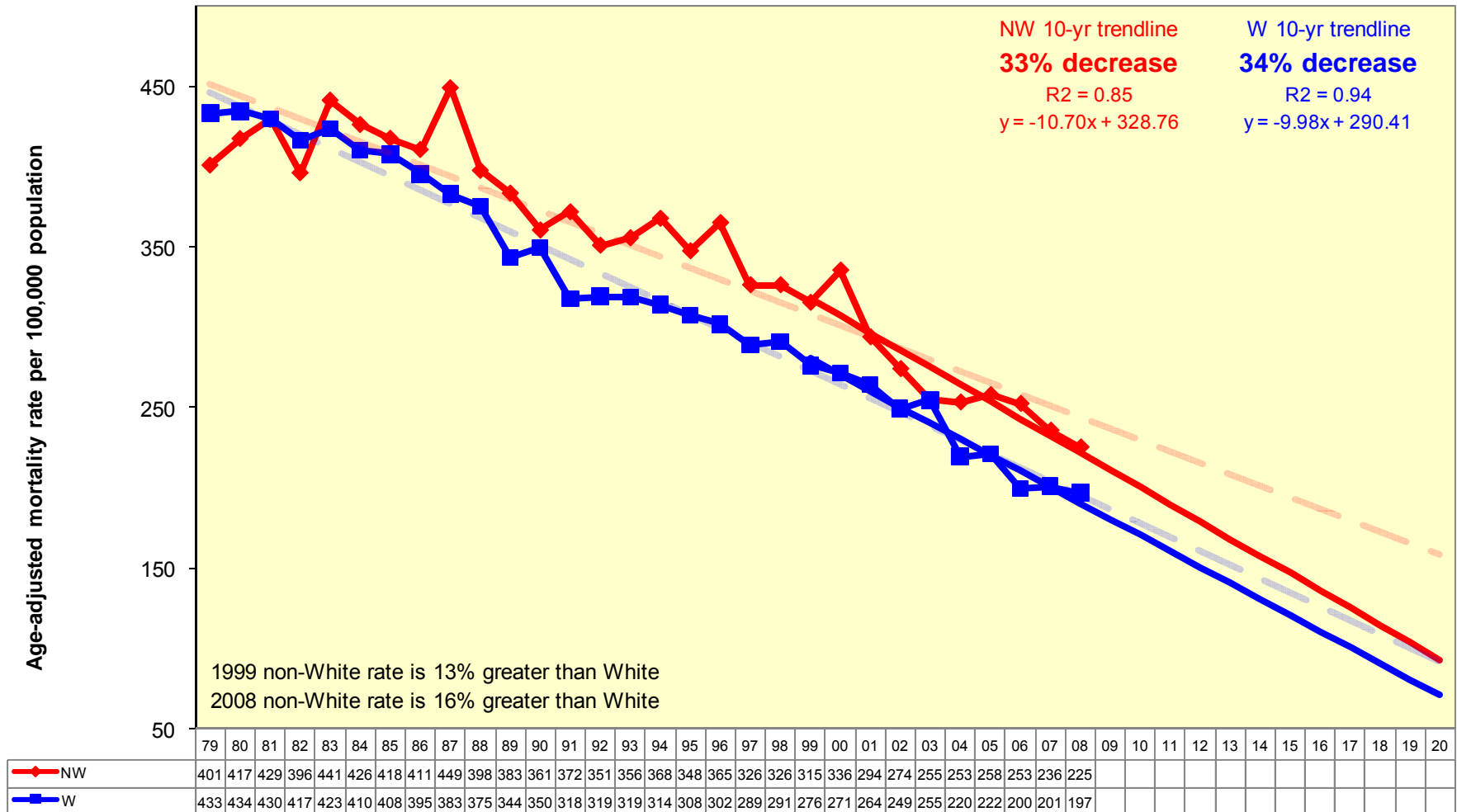
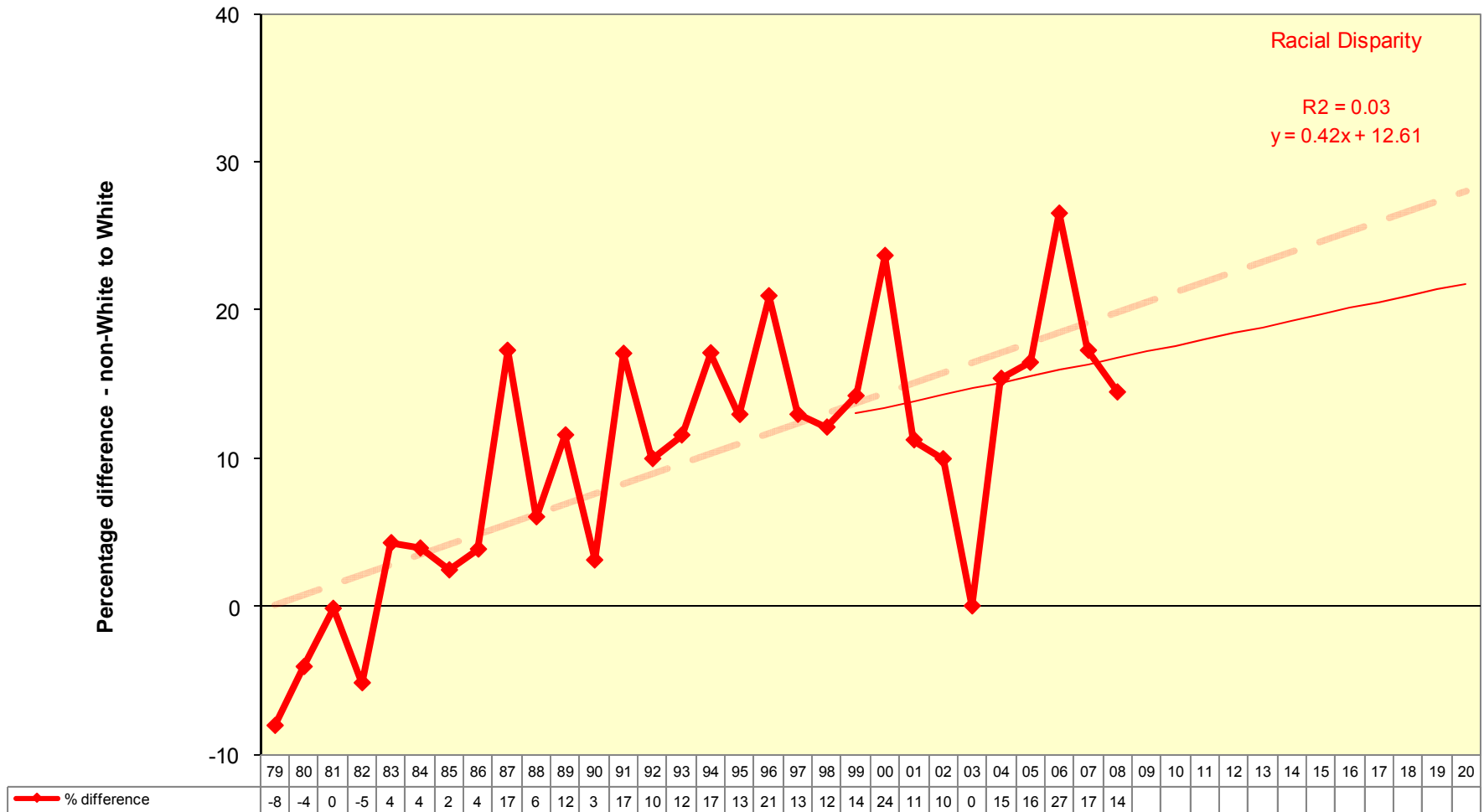
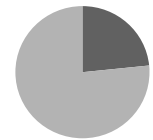


Figure 6.1 v. Diseases of Heart:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020



Cancer - Trachea, Bronchus, Lung

- The 10-year trend line for ENC crude mortality of Cancer – TBL is unreliable though continually higher than the rates of RNC and NC. In 2008, the ENC rate was 13% greater than RNC.
- During the period 1999-2008, the age-adjusted rate for ENC is decreasing at a greater rate than RNC, US, and NC and convergence in the near future is suggested. All four rates remain significantly higher than the goal set by *Healthy People 2010* of less than 44.9 deaths per 100,000.
- The mortality rate trends for males are decreasing; convergence with the increasing female trends is suggested in the future. Non-white males continue to have the highest rates in 2008.
- The non-White mortality rate for this cancer continues to decrease over the 10-year period and is diverging from the White rate. In 2008, the non-White rate was 11% less than the White rate.
- The moderately reliable trend for racial disparity has continued to decrease significantly over the 10 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 6.2 i. Cancer - Trachea, Bronchus, Lung:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020

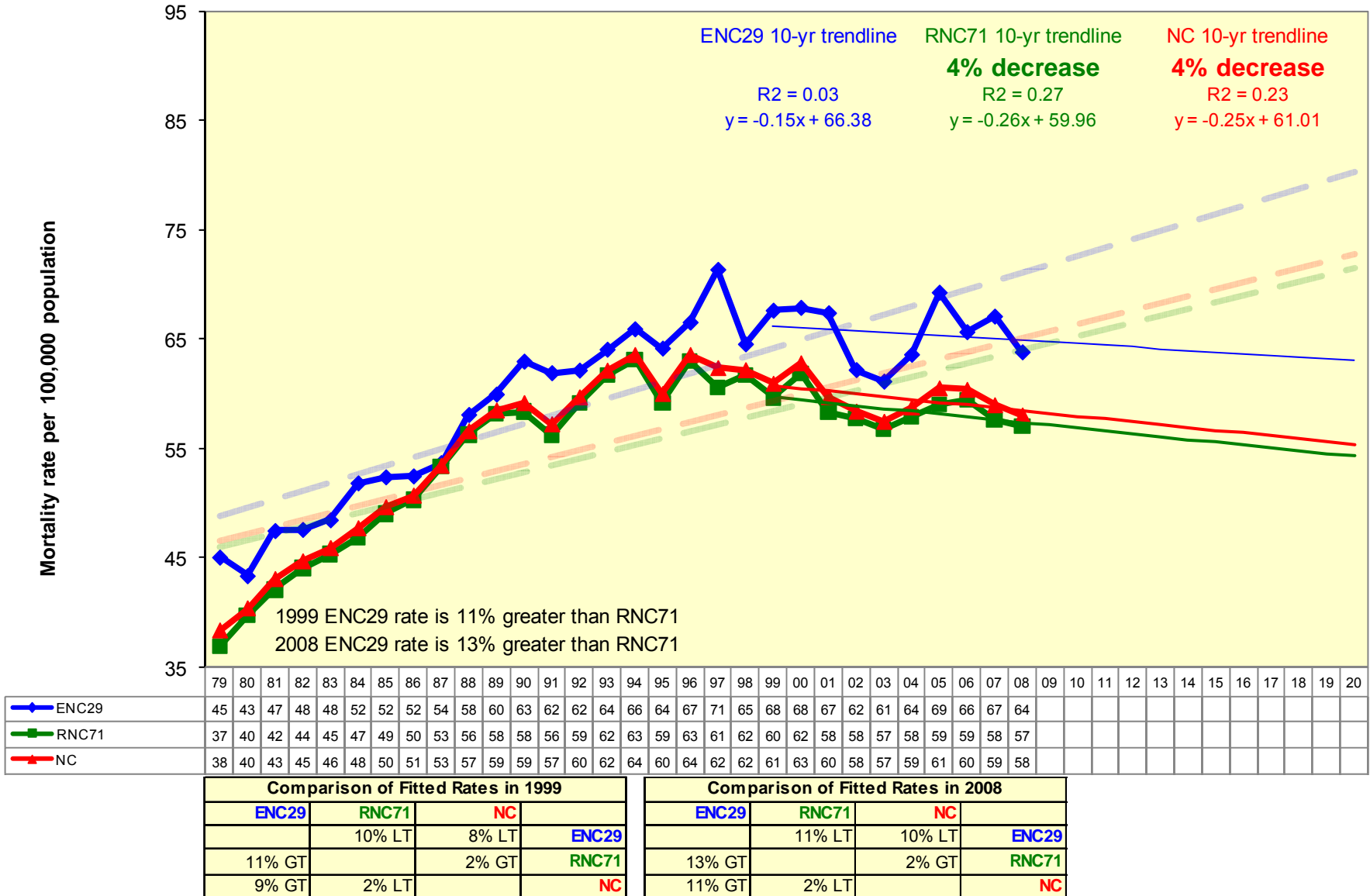
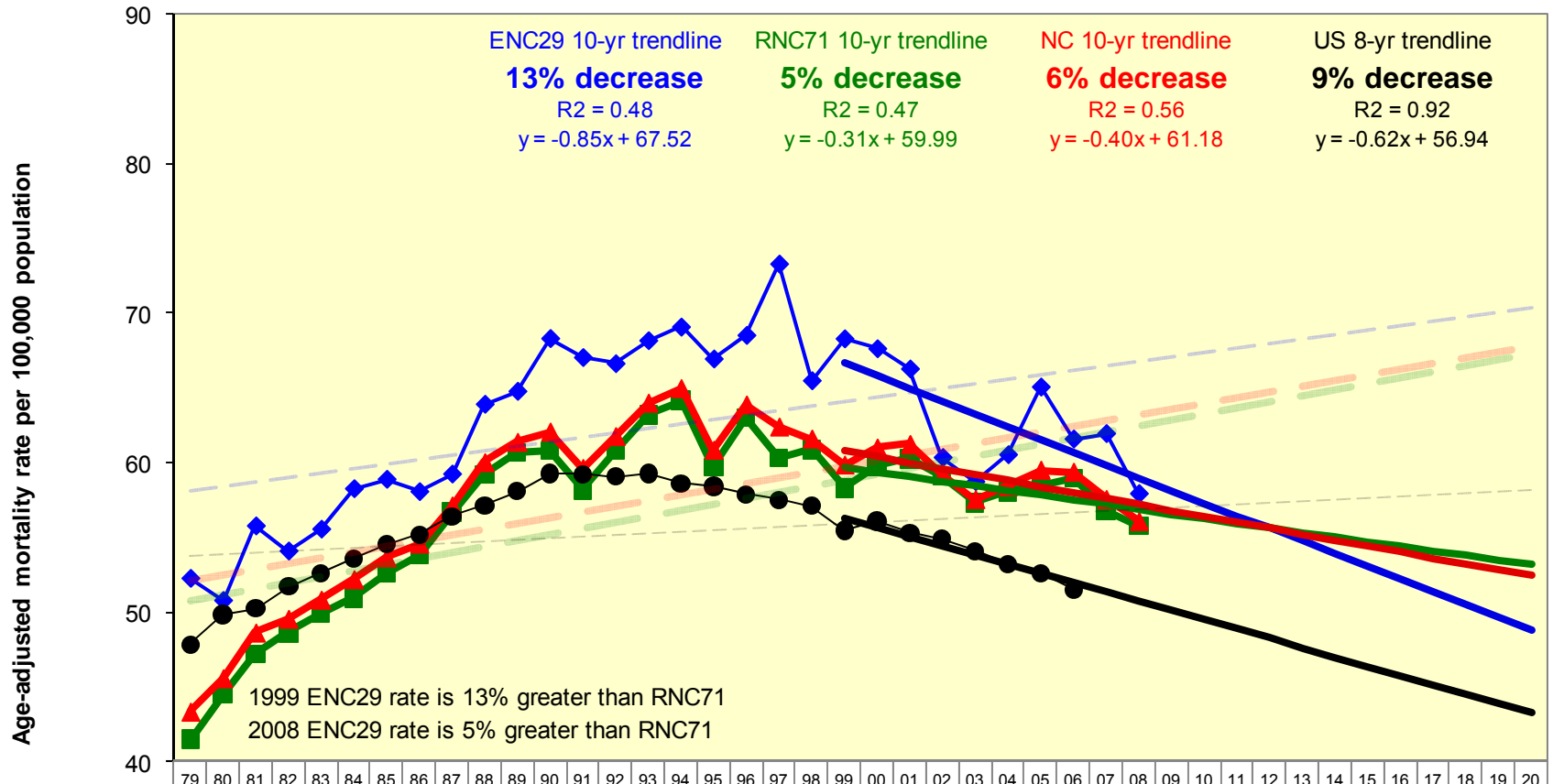


Figure 6.2 ii. Cancer - Trachea, Bronchus, Lung:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US,
1979-2008 with projections to 2020



ENC29	52	51	56	54	56	58	59	58	59	64	65	68	67	67	68	69	67	69	73	65	68	68	66	60	59	61	65	62	62	58
RNC71	42	45	47	49	50	51	53	54	57	59	61	61	58	61	63	64	60	63	60	61	58	60	60	59	57	58	59	59	57	56
NC	43	46	49	50	51	52	54	55	57	60	61	62	60	62	64	65	61	64	62	62	60	61	61	59	58	58	60	59	58	56
US	48	50	50	52	53	54	55	55	56	57	58	59	59	59	59	59	58	58	58	57	55	56	55	55	54	53	53	52		

Comparison of Fitted Rates in 1999				
ENC29	RNC71	NC	US	
	11% LT	9% LT	16% LT	ENC29
13% GT		2% GT	5% LT	RNC71
10% GT	2% LT		7% LT	NC
19% GT	5% GT	7% GT		US

Comparison of Fitted Rates in 2008				
ENC29	RNC71	NC	US	
	4% LT	4% LT	14% LT	ENC29
5% GT		1% GT	10% LT	RNC71
4% GT	1% LT		11% LT	NC
17% GT	11% GT	12% GT		US

Figure 6.2 iii. Cancer - Trachea, Bronchus, Lung:
Trends in age-adjusted mortality rates by race and gender for ENC29,
1979-2008 with projections to 2020

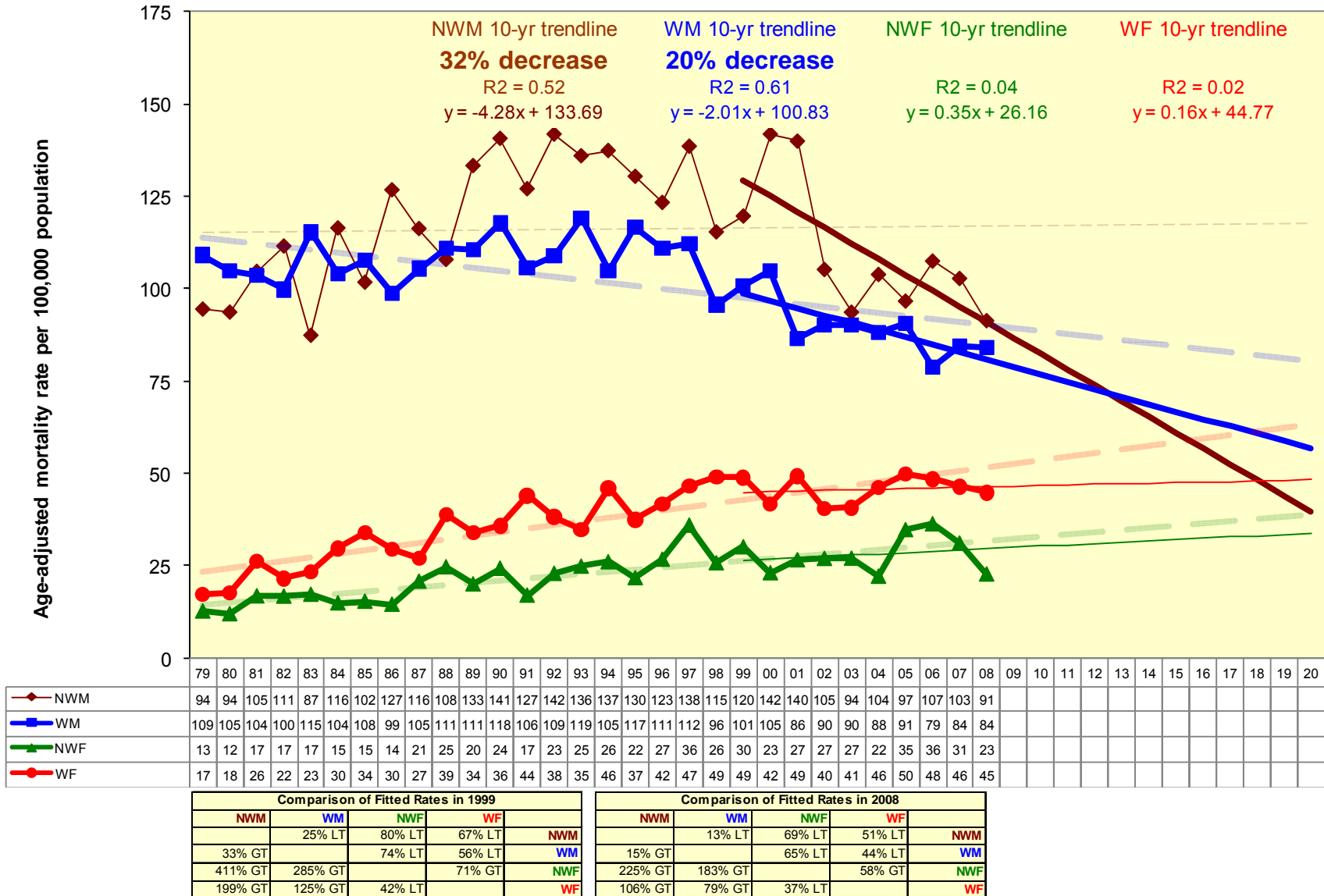


Figure 6.2 iv. Cancer - Trachea, Bronchus, Lung:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

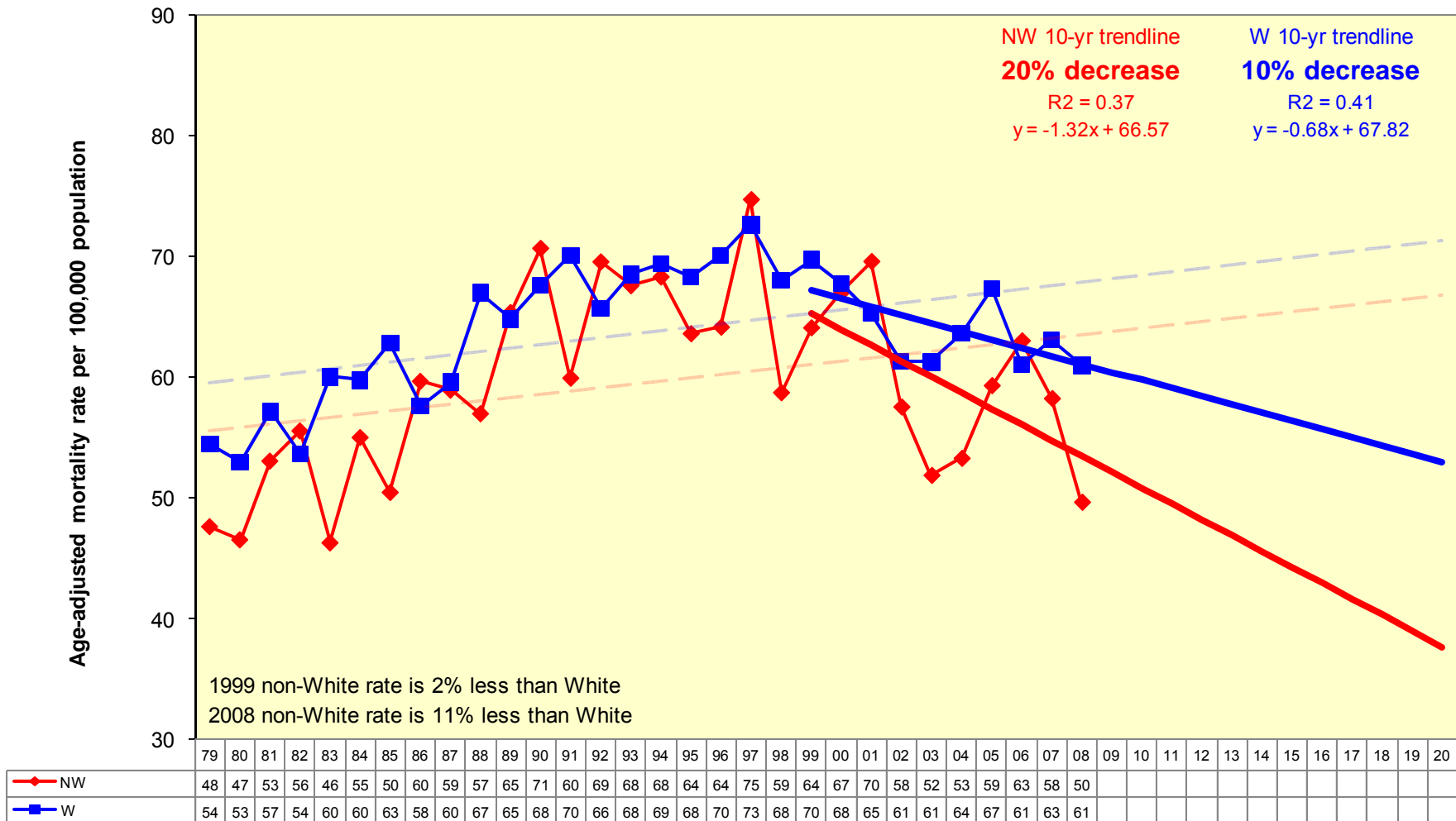
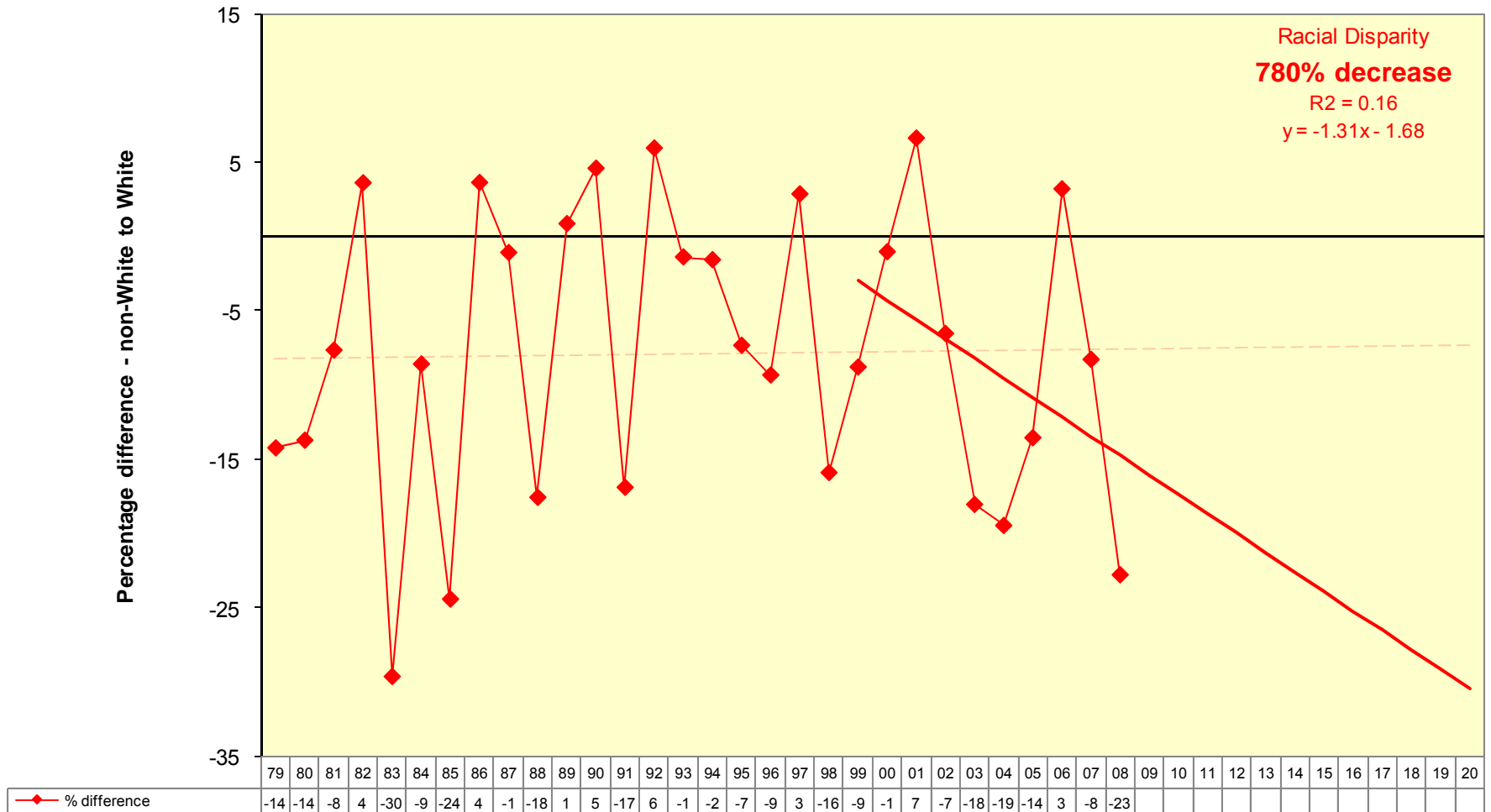


Figure 6.2 v. Cancer - Trachea, Bronchus, Lung:
 Measuring disparity in age-adjusted mortality rates by race for ENC29,
 1979-2008 with projections to 2020

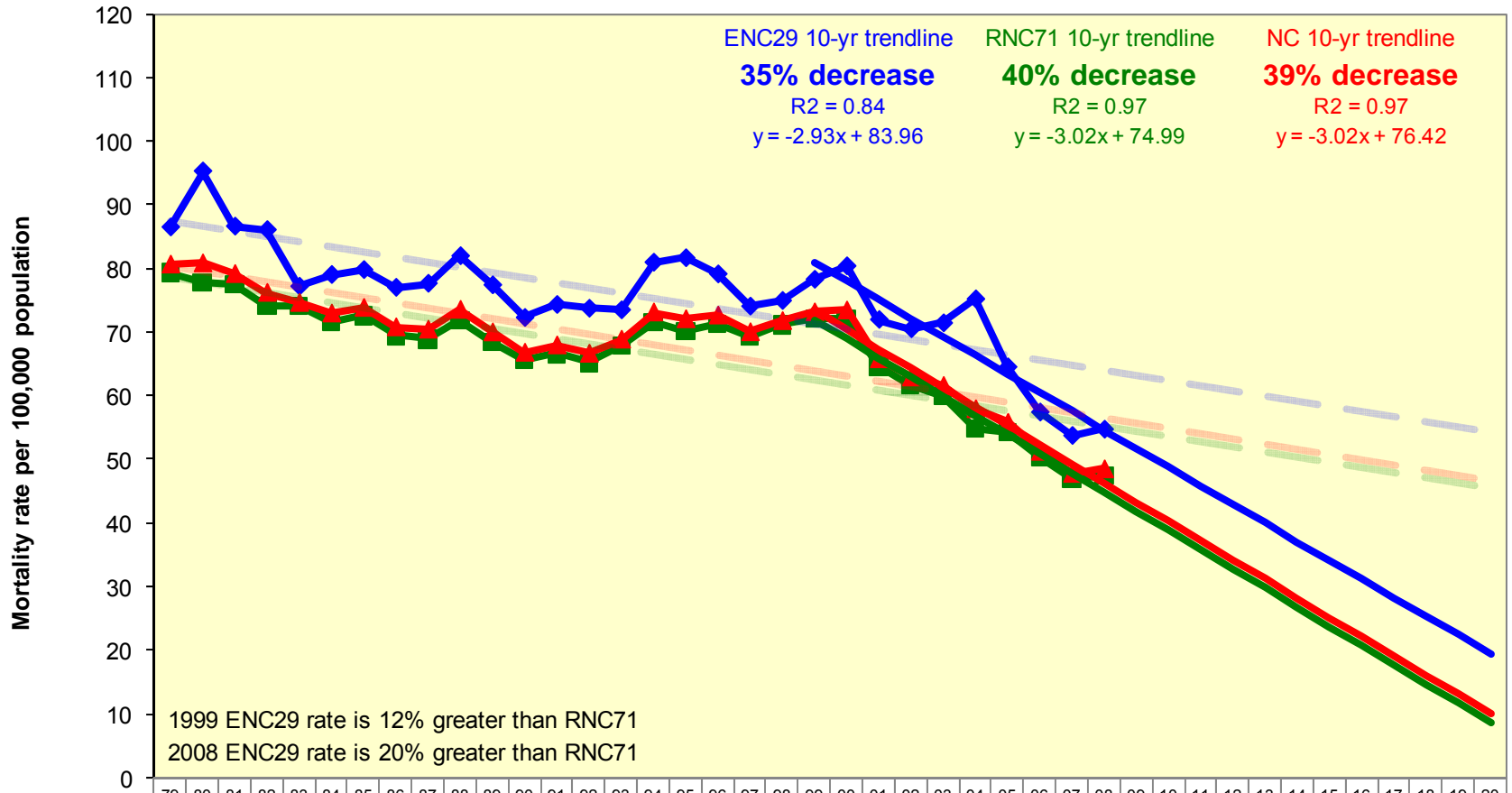


Cerebrovascular Disease

- ENC's cerebrovascular disease mortality trend line is decreasing but is diverging slightly from both RNC and NC. In 2008, the ENC rate was 20% greater than RNC.
- The ENC age-adjusted cerebrovascular disease mortality rate is decreasing and converging on the RNC and NC rates. Projected to 2020, the *Healthy People 2010* goal of less than 48 deaths per 100,000 could be achieved in the region.
- Although both non-White males and non-White females continue to have the highest cerebrovascular disease mortality rates, the rates are decreasing and converging on White male and White female rates. The non-White male rate in 2008 was 78% greater than the rate for White males; the non-White female rate was 37% greater than the rate for White females.
- The cerebrovascular disease mortality rate for non-Whites is decreasing and converging with that of Whites but remains 52% greater than Whites in 2008.
- The trend for racial disparity from 1999-2008 shows a 35% increase 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 6.3 i. Cerebrovascular Disease:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20						
ENC29	86	95	87	86	77	79	80	77	78	82	77	72	74	74	73	81	82	79	74	75	78	80	72	71	71	75	65	57	54	55																		
RNC71	79	78	78	74	74	72	73	69	69	72	68	66	67	65	68	72	70	71	69	71	72	72	65	62	60	55	54	50	47	47																		
NC	81	81	79	76	75	73	74	71	70	74	70	67	68	67	69	73	72	73	70	72	73	73	66	63	62	58	56	51	48	49																		

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	11% LT	9% LT	ENC29
12% GT		2% GT	RNC71
10% GT	2% LT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	17% LT	14% LT	ENC29
20% GT		3% GT	RNC71
17% GT	3% LT		NC

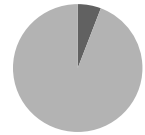
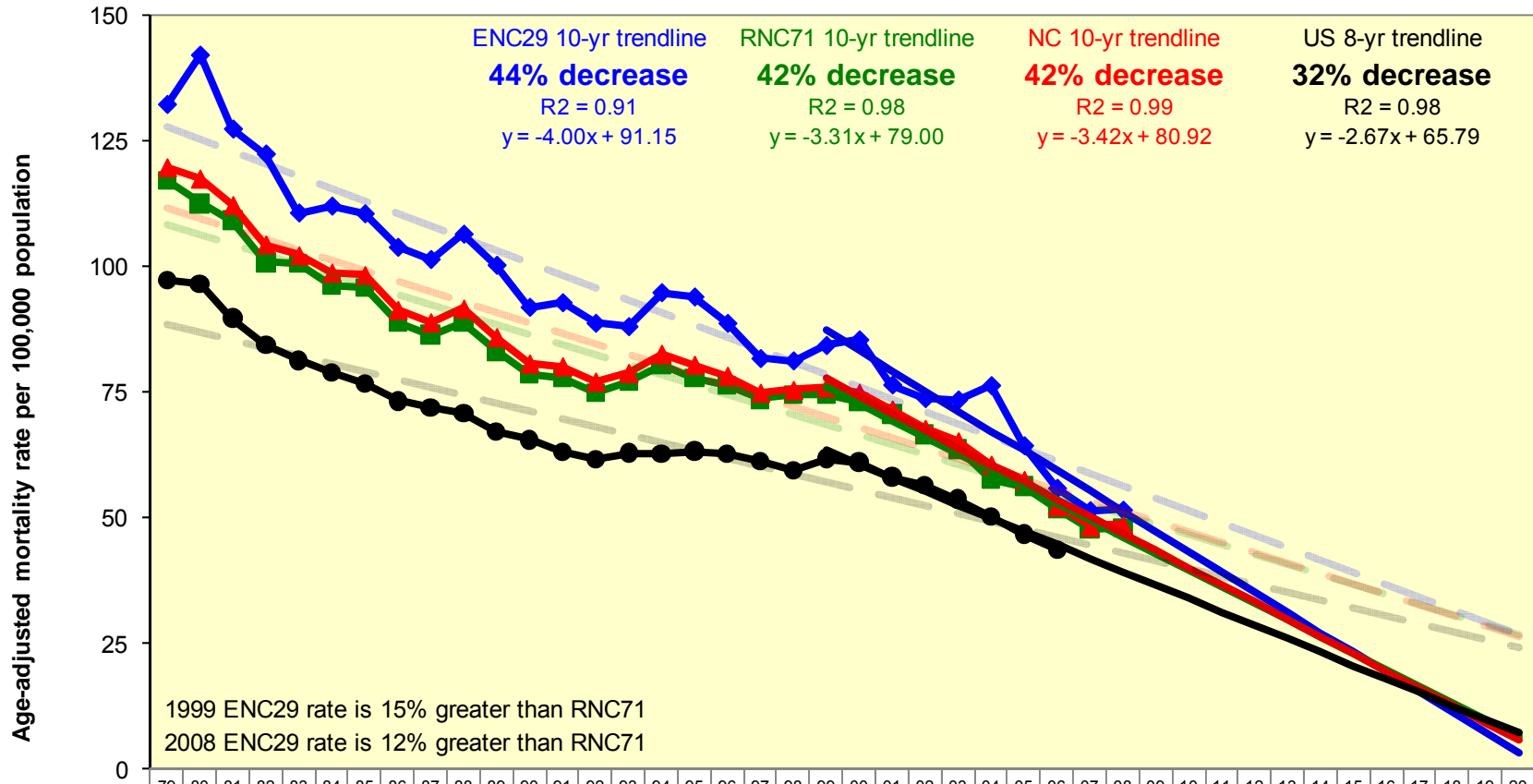


Figure 6.3 ii. Cerebrovascular Disease:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20						
ENC29	132	142	127	122	110	112	110	104	101	106	100	92	93	89	88	95	94	89	82	81	84	85	76	74	73	76	64	56	51	51																		
RNC71	117	112	109	101	100	96	96	89	86	89	83	78	78	75	77	80	78	76	73	74	74	73	70	66	64	58	56	51	48	48																		
NC	120	117	112	104	102	99	98	91	89	91	86	81	80	77	79	83	80	78	75	75	76	75	71	68	65	60	57	52	48	48																		
US	97	96	90	84	81	79	76	73	72	71	67	65	63	61	63	63	63	62	61	59	62	61	58	56	54	50	47	44																				

Comparison of Fitted Rates in 1999					Comparison of Fitted Rates in 2008				
ENC29	RNC71	NC	US		ENC29	RNC71	NC	US	
	13% LT	11% LT	28% LT	ENC29		11% LT	9% LT	24% LT	ENC29
15% GT		2% GT	17% LT	RNC71	12% GT		2% GT	15% LT	RNC71
13% GT	2% LT		19% LT	NC	10% GT	2% LT		17% LT	NC
39% GT	20% GT	23% GT		US	32% GT	18% GT	20% GT		US

Figure 6.3 iv. Cerebrovascular Disease:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

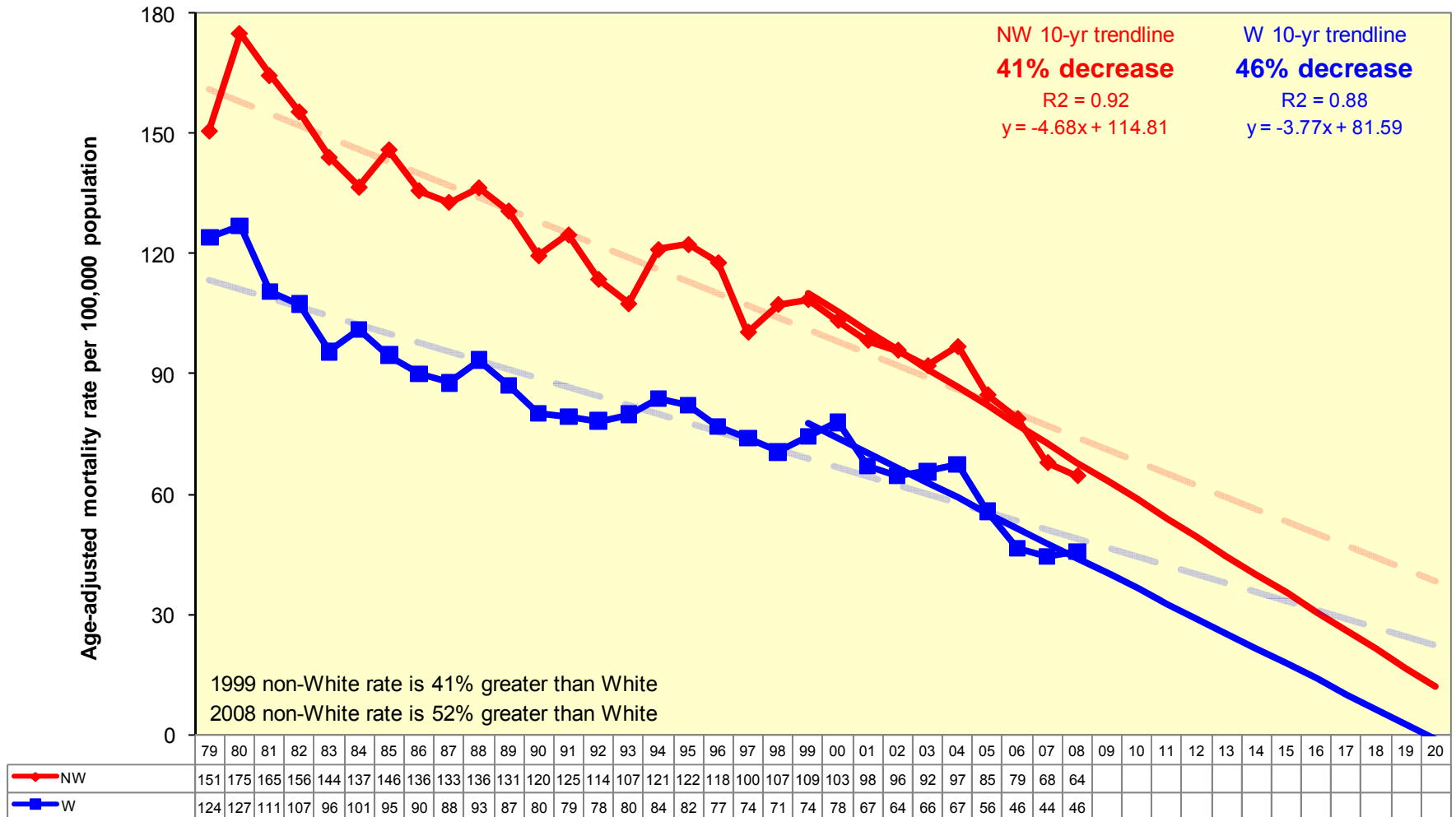
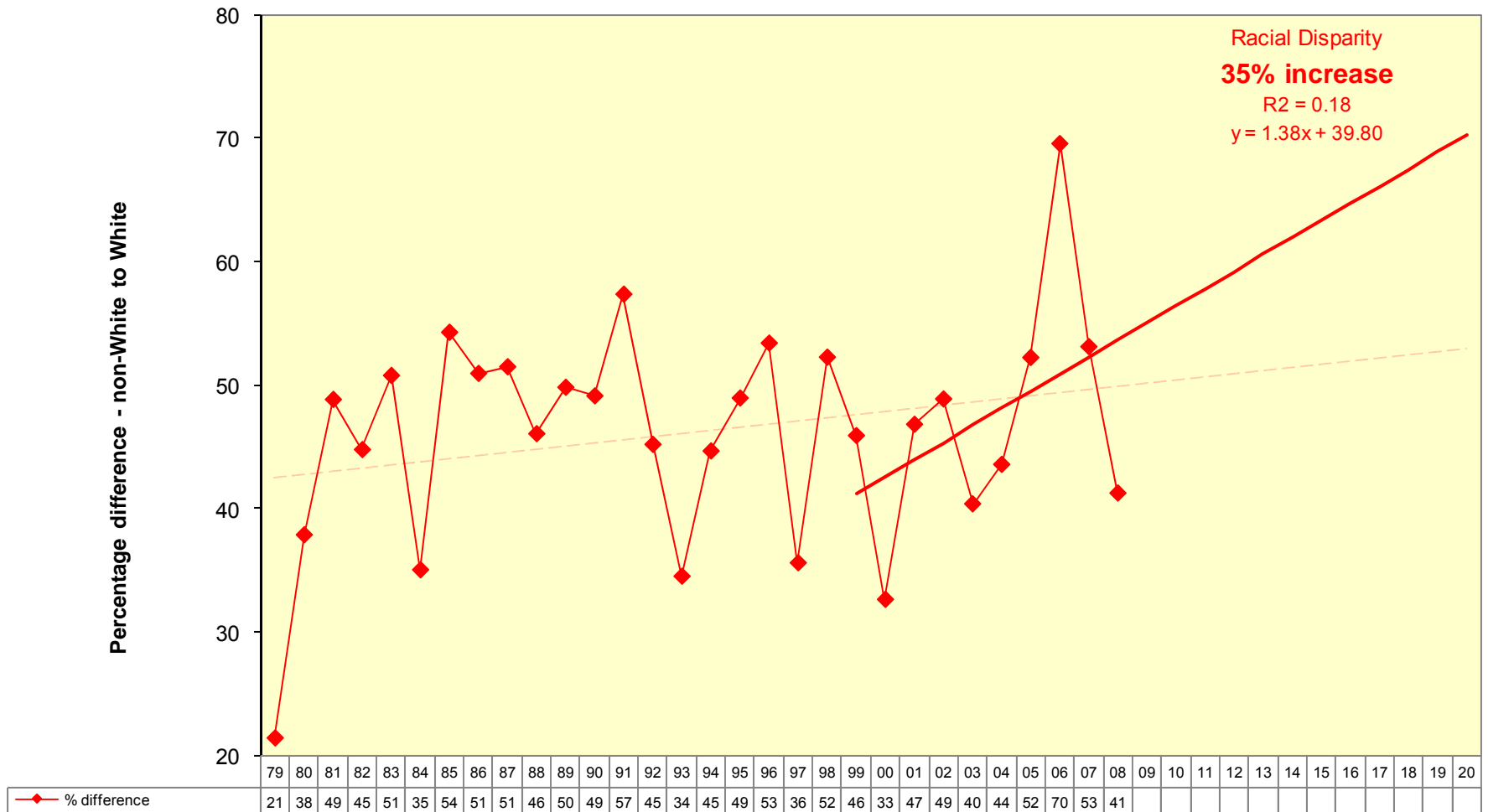


Figure 6.3 v. Cerebrovascular Disease:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

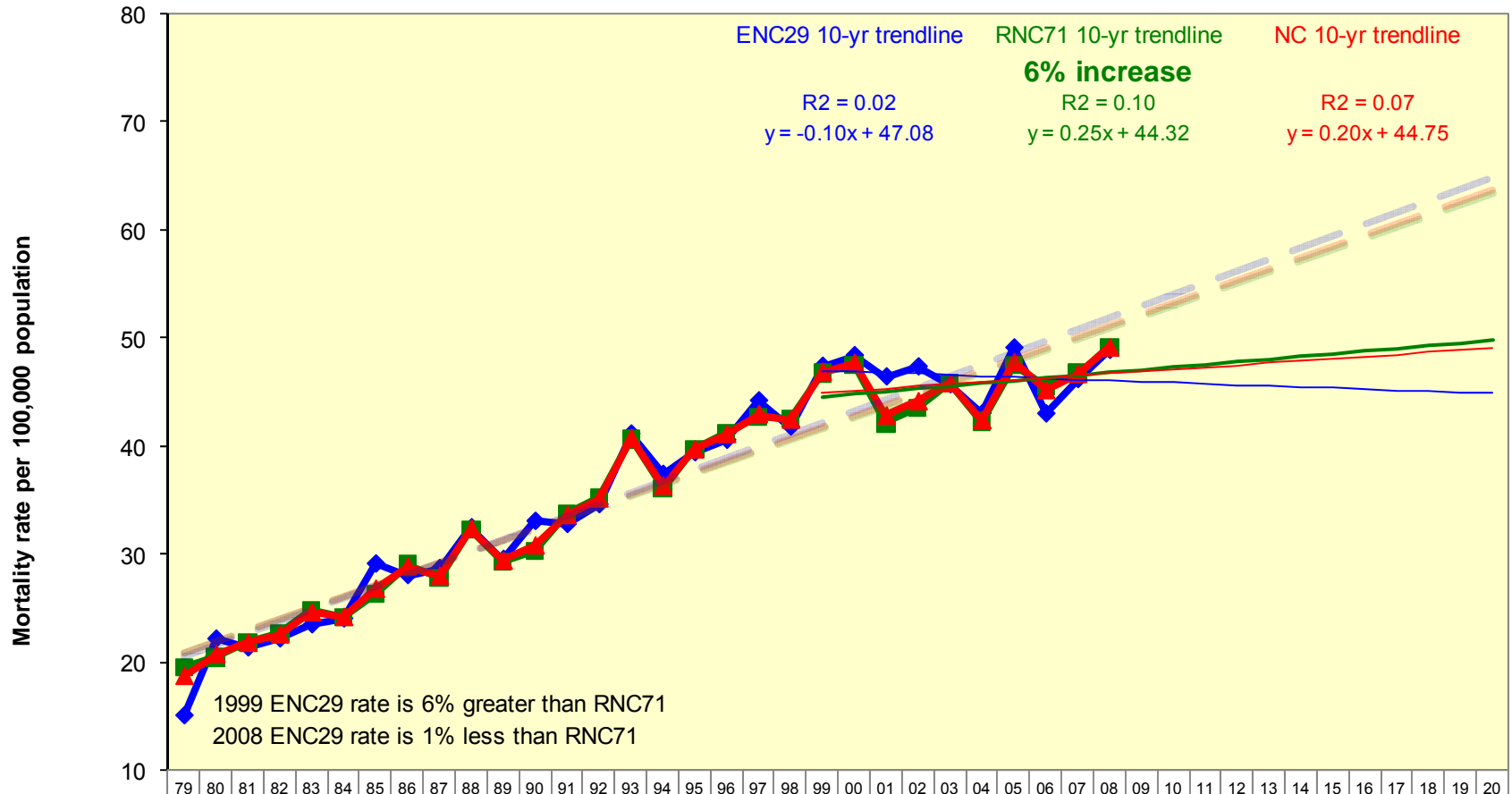


Chronic Lower Respiratory Diseases

- The 30-year CLRD mortality rate for ENC is increasing substantially at an annual rate of 5.5%. However, the 10-year trend for ENC appears to be decreasing, but the trend is not reliable. In 2008, the ENC rate was 1% less than RNC, decreasing below RNC for the first time.
- The 10-year CLRD age-adjusted rate for ENC is decreasing and converging with the US rate, remaining lower than RNC and NC. The ENC rate in 2008 was 8% less than RNC, whereas in 1999 the ENC rate was 9% greater than RNC.
- Fitted rates for non-White male, White male, and White female mortality have decreased over 10 years by 28%, 26%, and 6%, respectively, and are converging. Non-White males have the greatest rates of decrease. The 10-year trend for non-White females is unreliable.
- The 10-year White mortality rate trend is higher than the non-White trend, but the white trend is decreasing at a greater rate, although convergence is not suggested in the near future. The non-White rate remains 41% less than the White rate in 2008.
- 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 6.4 i. Chronic Lower Respiratory Diseases: Trends in mortality rates for ENC29, RNC71, and NC, 1979-2008 with projections to 2020

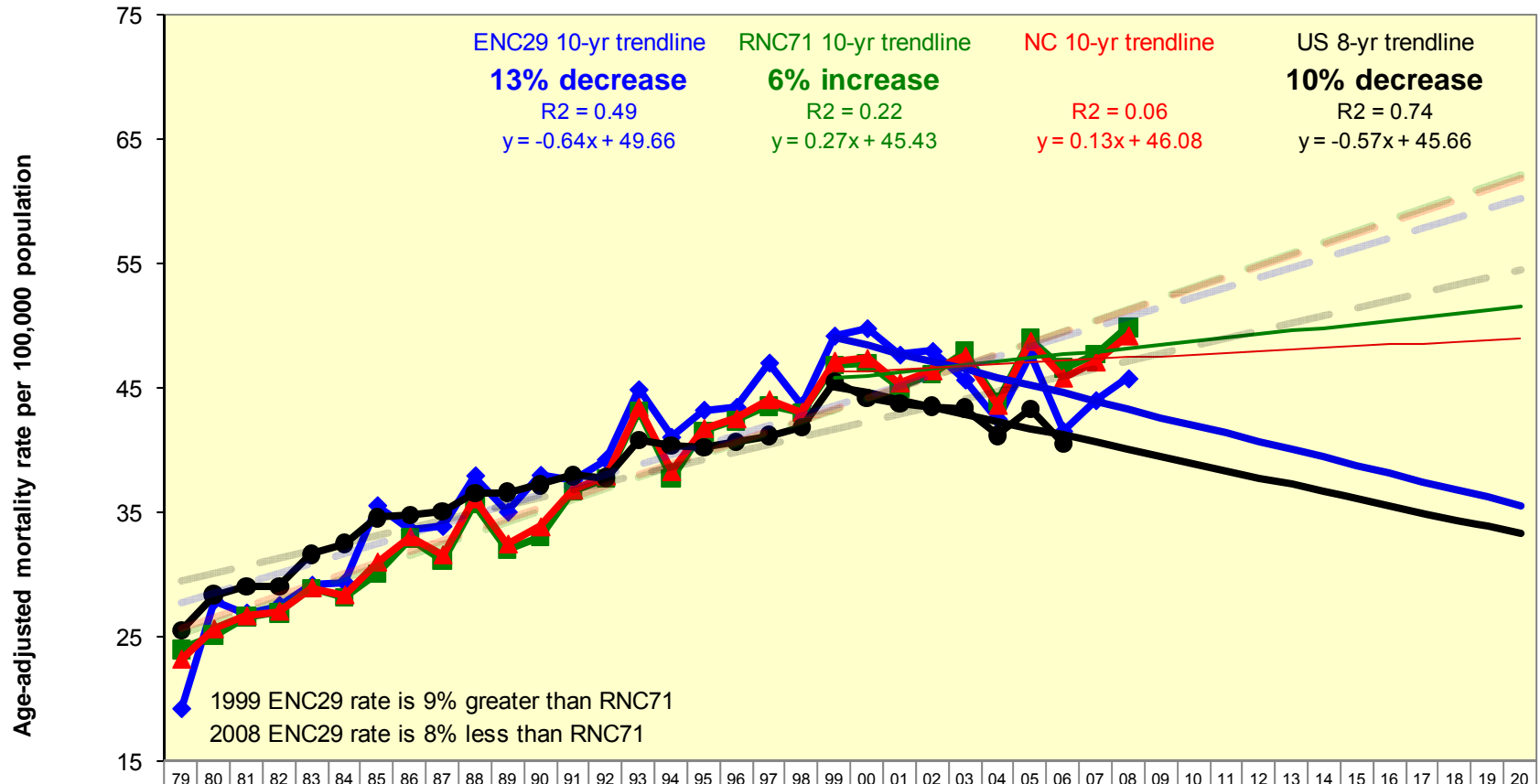
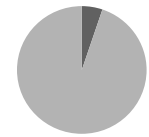


	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20						
ENC29	15	22	21	22	23	24	29	28	29	32	30	33	33	35	41	37	39	41	44	42	47	48	46	47	46	43	49	43	46	49																		
RNC71	20	20	22	23	25	24	26	29	28	32	29	30	34	35	41	36	40	41	43	43	47	48	42	44	46	42	48	46	47	49																		
NC	19	21	22	23	25	24	27	29	28	32	29	31	34	35	41	36	40	41	43	42	47	48	43	44	46	42	48	45	47	49																		

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	6% LT	5% LT	ENC29
6% GT		1% GT	RNC71
5% GT	1% LT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	1% GT	1% GT	ENC29
1% LT		0% LT	RNC71
1% LT	0% GT		NC

Figure 6.4 ii. Chronic Lower Respiratory Diseases:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20						
ENC29	19	28	27	27	29	29	35	34	34	38	35	38	38	39	45	41	43	43	47	44	49	50	48	48	46	42	48	41	44	46																		
RNC71	24	25	27	27	29	28	30	33	31	36	32	33	37	38	43	38	41	42	43	43	47	47	45	46	48	44	49	47	48	50																		
NC	23	26	27	27	29	28	31	33	32	36	32	34	37	38	43	38	42	42	44	43	47	47	45	46	48	44	49	46	47	49																		
US	26	28	29	29	32	32	35	35	35	36	37	37	38	38	41	40	40	41	41	42	45	44	44	43	43	41	43	40																				

Comparison of Fitted Rates in 1999				
ENC29	RNC71	NC	US	
	9% LT	7% LT	8% LT	ENC29
9% GT		1% GT	0% GT	RNC71
8% GT	1% LT		1% LT	NC
9% GT	0% LT	1% GT		US

Comparison of Fitted Rates in 2008				
ENC29	RNC71	NC	US	
	9% GT	8% GT	8% LT	ENC29
8% LT		1% LT	15% LT	RNC71
7% LT	1% GT		14% LT	NC
8% GT	18% GT	16% GT		US

Figure 6.4 iii. Chronic Lower Respiratory Diseases: Trends in age-adjusted mortality rates by race and gender for ENC29, 1979-2008 with projections to 2020

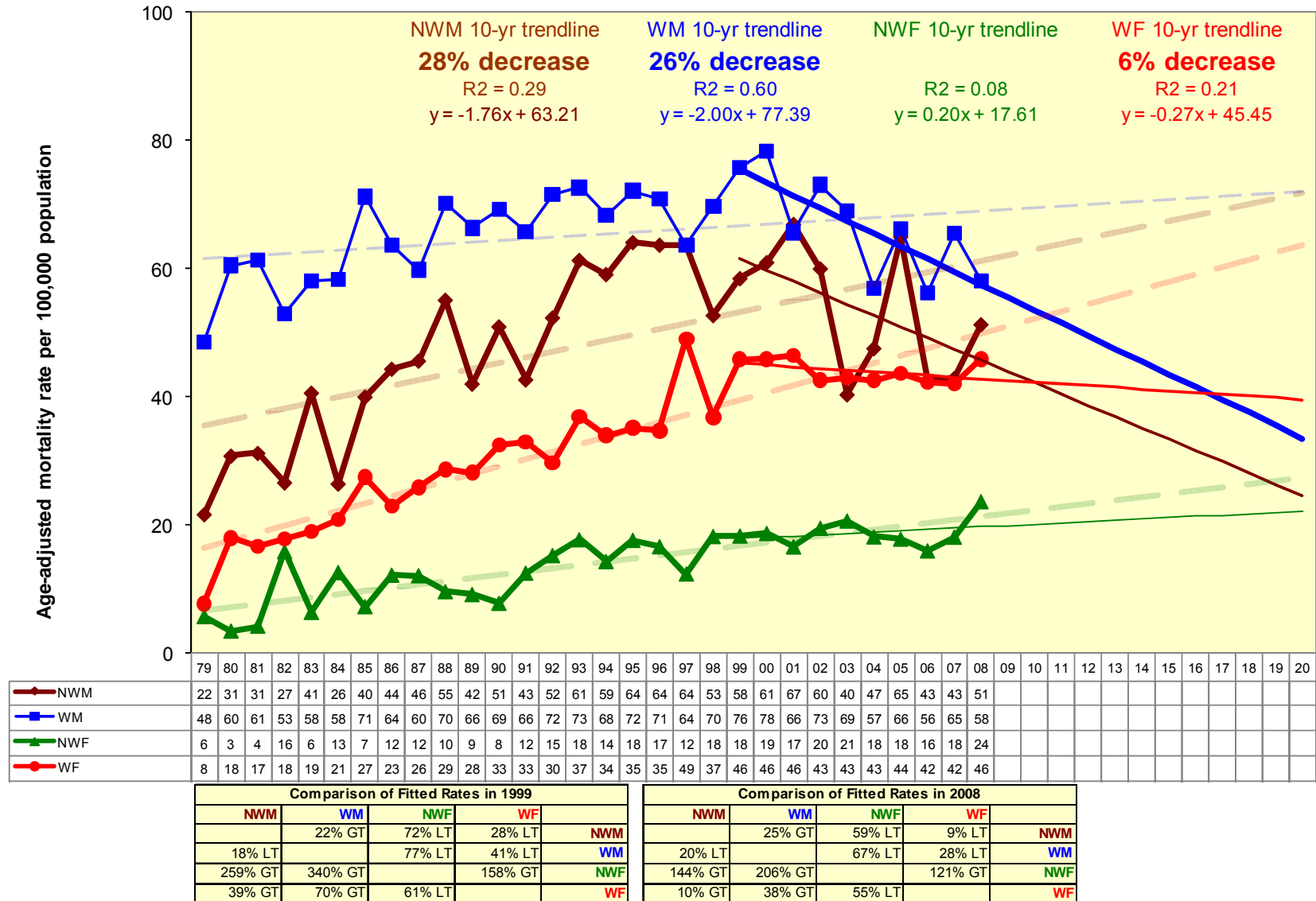
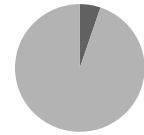


Figure 6.4 iv. Chronic Lower Respiratory Diseases:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

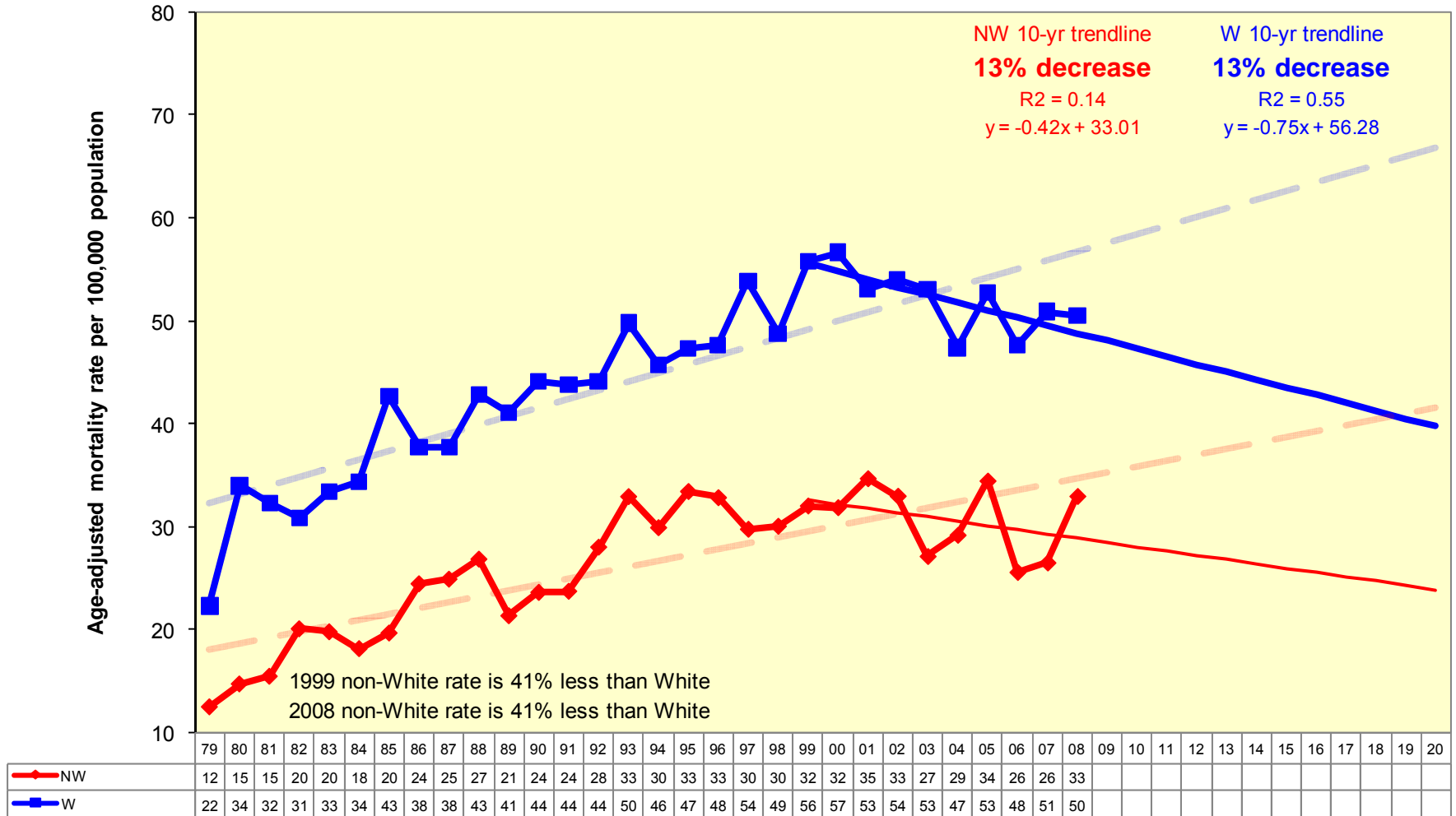
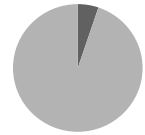
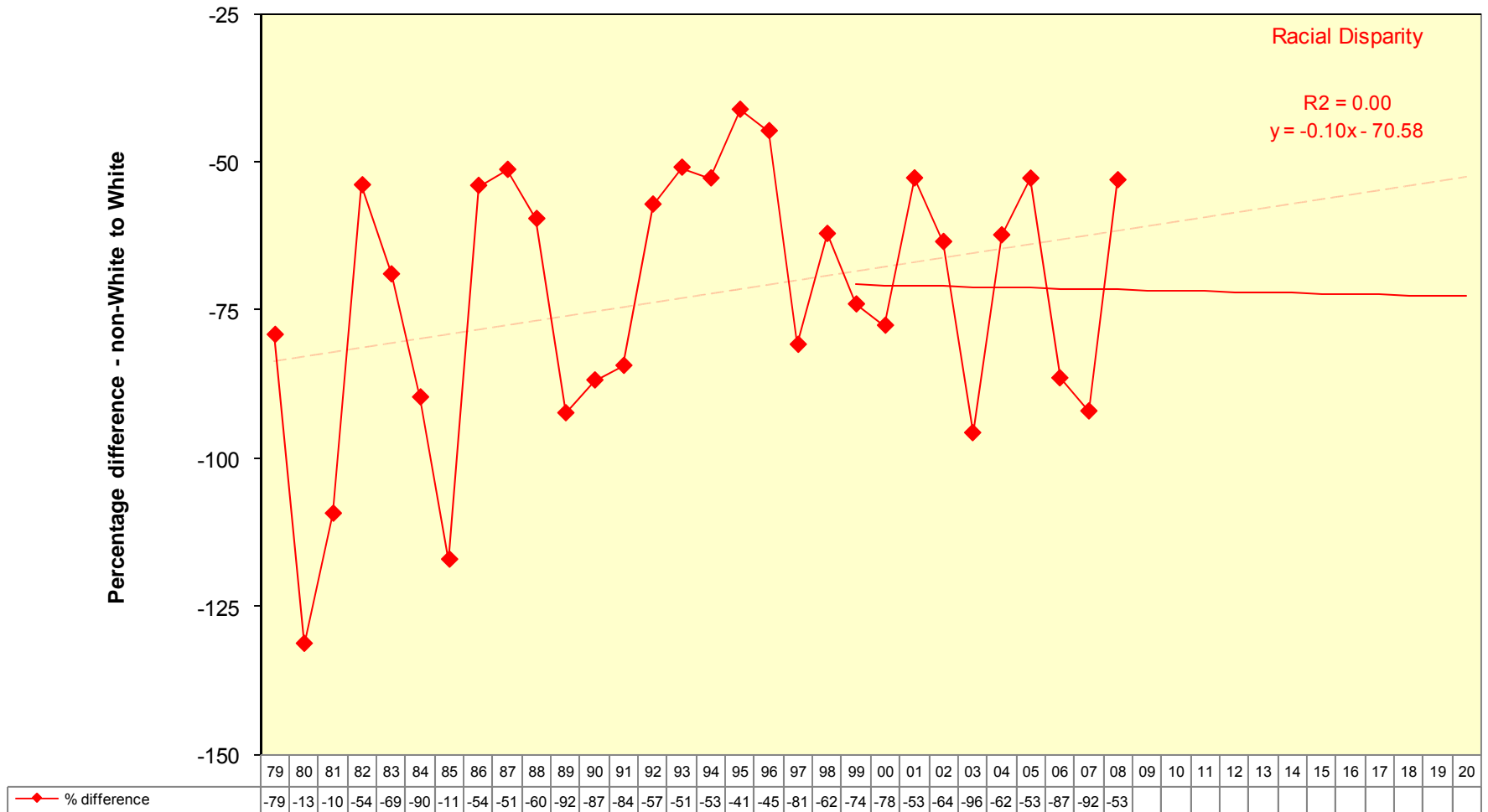


Figure 6.4 v. Chronic Lower Respiratory Diseases:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

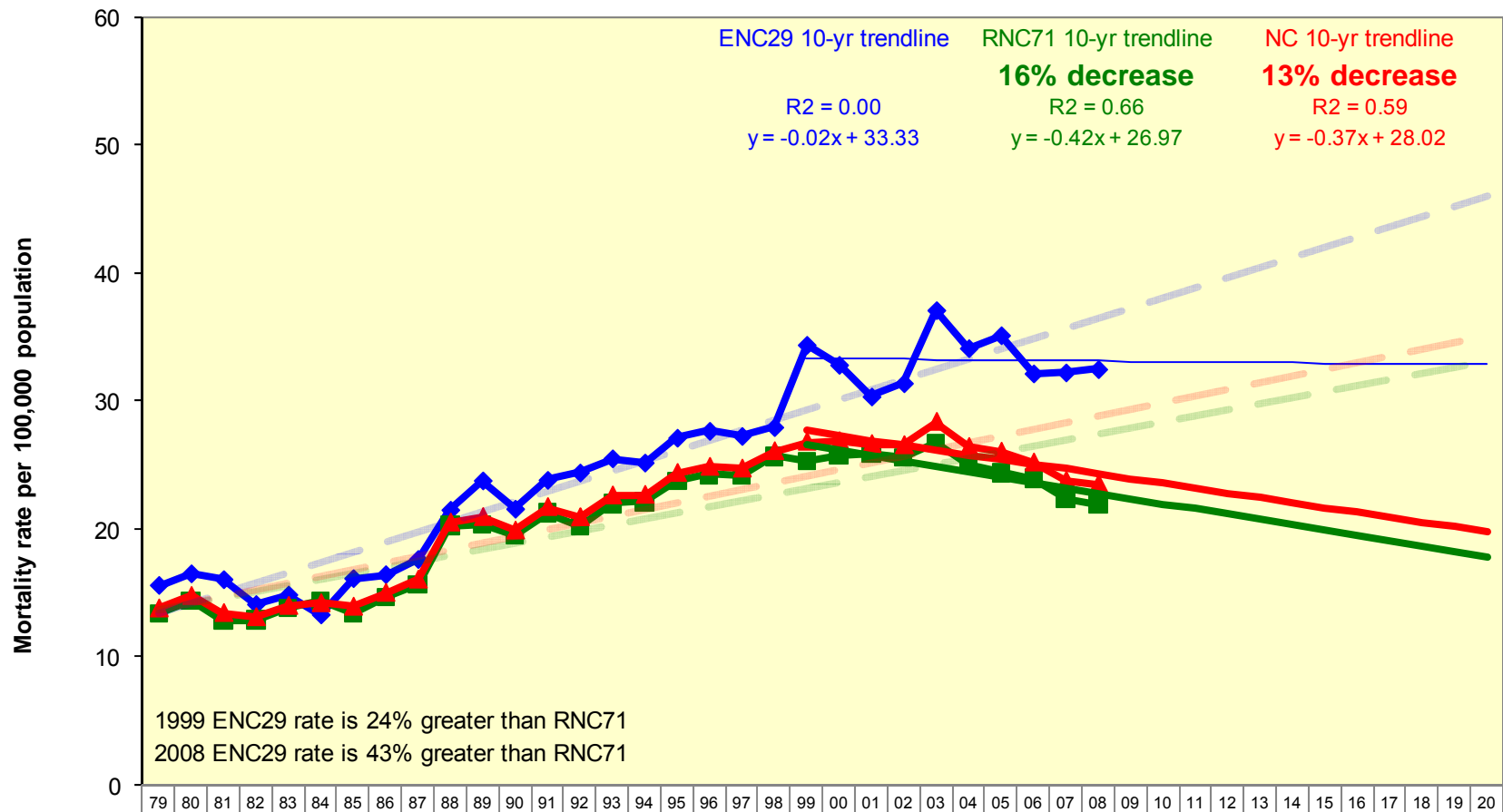
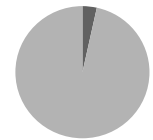


Diabetes Mellitus

- The 30-year CLRD mortality rate for ENC is increasing substantially at an annual rate of 5.5%. However, the 10-year trend for ENC appears to be decreasing, but the trend is not reliable. In 2008, the ENC rate was 1% less than RNC, decreasing below RNC for the first time.
- The 10-year CLRD age-adjusted rate for ENC is decreasing and converging with the US rate, remaining lower than RNC and NC. The ENC rate in 2008 was 8% less than RNC, whereas in 1999 the ENC rate was 9% greater than RNC.
- Fitted rates for non-White male, White male, and White female mortality have decreased over 10 years by 28%, 26%, and 6%, respectively, and are converging. Non-White males have the greatest rates of decrease. The 10-year trend for non-White females is unreliable.
- The 10-year White mortality rate trend is higher than the non-White trend, but the white trend is decreasing at a greater rate, although convergence is not suggested in the near future. The non-White rate remains 41% less than the White rate in 2008.
- 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 6.5 i. Diabetes Mellitus:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020

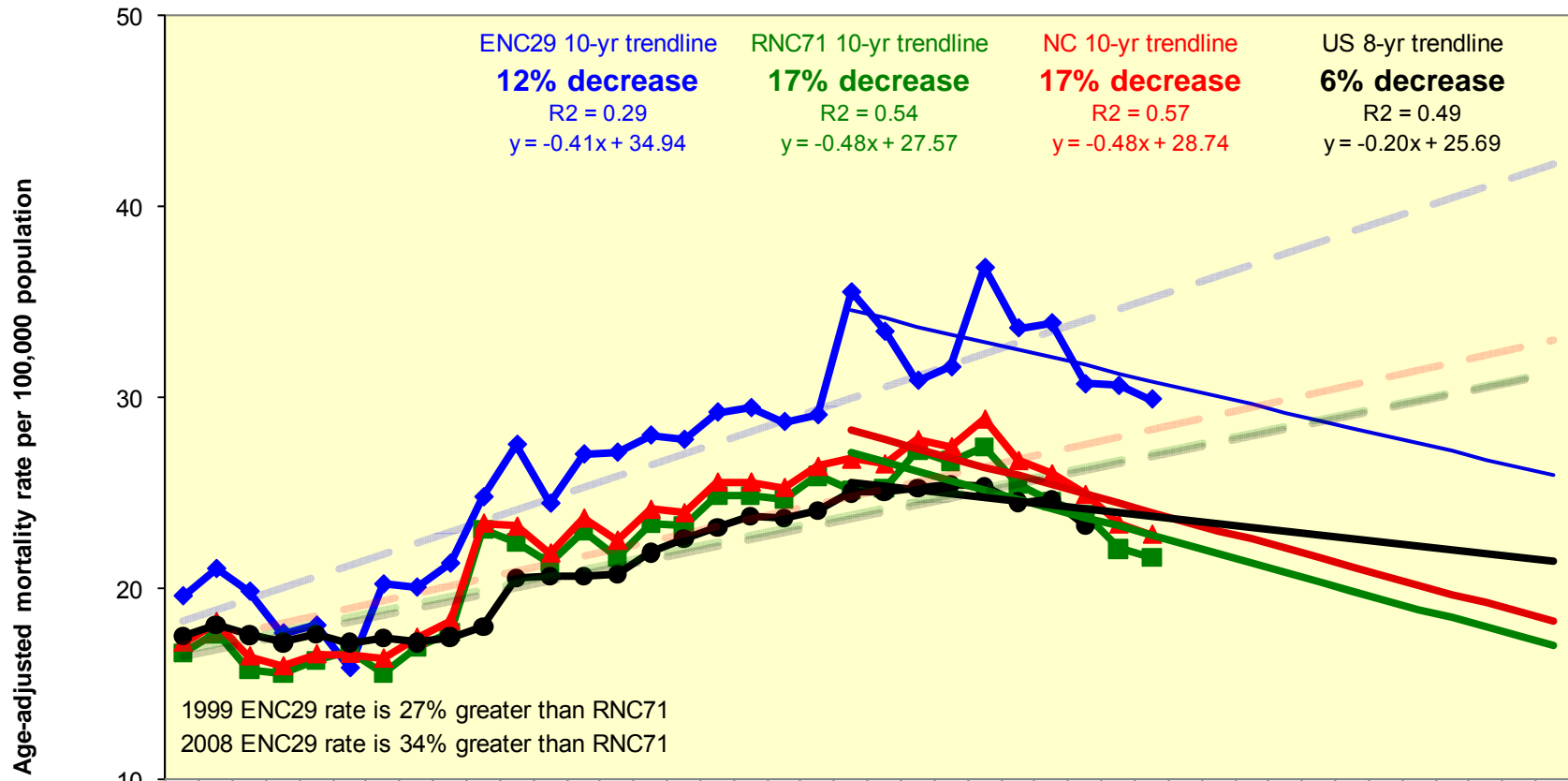
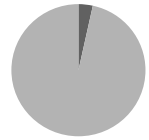


	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20									
ENC29	16	16	16	14	15	13	16	16	18	21	24	22	24	24	25	25	27	28	27	28	34	33	30	31	37	34	35	32	32	32																					
RNC71	13	14	13	13	14	14	13	15	16	20	20	19	21	20	22	22	24	24	24	26	25	26	26	26	27	25	24	24	22	22																					
NC	14	15	13	13	14	14	14	15	16	20	21	20	22	21	23	23	24	25	25	26	27	27	27	26	28	26	26	25	24	23																					

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	19% LT	16% LT	ENC29
24% GT		4% GT	RNC71
19% GT	4% LT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	30% LT	26% LT	ENC29
43% GT		6% GT	RNC71
34% GT	6% LT		NC

Figure 6.5 ii. Diabetes Mellitus:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US, 1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20									
ENC29	20	21	20	18	18	16	20	20	21	25	28	24	27	27	28	28	29	29	29	29	36	33	31	32	37	34	34	31	31	30																					
RNC71	17	18	16	16	16	17	16	17	18	23	22	21	23	22	23	23	25	25	25	26	25	25	27	27	27	25	25	24	22	22																					
NC	17	18	16	16	17	17	16	17	18	23	23	22	24	23	24	24	26	26	25	26	27	27	28	27	29	27	26	25	23	23																					
US	17	18	18	17	18	17	17	17	17	18	21	21	21	21	22	23	23	24	24	24	24	25	25	25	25	25	25	25	23																						

ENC29	RNC71	NC	US
	21% LT	18% LT	26% LT
27% GT		4% GT	7% LT
22% GT	4% LT		11% LT
36% GT	7% GT	12% GT	

ENC29	RNC71	NC	US
	26% LT	22% LT	23% LT
34% GT		5% GT	3% GT
28% GT	5% LT		2% LT
31% GT	3% LT	2% GT	

Figure 6.5 iv. Diabetes Mellitus:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

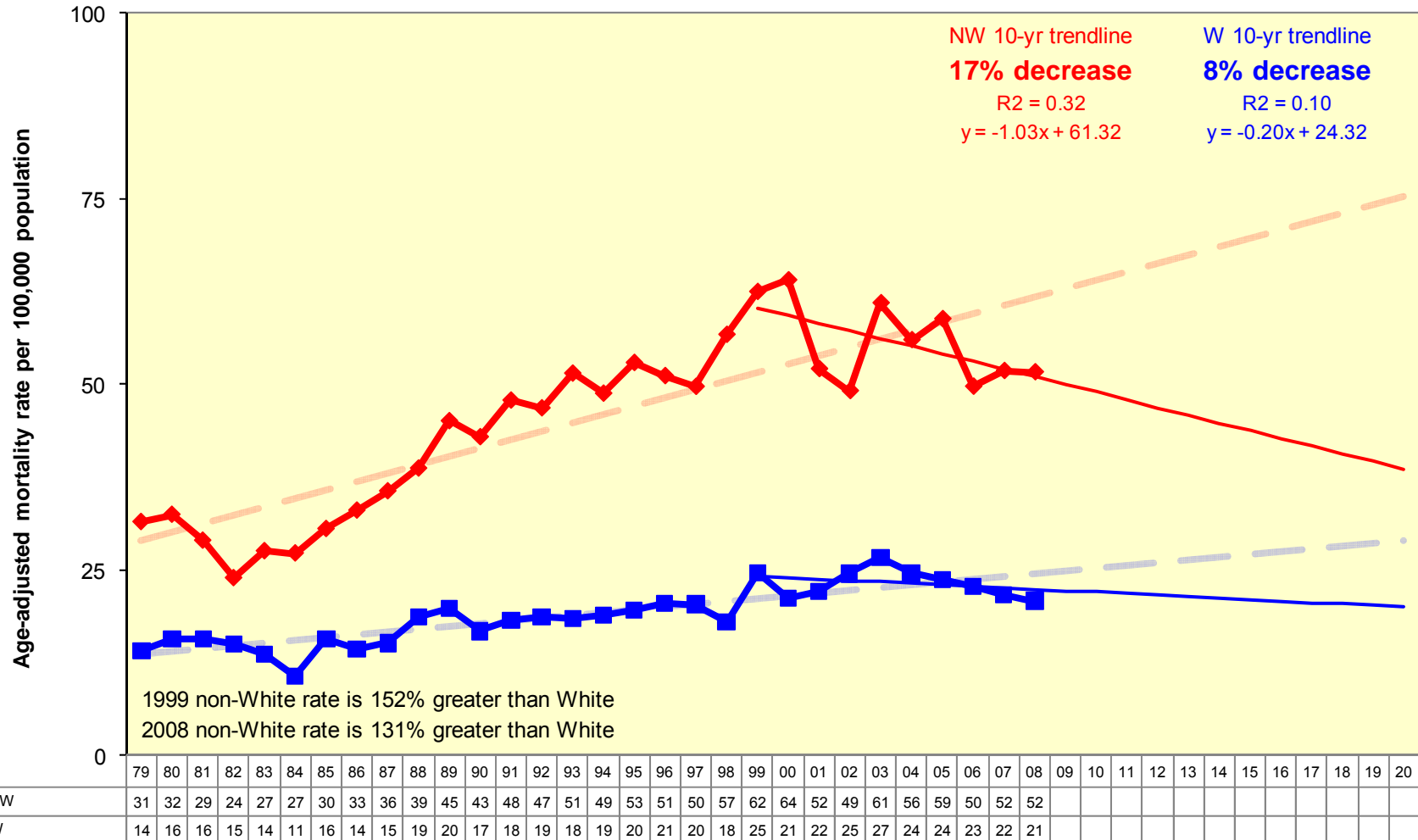
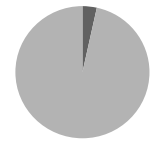
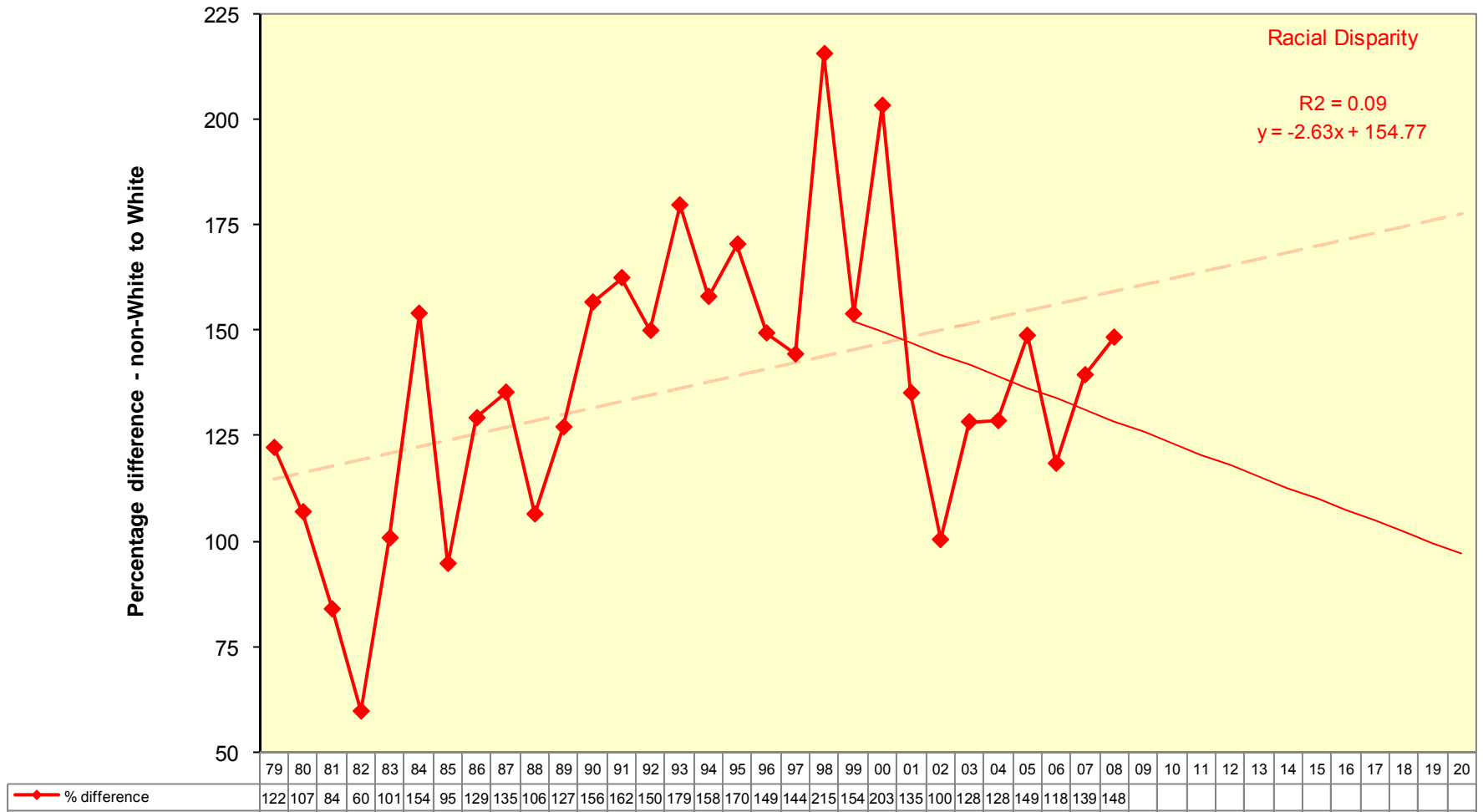
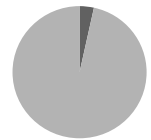


Figure 6.5 v. Diabetes Mellitus:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020



All Other Unintentional Injuries and Adverse Effects

- Mortality from unintentional injuries and adverse effects has increased substantially in ENC (29% over 10 years). In 1999, ENC was 5% greater than RNC. In 2008, ENC is 4% less than RNC, suggesting a regional disparity that favors the ENC region.
- The age-adjusted mortality 10-year trend lines also suggest a regional disparity that favors ENC. The ENC rate is 6% less than the RNC rate in 2008. The ENC rate has increased 20% over 10 years. All trends are higher than the *Healthy People 2010* projected goal of less than 17.5 deaths per 100,000.
- The non-White male rates continue to decrease at a greater rate (39%) than other demographic groups and convergence with White female and non-White female rates is suggested in the future. The White male rate is now the highest rate of all demographic groups and has increased 32% over 10 years. White females had the greatest rate of increase (90%) over 10 years.
- Non-White rates have decreased by 31% over 10 years, whereas white rates have increased 52%, causing these two rates to diverge significantly. In 2008, the non-White rate is 35% less than the White rate.
- The racial disparity associated with deaths from unintentional injuries has decreased by 304% between 1999 and 2008, eliminating the unfavorable disparity in relation to Whites, and favoring 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 $R^2 < 0.10$.

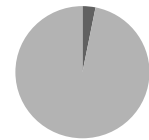
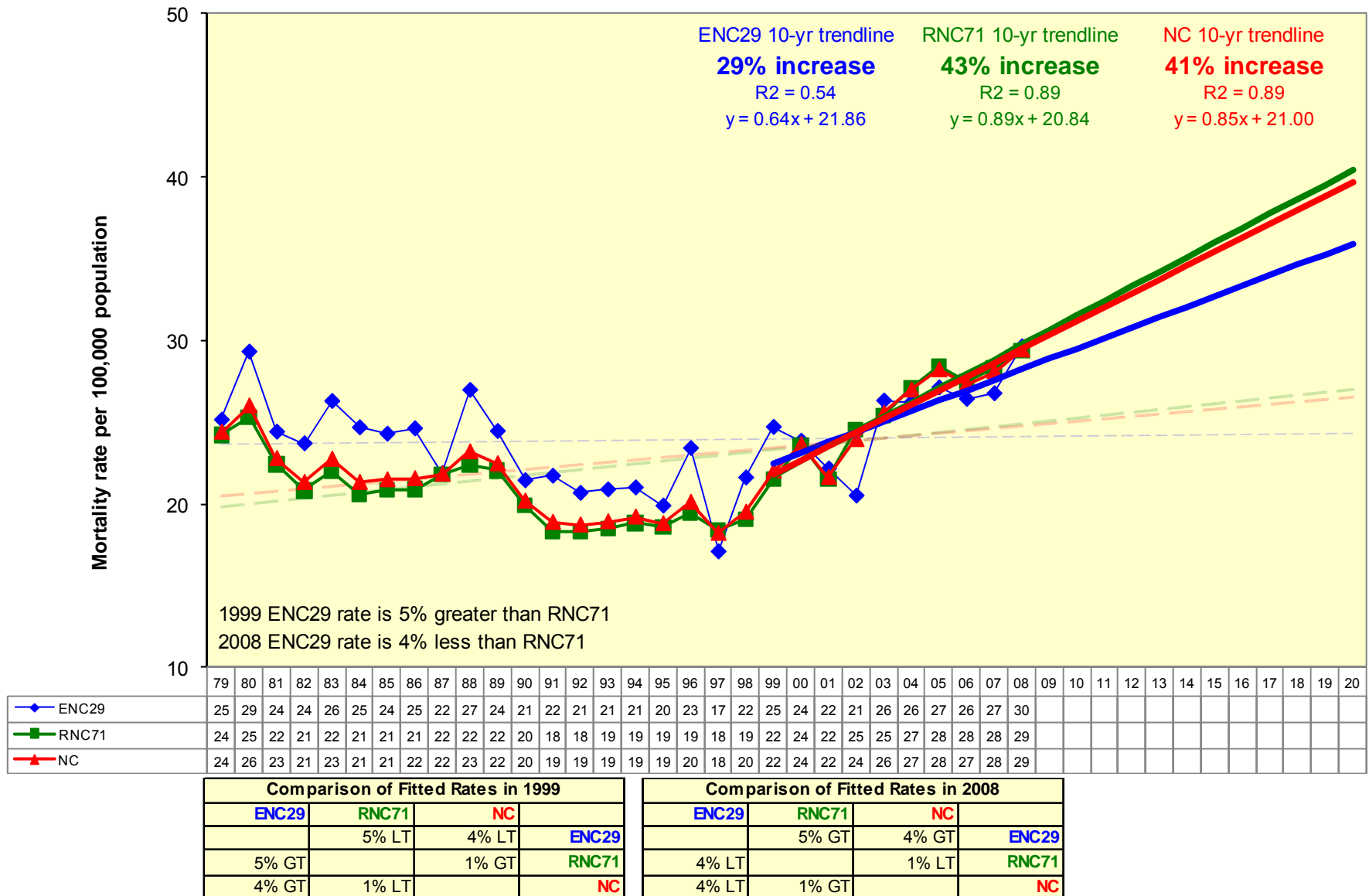


Figure 6.6 i. All Other Unintentional Injuries and Adverse Effects:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020



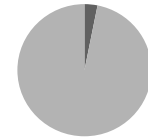


Figure 6.6 iii. All Other Unintentional Injuries and Adverse Effects: Trends in age-adjusted mortality rates by race and gender for ENC29, 1979-2008 with projections to 2020

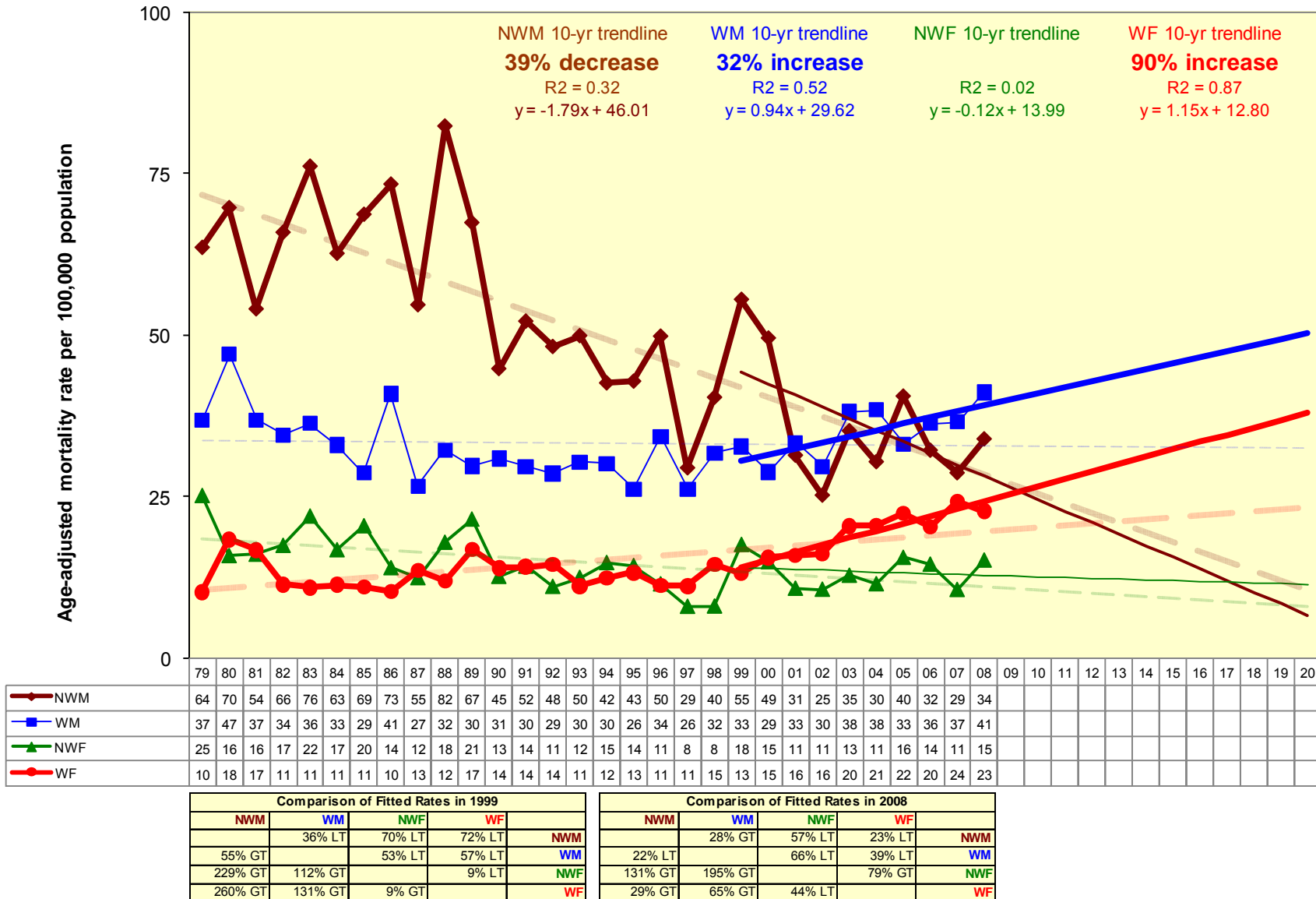
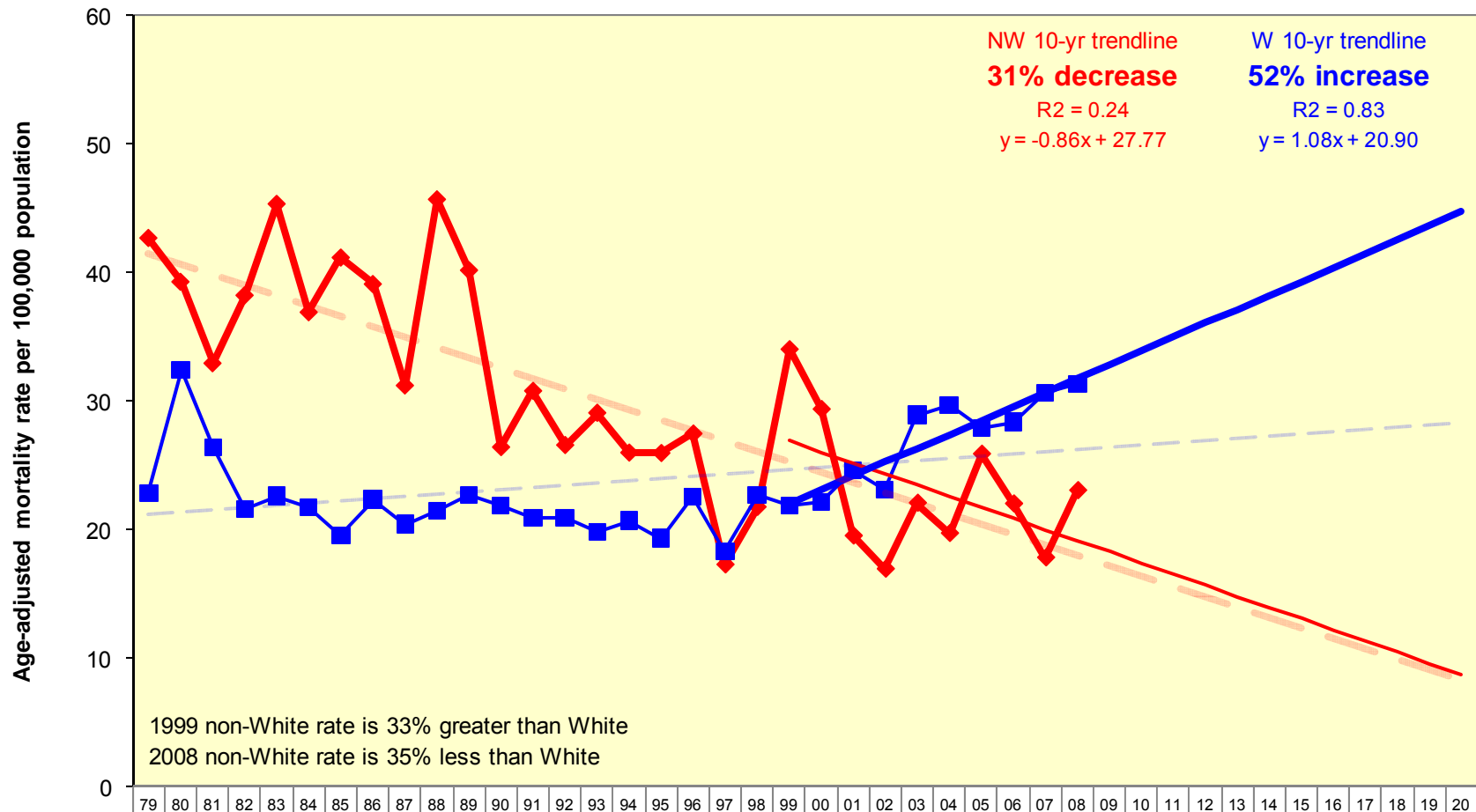
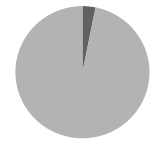
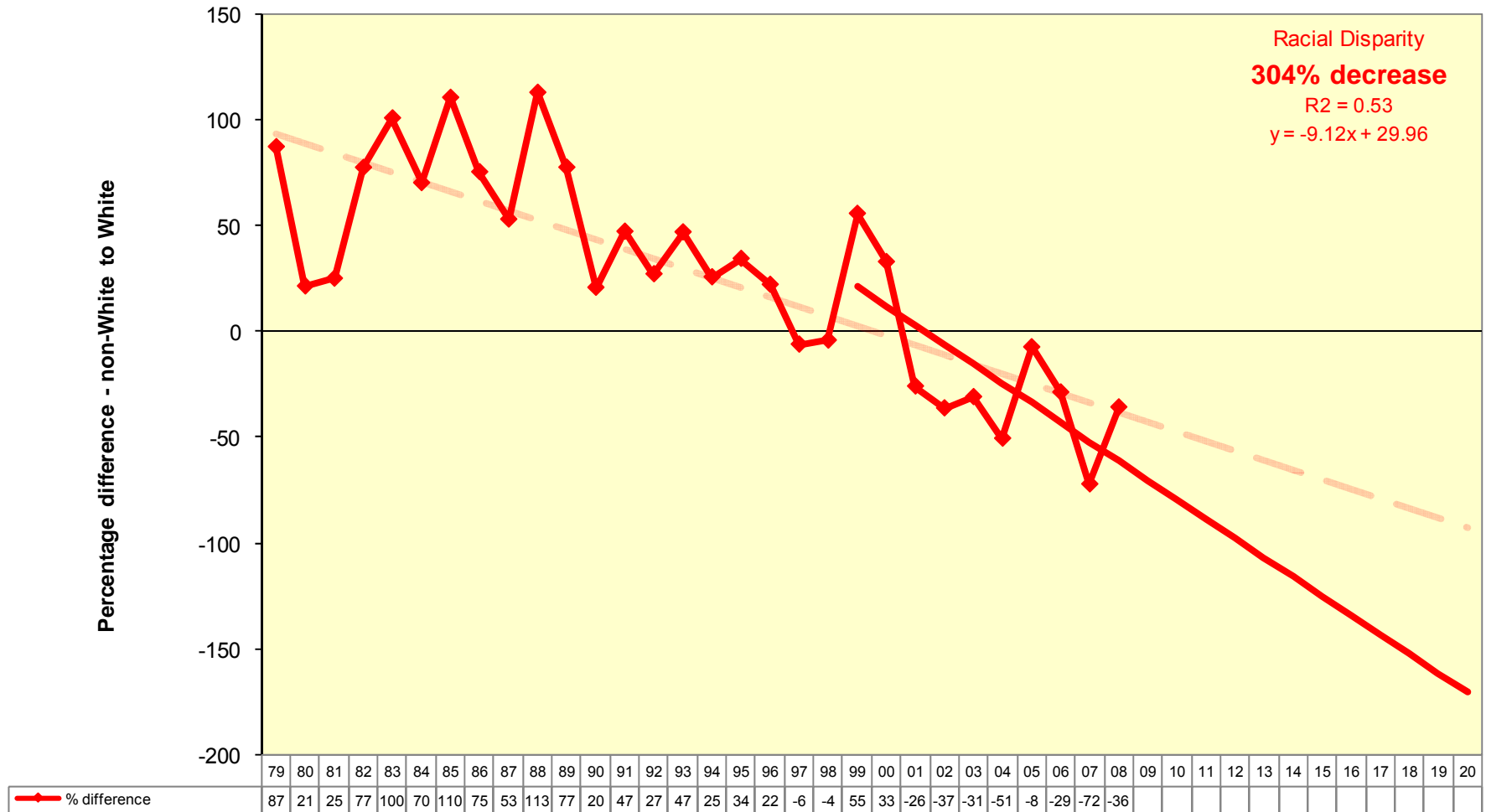


Figure 6.6 iv. All Other Unintentional Injuries and Adverse Effects:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20					
—◆— NW	43	39	33	38	45	37	41	39	31	46	40	26	31	27	29	26	26	27	17	22	34	29	19	17	22	20	26	22	18	23																	
—■— W	23	32	26	22	23	22	20	22	20	21	23	22	21	21	20	21	19	23	18	23	22	22	25	23	29	30	28	28	31	31																	

Figure 6.6 v. All Other Unintentional Injuries and Adverse Effects:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

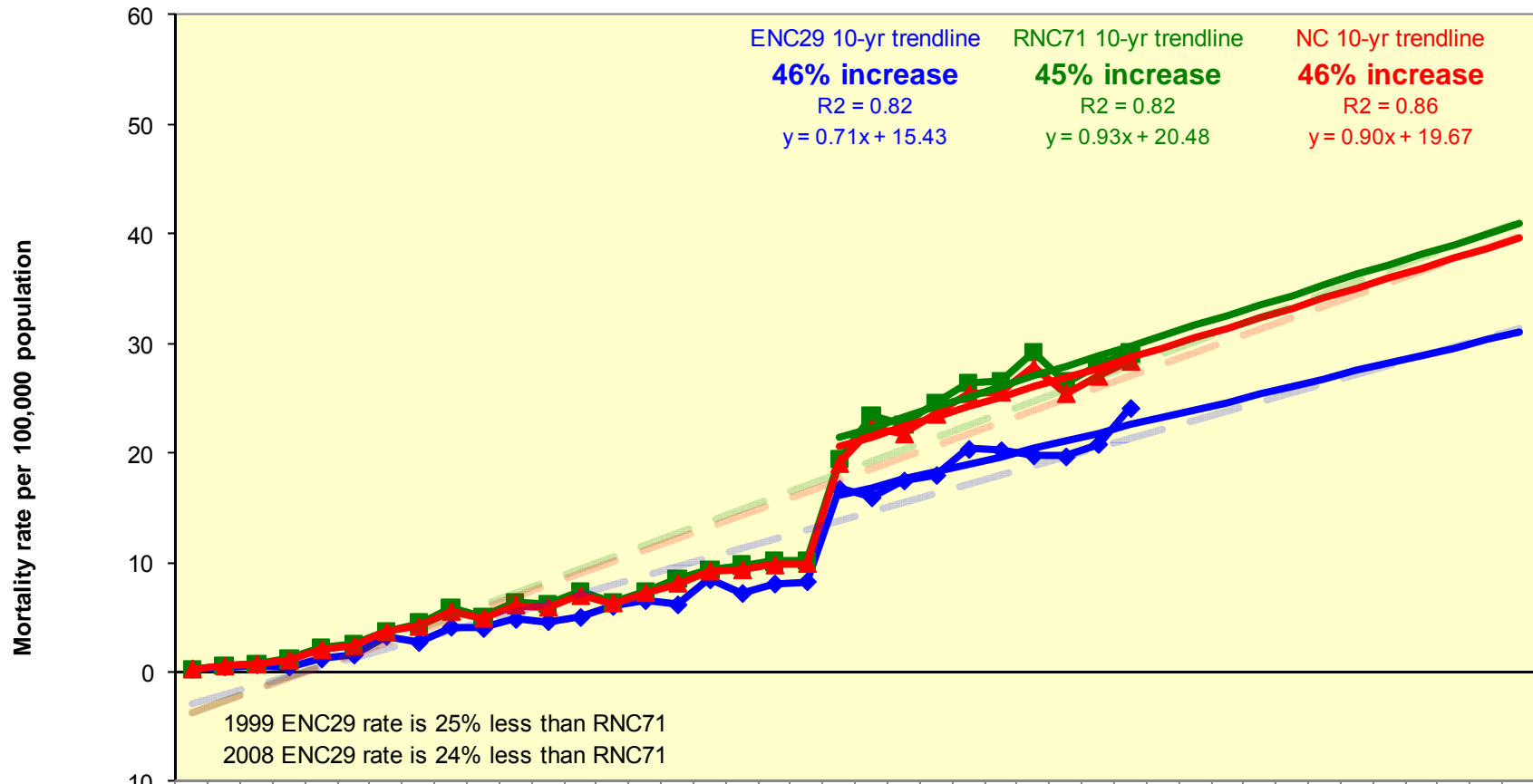
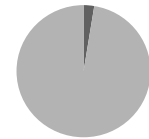


Alzheimers Disease

- The Alzheimer's mortality rate is increasing at a rate of 4.6% per year, showing a 46% increase over the 10-year period, about the same rate of increase as RNC and NC.
- In 2008, the age-adjusted rate for ENC is on par with the US (2006) rate. The rate of increase for ENC is below the US and NC rates of increase.
- The mortality rate for females, both White and non-White, is greater than that of non-White and White males.
- The non-White mortality rate for Alzheimer's has been increasing continually but remains less than the White mortality rate by 22% in 2008.
- The trend for racial disparity is not reliable, but currently favors non-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 6.7 i. Alzheimers Disease:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20										
ENC29	0	0	1	0	1	2	3	3	4	4	5	5	5	6	7	6	8	7	8	8	17	16	17	18	20	20	20	20	21	24																						
RNC71	0	1	1	1	2	3	4	4	6	5	6	6	7	6	7	8	9	10	10	10	19	23	23	25	26	27	29	26	28	29																						
NC	0	1	1	1	2	2	4	4	6	5	6	6	7	6	7	8	9	9	10	10	19	22	22	24	25	26	28	25	27	28																						

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	33% GT	27% GT	ENC29
25% LT		4% LT	RNC71
22% LT	4% GT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	32% GT	27% GT	ENC29
24% LT		4% LT	RNC71
22% LT	4% GT		NC

Figure 6.7 iii. Alzheimers Disease:
Trends in age-adjusted mortality rates by race and gender for ENC29,
1979-2008 with projections to 2020

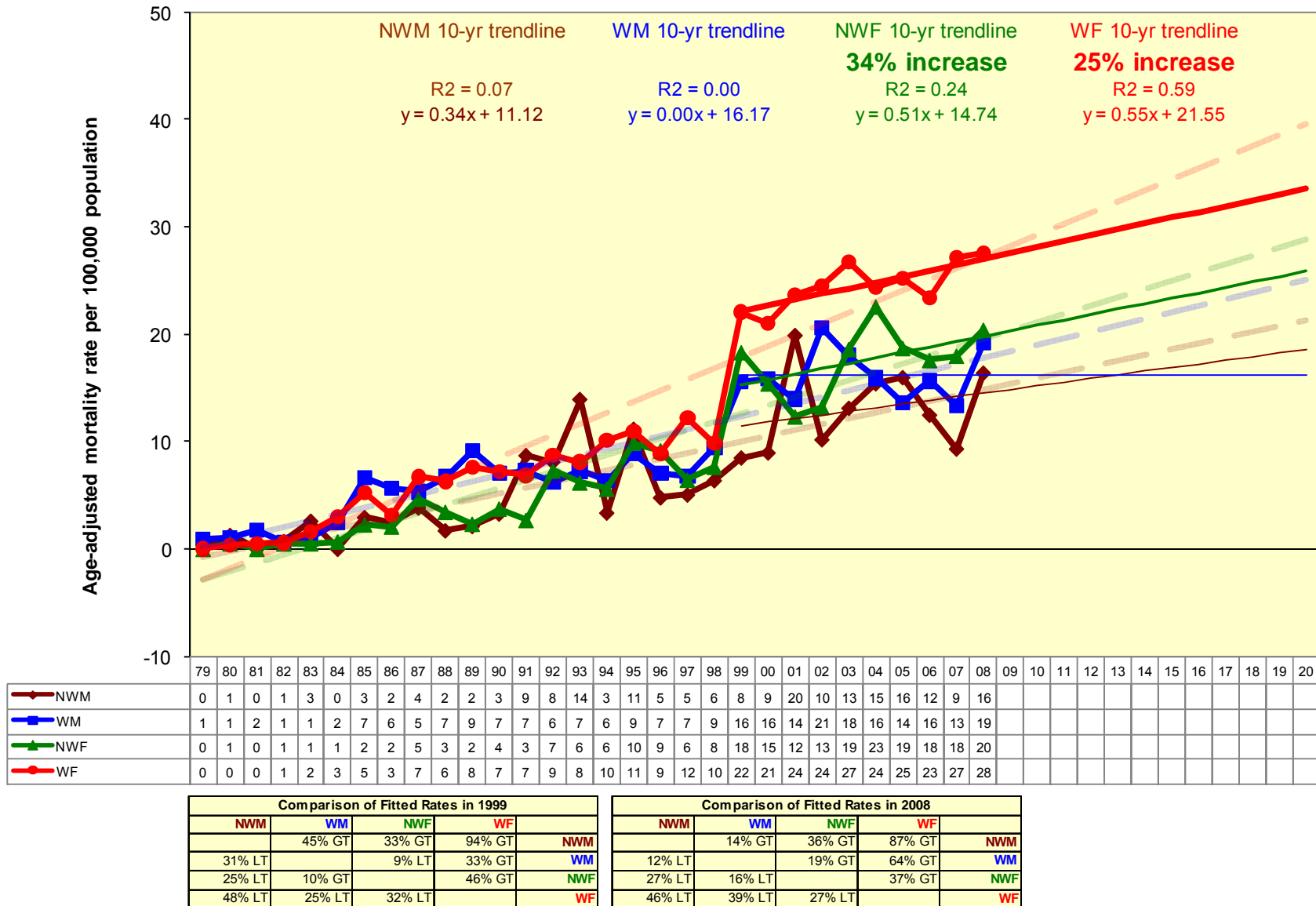
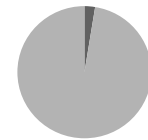


Figure 6.7 iv. Alzheimers Disease:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

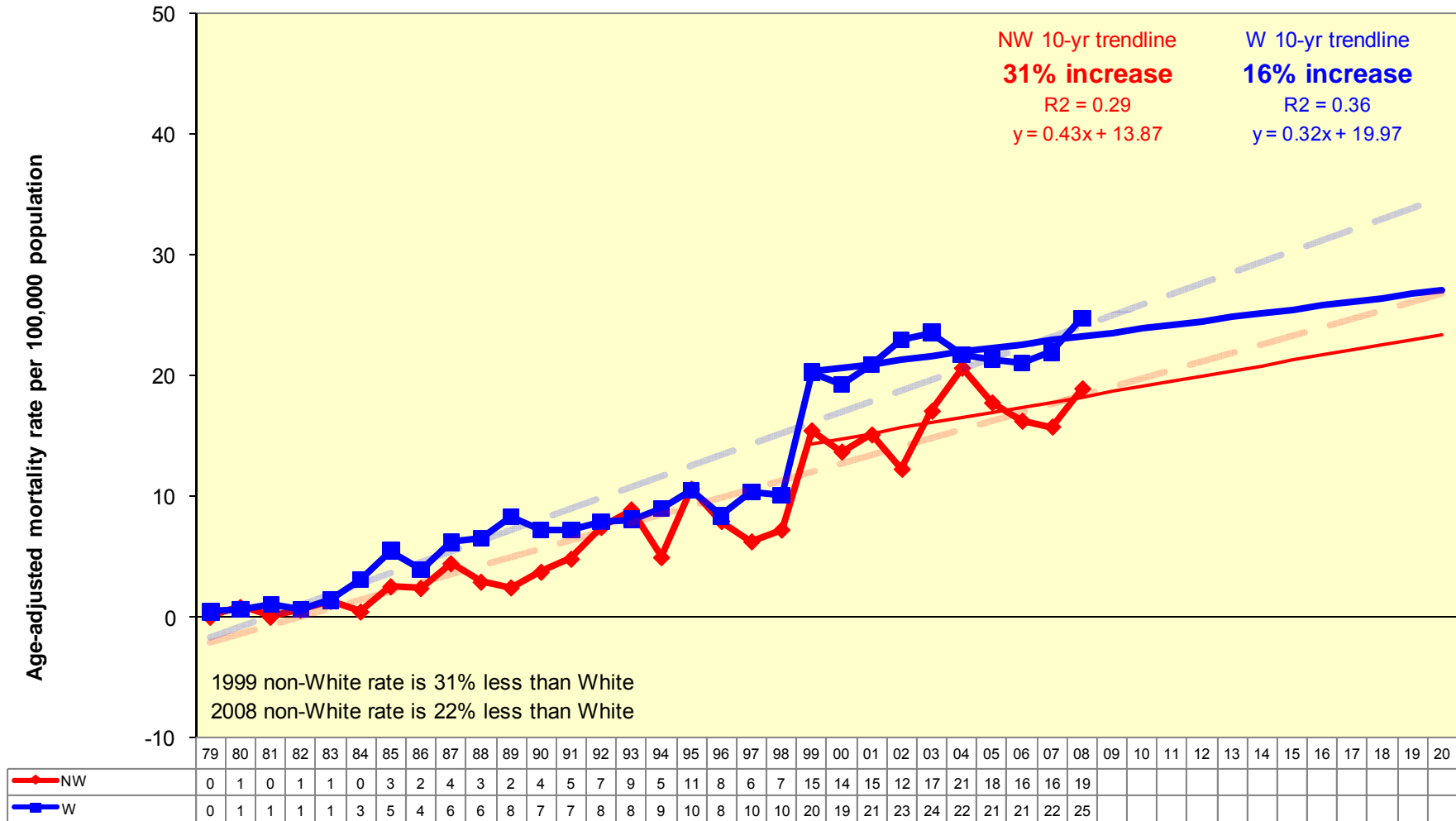
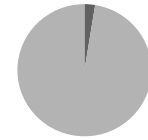
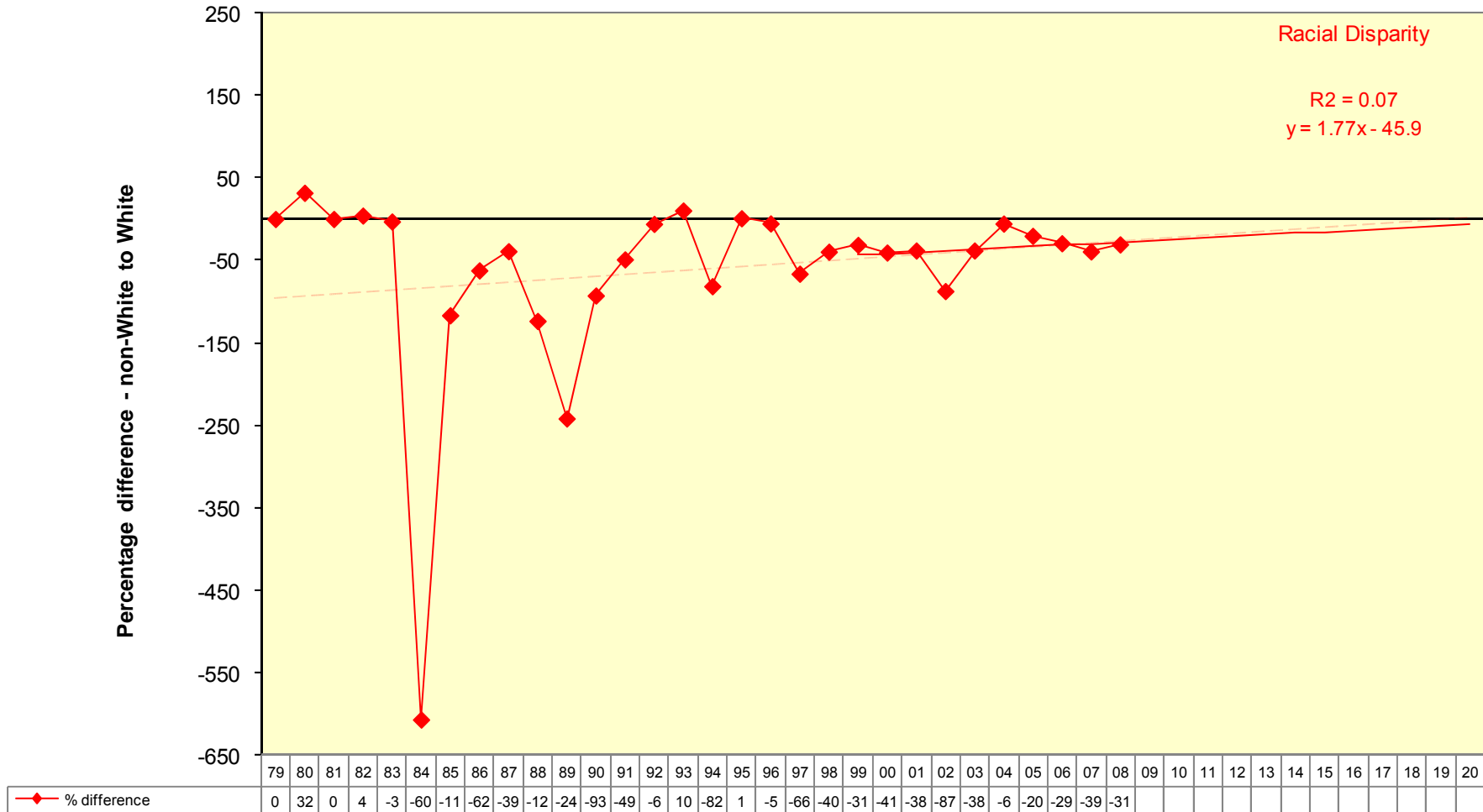
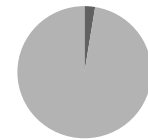


Figure 6.7 v. Alzheimers Disease:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

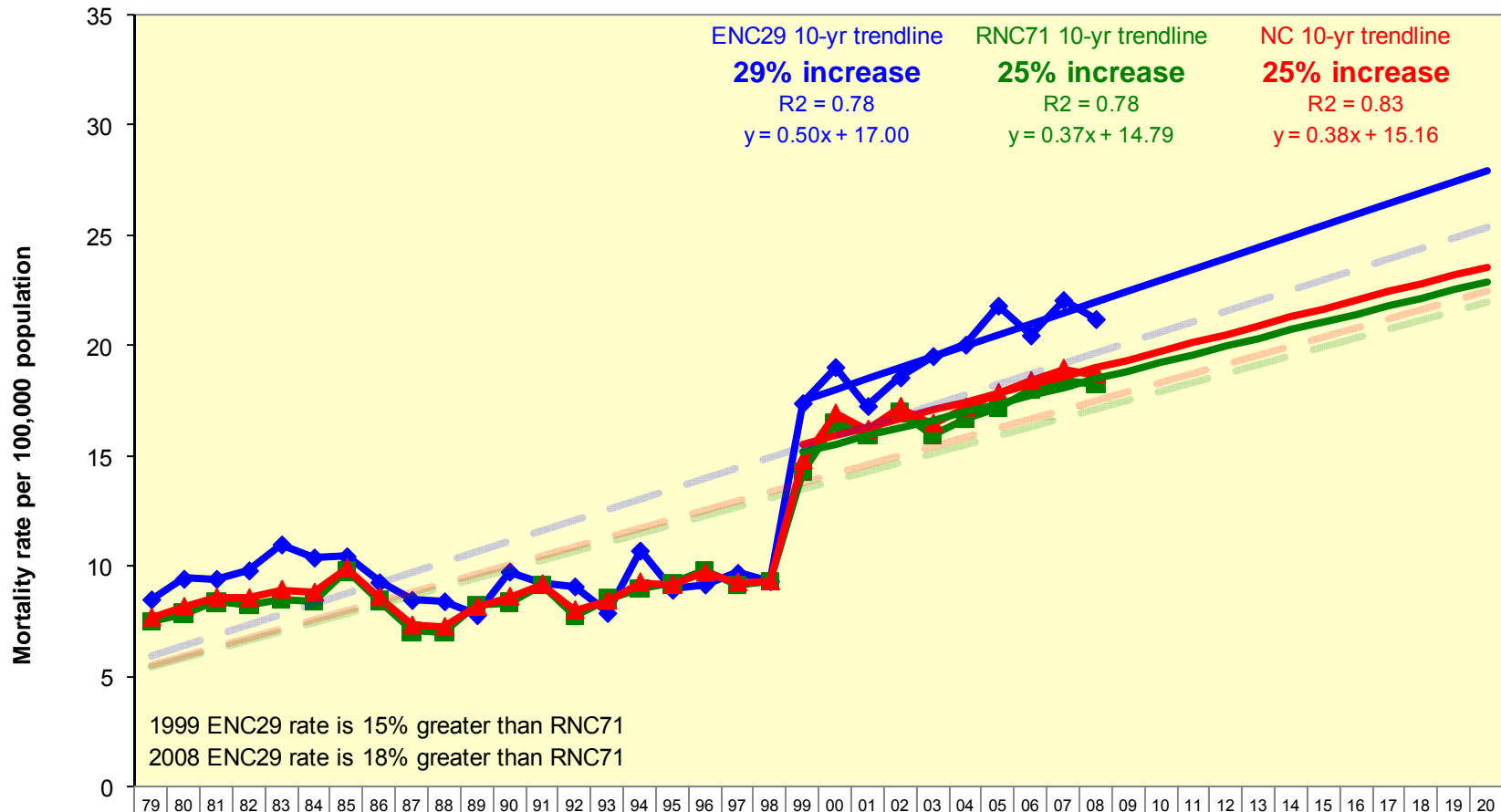
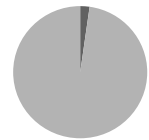


Nephritis, Nephrotic Syndrome, and Nephrosis

- Mortality due to nephritis, nephrotic syndrome, and nephrosis in ENC has increased by 29% over 10 years, a rate divergent from those of RNC and NC. While other regions have also experienced large increases, ENC rate of increase remains the greatest.
- With age-adjustment, ENC has increased by 13% contrasting to the 21% rate increase for RNC. This suggests convergence of ENC with RNC and NC in the near future.
- The 10-year trend for non-White males is unreliable but continues to remain the demographic group with the highest mortality rates. Non-white females have the greatest rate of decline, 12% decrease over 10 years, suggesting convergence with White males in the near future.
- In 2008, the non-White rate was 116% greater than the White rate.
- A reliable trend shows a 41% decrease in racial disparity over the 10-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 6.8 i. Nephritis, Nephrotic Syndrome, and Nephrosis:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020

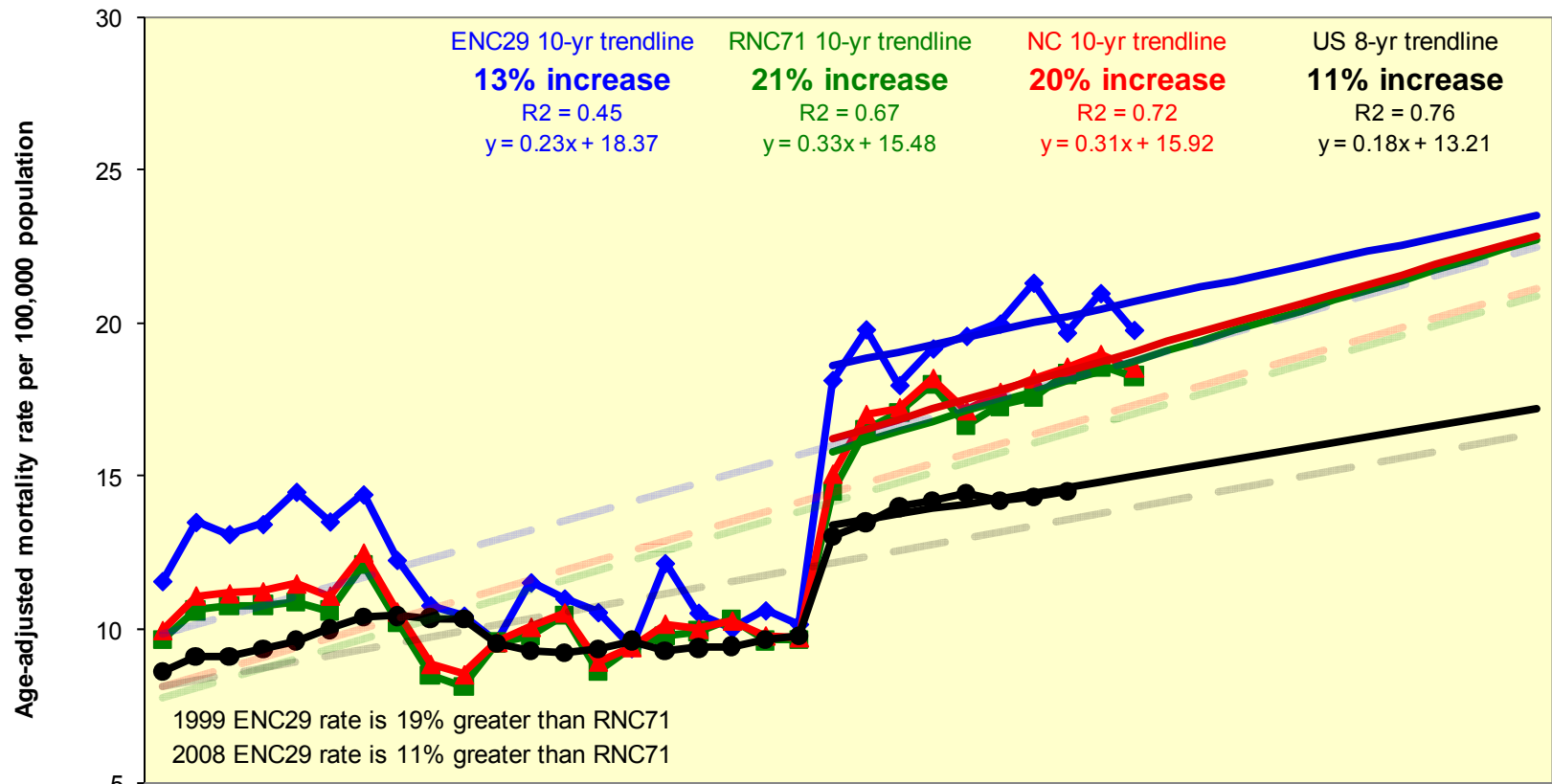
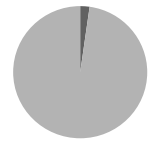


	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20						
ENC29	9	9	9	10	11	10	10	9	8	8	8	10	9	9	8	11	9	9	10	9	17	19	17	19	20	20	22	20	22	21																		
RNC71	7	8	8	8	8	8	10	8	7	7	8	8	9	8	9	9	9	10	9	9	14	17	16	17	16	17	17	18	18	18																		
NC	8	8	9	9	9	9	10	9	7	7	8	9	9	8	8	9	9	10	9	9	15	17	16	17	16	17	18	18	19	19																		

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	13% LT	11% LT	ENC29
15% GT		2% GT	RNC71
12% GT	2% LT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	16% LT	13% LT	ENC29
18% GT		3% GT	RNC71
15% GT	3% LT		NC

Figure 6.8 ii. Nephritis, Nephrotic Syndrome, and Nephrosis: Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US, 1979-2008 with projections to 2020

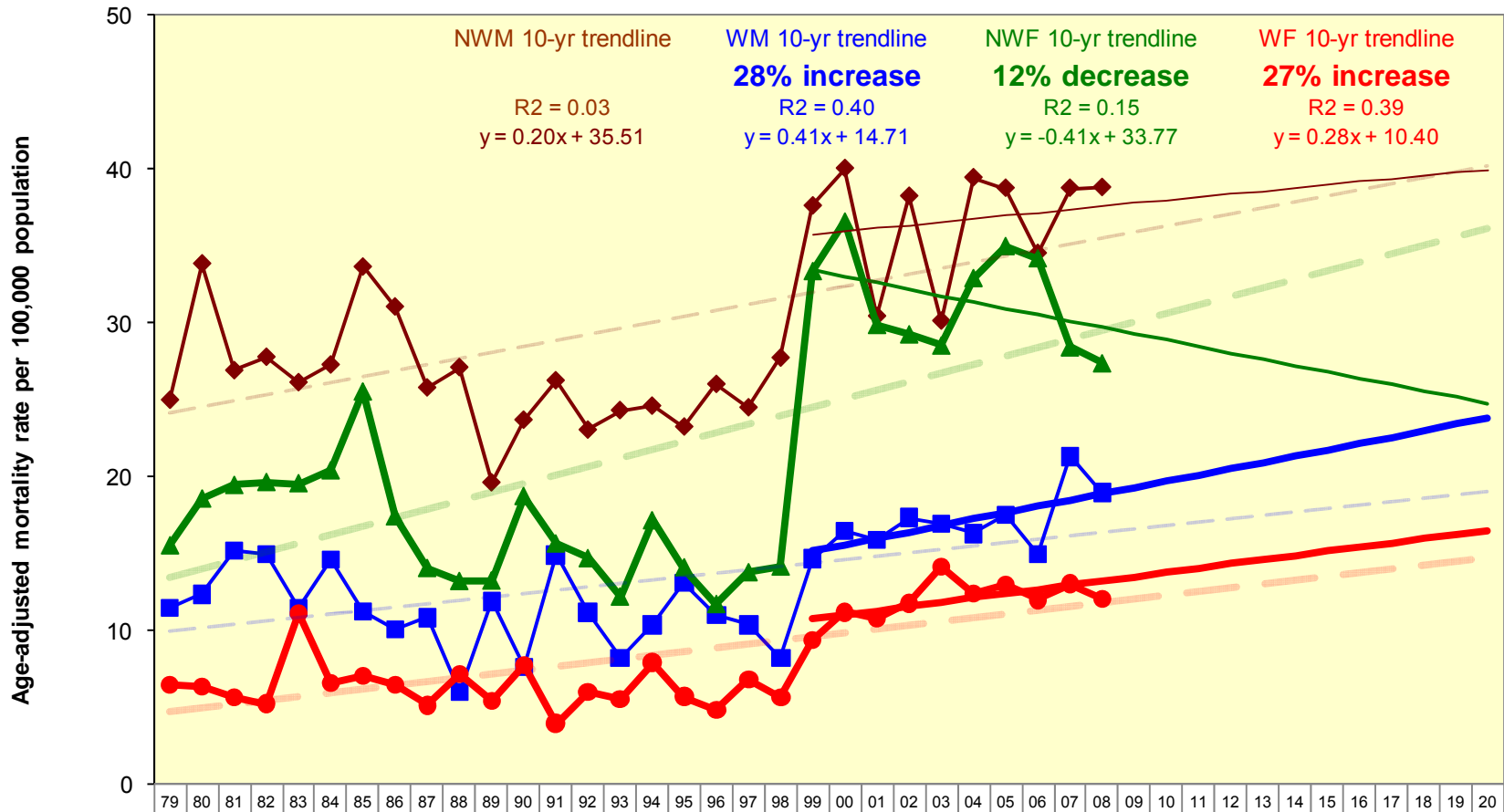
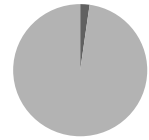


	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20								
ENC29	12	14	13	13	15	14	14	12	11	10	10	12	11	11	9	12	11	10	11	10	10	18	20	18	19	20	20	21	20	21	20																			
RNC71	10	11	11	11	11	11	12	10	8	8	10	10	10	9	9	10	10	10	10	10	10	14	17	17	18	17	17	18	18	19	18																			
NC	10	11	11	11	11	11	12	11	9	9	10	10	11	9	9	10	10	10	10	10	10	15	17	17	18	17	18	18	19	19																				
US	9	9	9	9	10	10	10	10	10	10	10	9	9	9	9	10	9	9	9	10	10	13	13	14	14	14	14	14	14																					

Comparison of Fitted Rates in 1999				
ENC29	RNC71	NC	US	
	16% LT	13% LT	28% LT	ENC29
19% GT		3% GT	15% LT	RNC71
15% GT	3% LT		17% LT	NC
39% GT	17% GT	21% GT		US

Comparison of Fitted Rates in 2008				
ENC29	RNC71	NC	US	
	10% LT	8% LT	28% LT	ENC29
11% GT		2% GT	20% LT	RNC71
9% GT	2% LT		21% LT	NC
38% GT	24% GT	26% GT		US

Figure 6.8 iii. Nephritis, Nephrotic Syndrome, and Nephrosis: Trends in age-adjusted mortality rates by race and gender for ENC29, 1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20							
NWM	25	34	27	28	26	27	34	31	26	27	20	24	26	23	24	25	23	26	24	28	38	40	30	38	30	39	39	34	39	39																			
WM	11	12	15	15	11	15	11	10	11	6	12	8	15	11	8	10	13	11	10	8	15	16	16	17	17	16	17	15	21	19																			
NWF	15	18	19	20	19	20	25	17	14	13	13	19	16	15	12	17	14	12	14	14	33	37	30	29	28	33	35	34	28	27																			
WF	6	6	6	5	11	7	7	6	5	7	5	8	4	6	5	8	6	5	7	6	9	11	11	12	14	12	13	12	13																				

Comparison of Fitted Rates in 1999			
NWM	WM	NWF	WF
	59% LT	5% LT	71% LT
141% GT		130% GT	29% LT
5% GT	56% LT		69% LT
241% GT	41% GT	225% GT	

Comparison of Fitted Rates in 2008			
NWM	WM	NWF	WF
	51% LT	19% LT	65% LT
103% GT		63% GT	30% LT
24% GT	39% LT		57% LT
190% GT	43% GT	133% GT	

Figure 6.8 iv. Nephritis, Nephrotic Syndrome, and Nephrosis:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

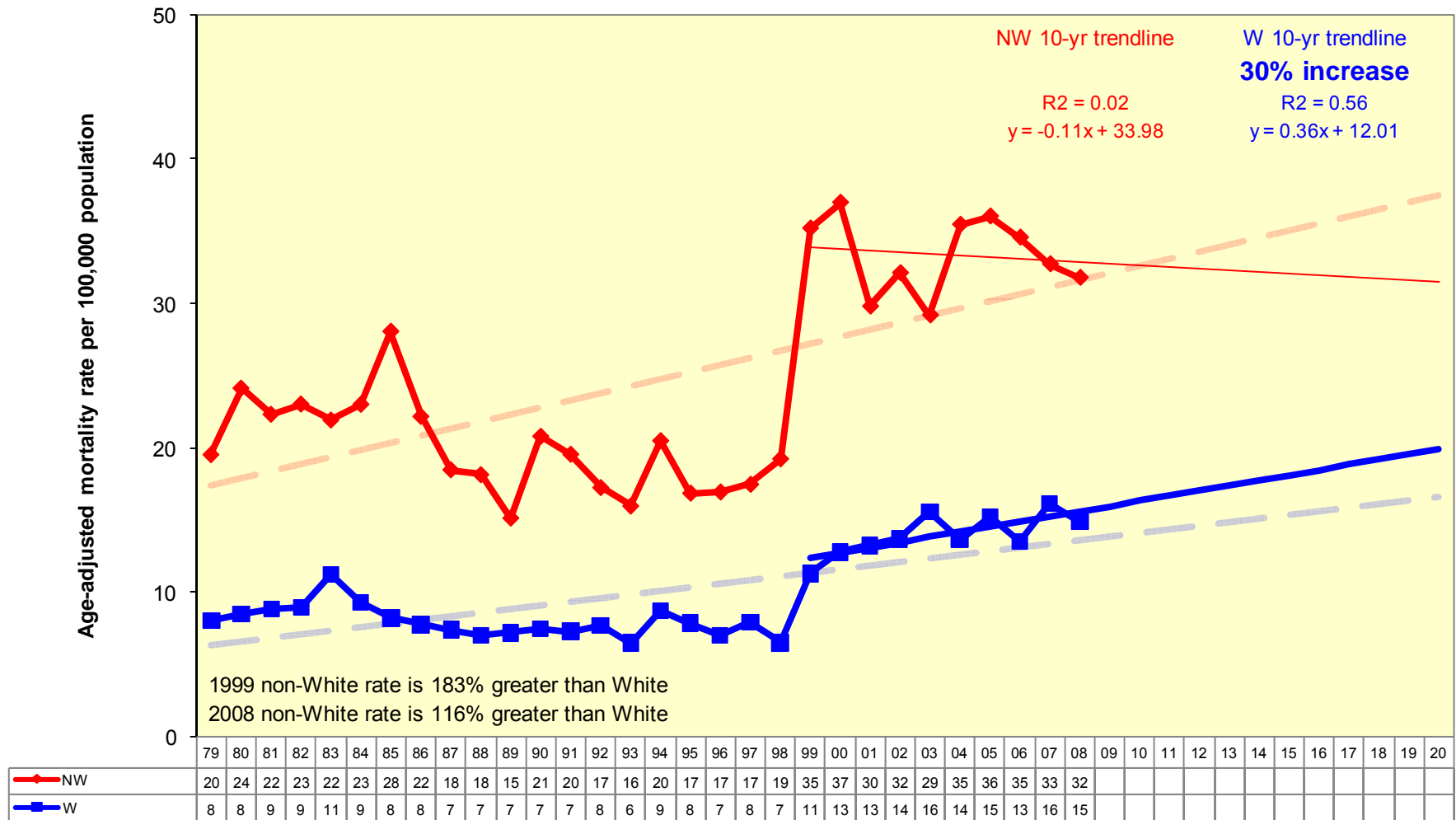
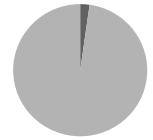
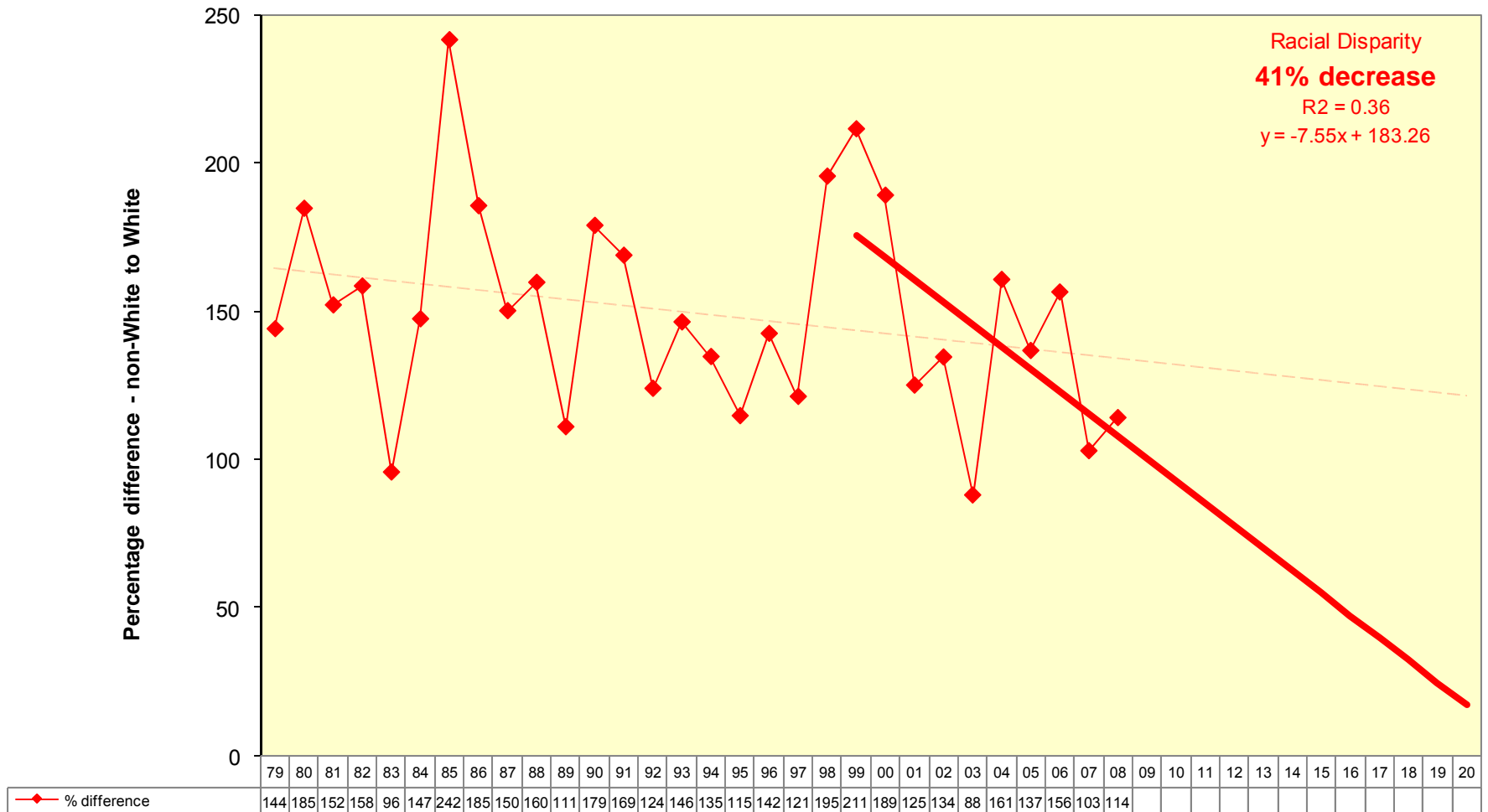
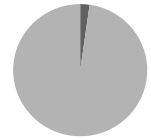


Figure 6.8 v. Nephritis, Nephrotic Syndrome, and Nephrosis: Measuring disparity in age-adjusted mortality rates by race for ENC29, 1979-2008 with projections to 2020

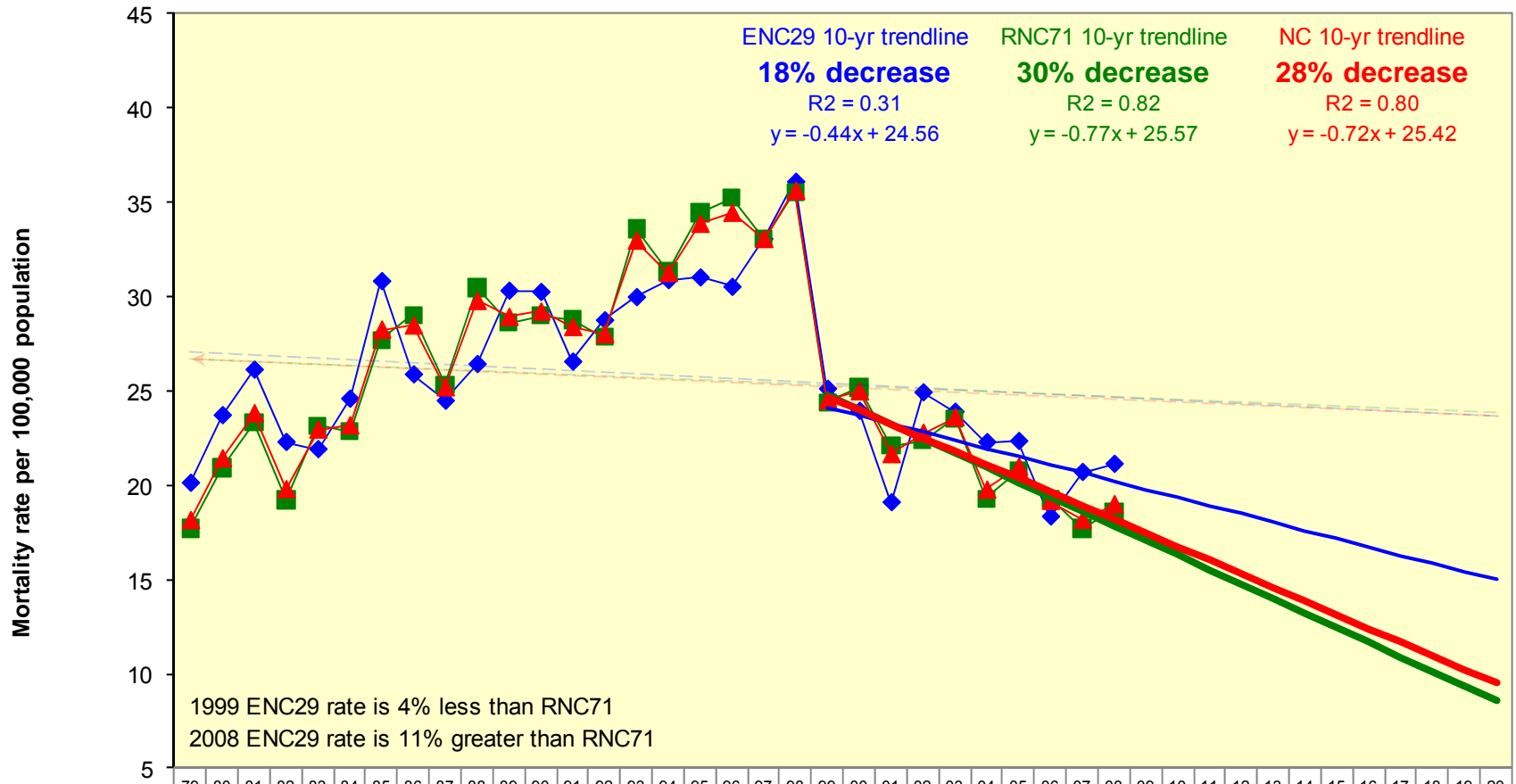


Pneumonia and Influenza

- The mortality rates for pneumonia and influenza have all been decreasing over the 1999-2008 period. ENC is decreasing less (18% over the 10-year period) and therefore diverging from RNC and NC.
- The age-adjusted mortality rates for all NC regions are decreasing at very similar rates (decreasing approximately 3.1% annually), all declining at a rate slightly greater than the US (2.5% decrease annually).
- The age-adjusted mortality rates for both genders of both races appear to be decreasing with Non-White males and White males remaining the highest. Non-White females have seen the greatest decrease, 39% from 1999-2008.
- White mortality rates remain higher and diverging from non-Whites rates. Non-white rates were 10% less than White rates in 2008.
- The decreasing 10-year trend in 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 6.9 i. Pneumonia and Influenza:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020

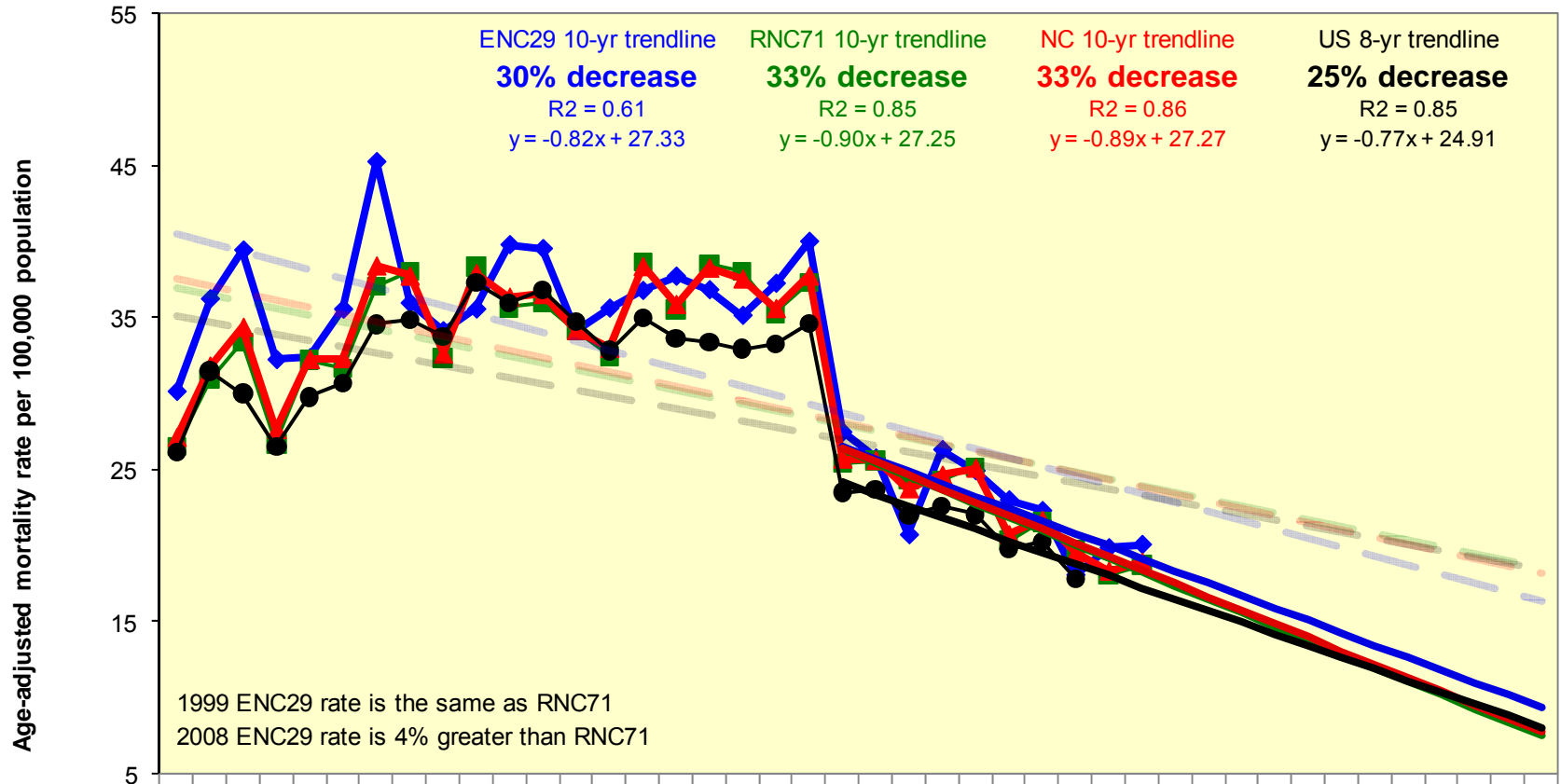


	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20							
ENC29	20	24	26	22	22	25	31	26	24	26	30	30	27	29	30	31	31	31	33	36	25	24	19	25	24	22	22	18	21	21																			
RNC71	18	21	23	19	23	23	28	29	25	30	29	29	29	28	34	31	34	35	33	36	24	25	22	22	24	19	21	19	18	19																			
NC	18	21	24	20	23	23	28	28	25	30	29	29	28	28	33	31	34	34	33	36	25	25	22	23	24	20	21	19	18	19																			

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	4% GT	4% GT	ENC29
4% LT		1% LT	RNC71
3% LT	1% GT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	10% LT	8% LT	ENC29
11% GT		2% GT	RNC71
9% GT	2% LT		NC

Figure 6.9 ii. Pneumonia and Influenza:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20						
ENC29	30	36	39	32	32	36	45	36	34	36	40	40	34	36	37	38	37	35	37	40	27	26	21	26	25	23	22	18	20	20																		
RNC71	26	31	33	27	32	32	37	38	32	38	36	36	34	32	39	36	39	38	35	37	25	26	24	24	25	20	22	20	18	19																		
NC	27	32	34	28	32	32	38	38	33	38	36	37	34	33	38	36	38	38	36	38	26	26	24	25	25	21	22	20	18	19																		
US	26	31	30	27	30	31	35	35	34	37	36	37	35	33	35	34	33	33	33	35	24	24	22	23	22	20	20	18																				

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	US
	0% LT	0% LT	9% LT
0% GT		0% GT	9% LT
0% GT	0% LT		9% LT
10% GT	9% GT	9% GT	

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	US
	4% LT	3% LT	10% LT
4% GT		1% GT	6% LT
4% GT	1% LT		7% LT
11% GT	6% GT	7% GT	

Figure 6.9 iii. Pneumonia and Influenza:
Trends in age-adjusted mortality rates by race and gender for ENC29,
1979-2008 with projections to 2020

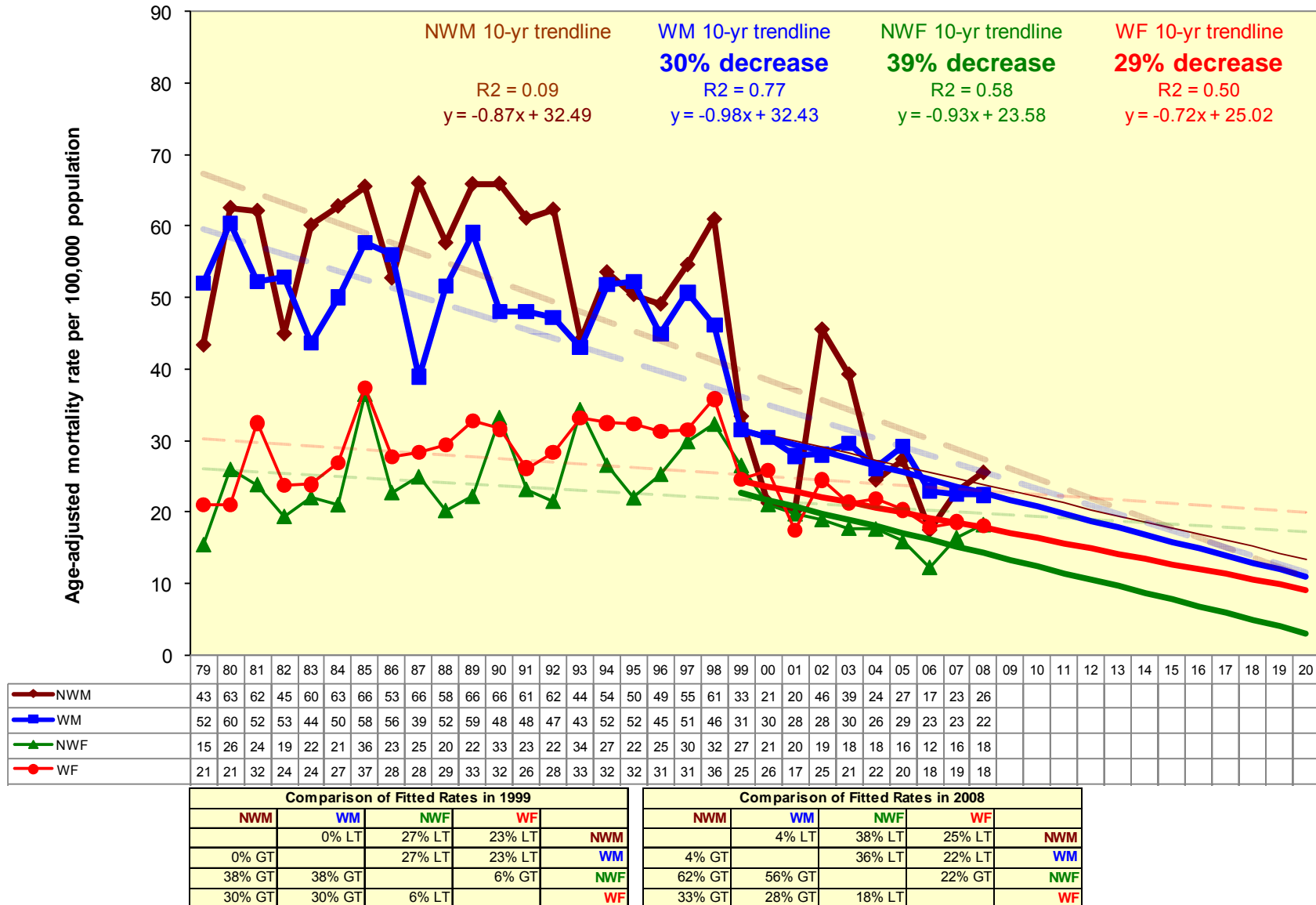
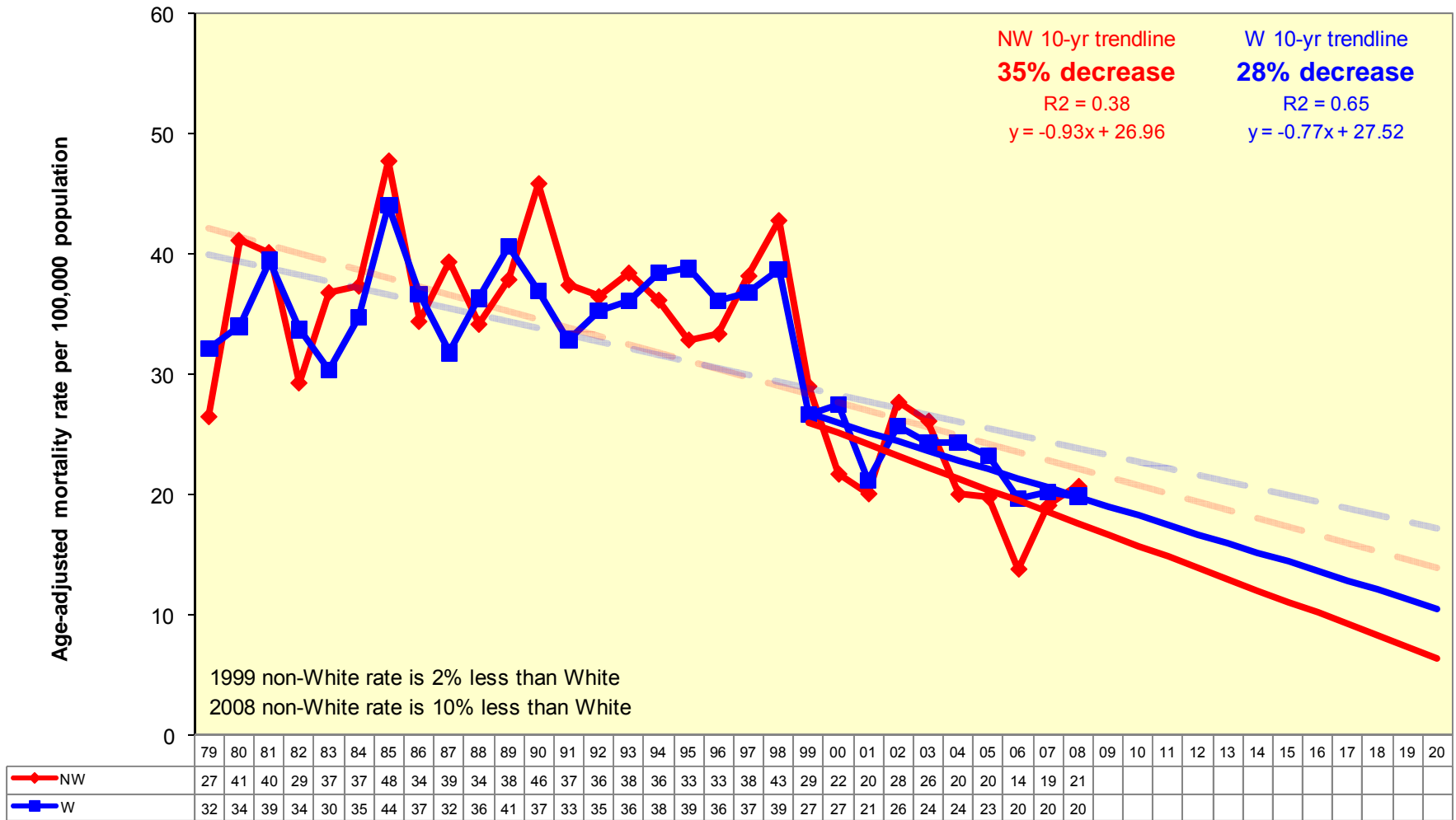


Figure 6.9 iv. Pneumonia and Influenza:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020



Unintentional Motor Vehicle Injuries

- ENC's unintentional motor vehicle injury rate is unreliable but is continually higher than the RNC rate (29% greater than RNC in 2008).
- There is a similar unreliable trend in the age-adjusted mortality rate for ENC. The ENC age-adjusted rate is 28% greater than RNC and 49% greater than the US rate in 2008. Regardless of reliability, the trends indicate that the *HP2010* target will not be met soon.
- All 10-year trends for males are unreliable though rates are continually higher in men, both White and non-White. Non-White female mortality rate has decreased 41% over the 10-year period and has achieved the *HP2010* goal of less than 9.2 deaths per 100,000.
- The non-White rates have decreased by 10% and converged with the White rates suggesting a reversal in disparity within ENC. In 2008, the non-White rate was 9% less than the White rate compared to 1999 when the non-White rate was 7% greater than the White rate.
- Recent observed rates and fitted rates suggest that the racial disparity in ENC is eliminated, and may actually be favoring non-Whites. With a moderately reliable trend, the racial disparity has decreased by 259% over the 10-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 ENC29, RNC71, and NC,
1979-2008 with projections to 2020

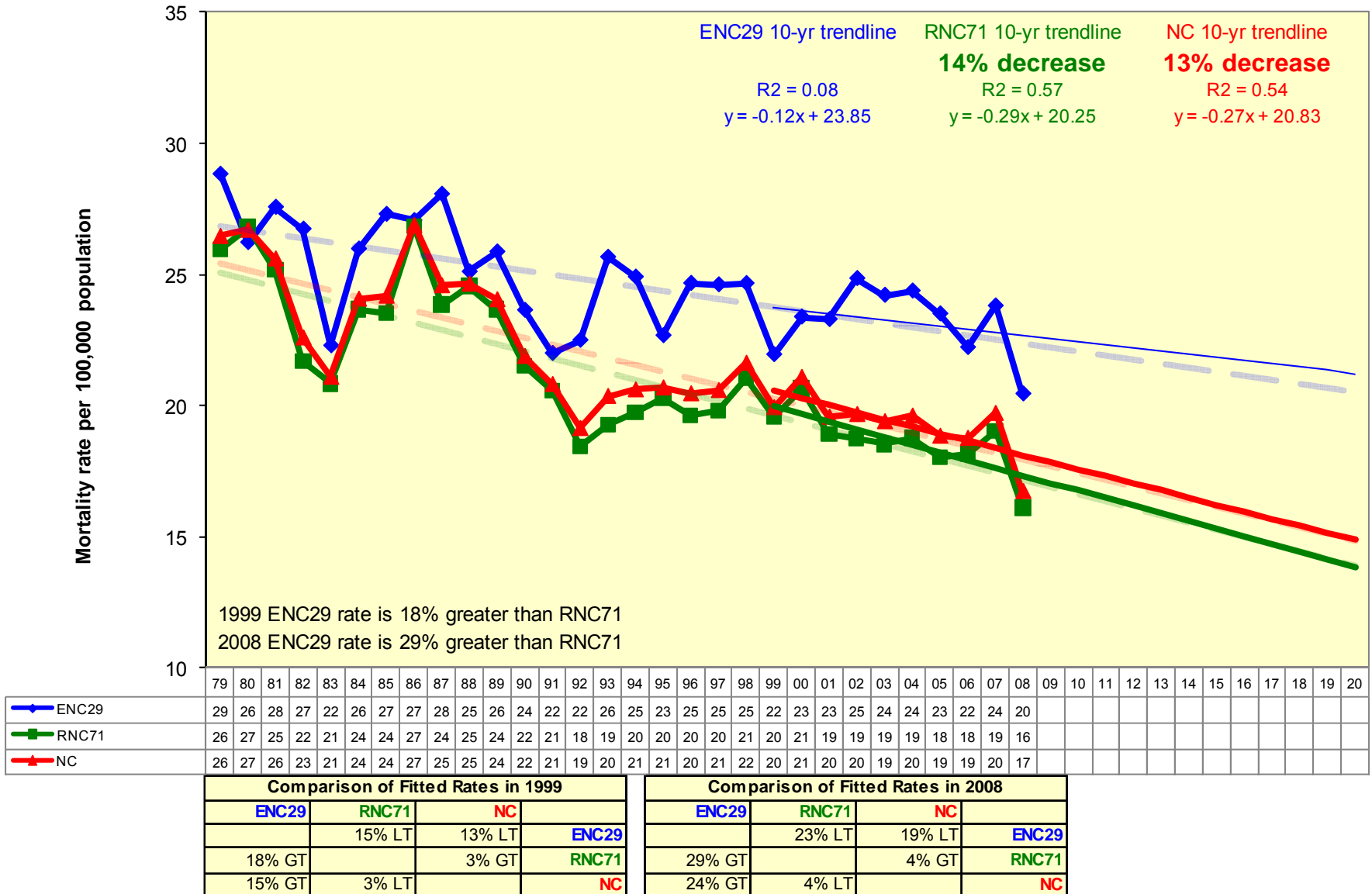
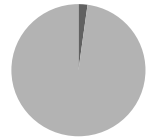


Figure 6.10 ii. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US, 1979-2008 with projections to 2020

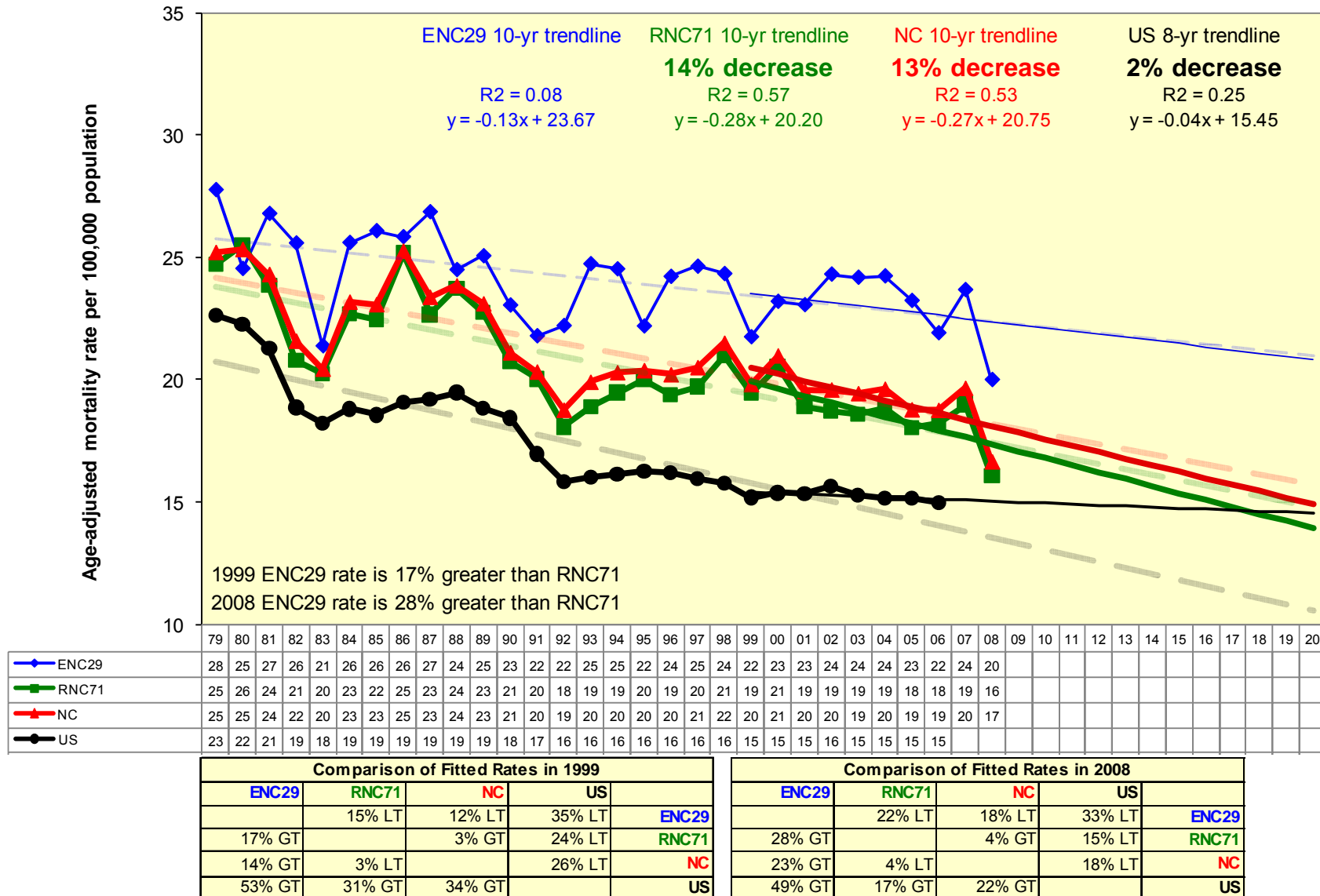
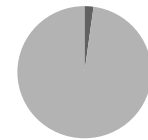


Figure 6.10 iii. Unintentional Motor Vehicle Injuries: Trends in age-adjusted mortality rates by race and gender for ENC29, 1979-2008 with projections to 2020

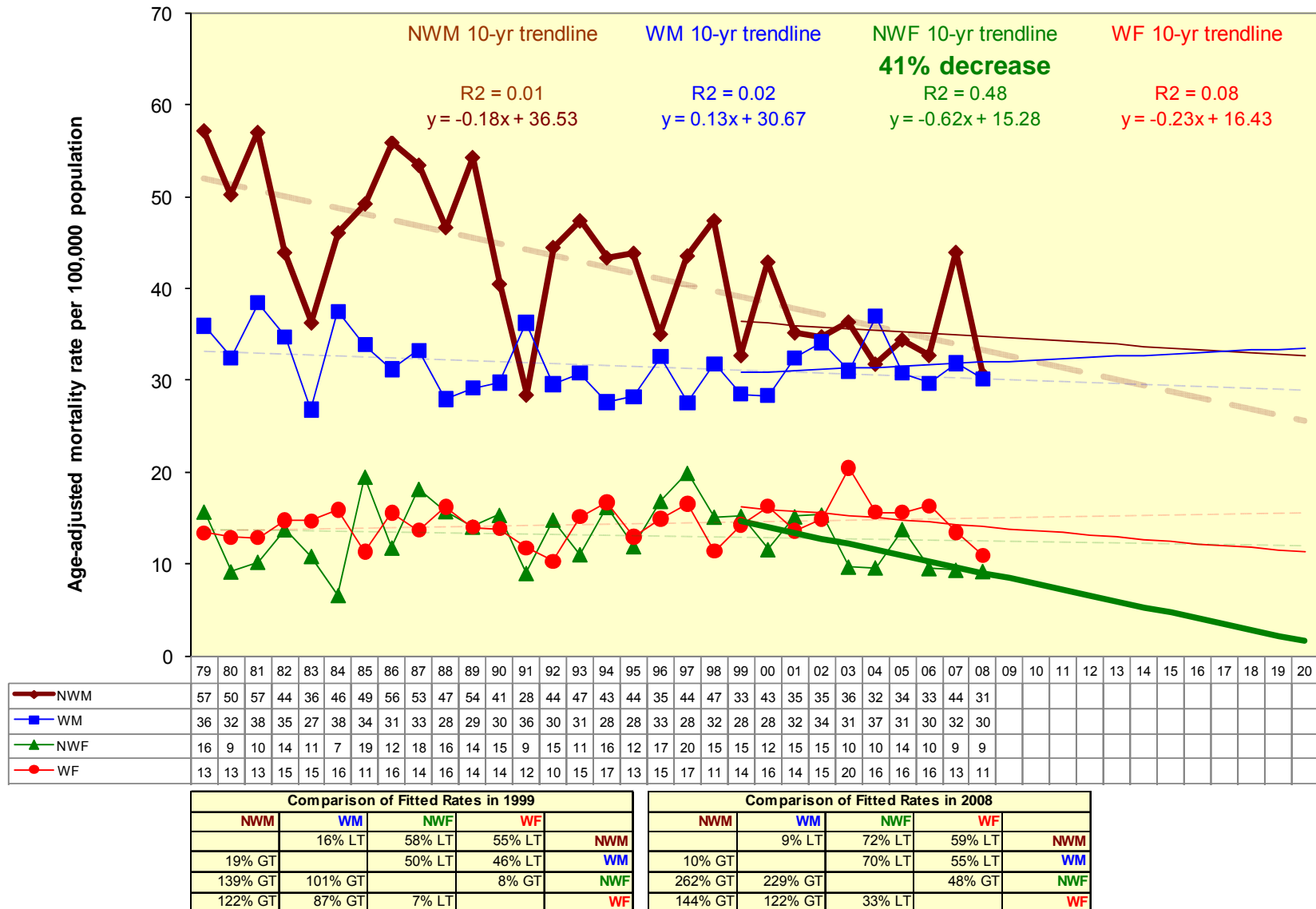
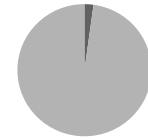


Figure 6.10 iv. Unintentional Motor Vehicle Injuries:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

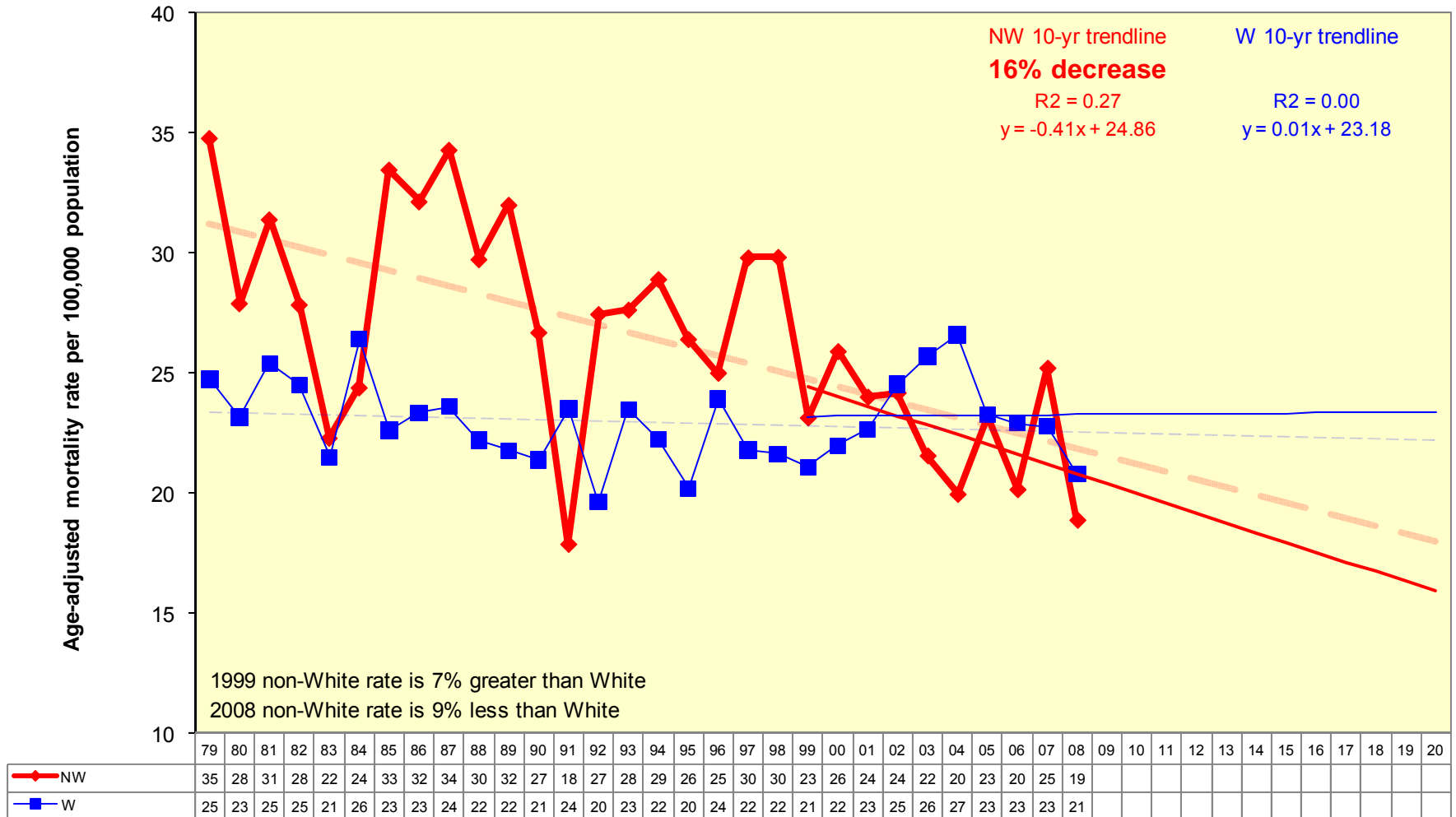
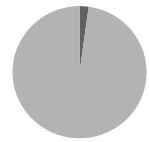
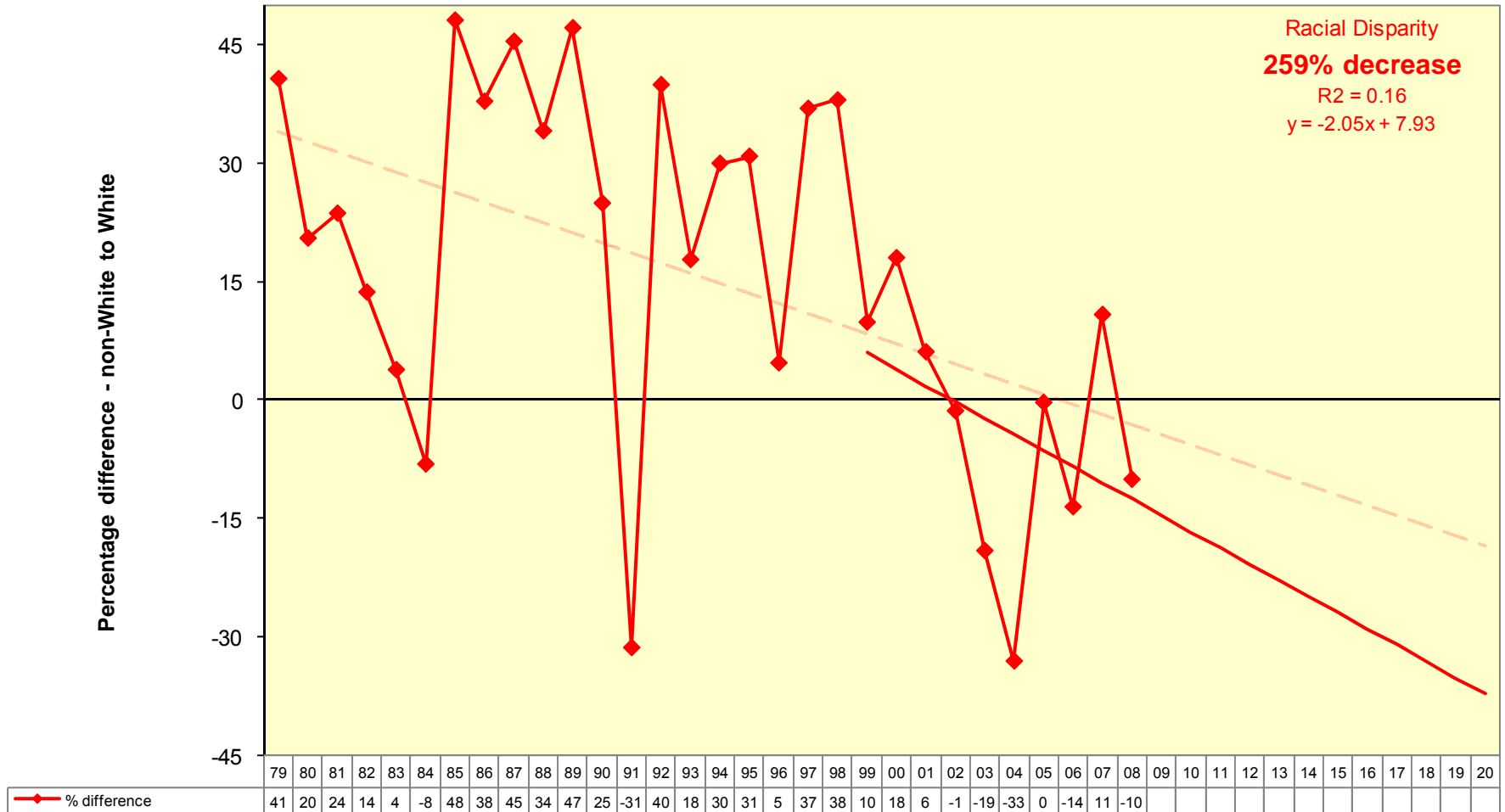
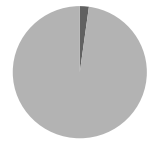


Figure 6.10 v. Unintentional Motor Vehicle Injuries:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020



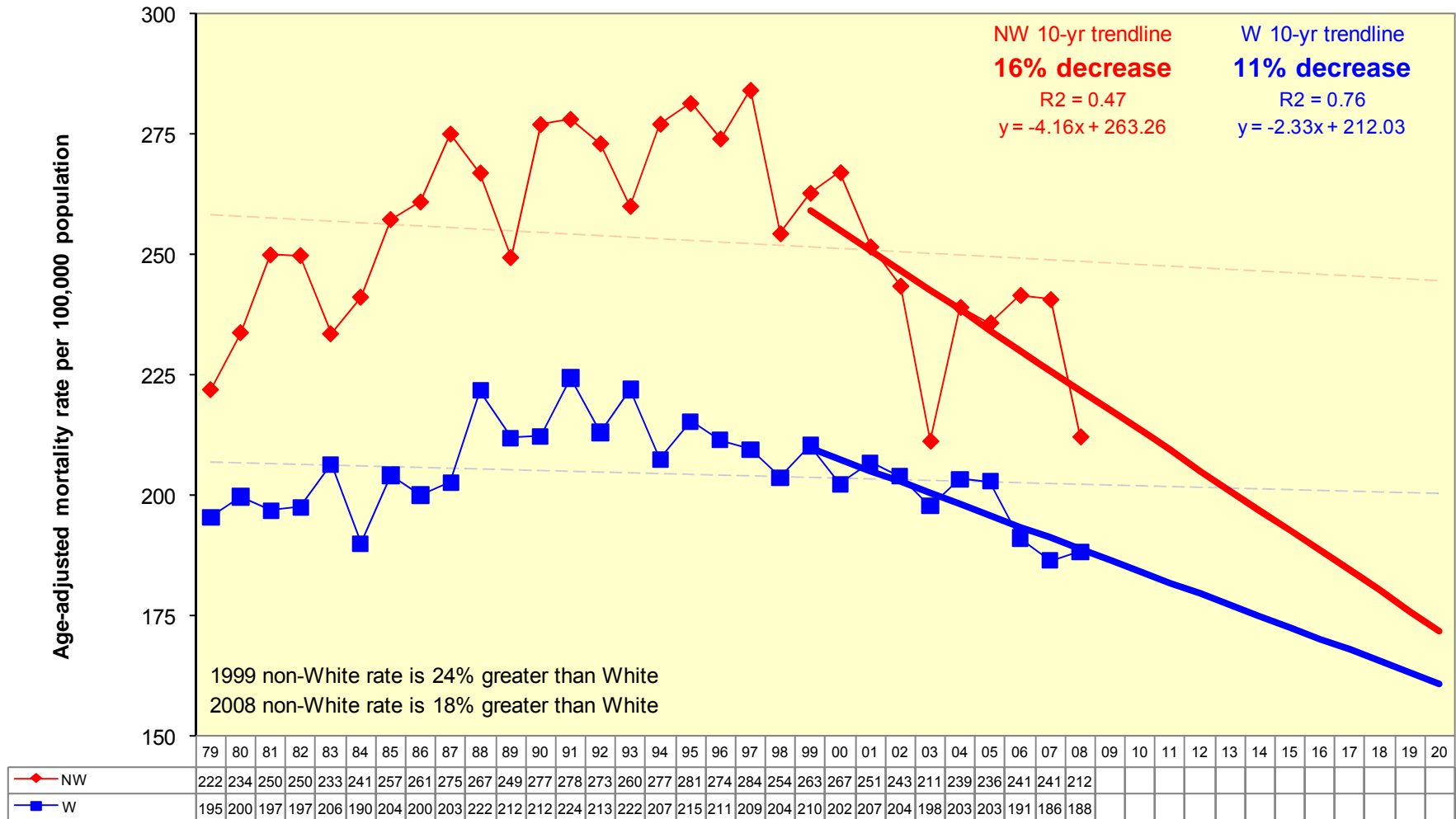
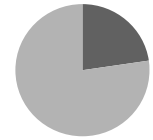
7. Trends and Disparities in Mortality in ENC29: Cancer - All Sites and HIV Disease; 1979-2008

Cancer - All Sites

- The cancer – all sites mortality rate trend for ENC is unreliable but continuously higher than both RNC and NC rate trends. The 30-year trend shows ENC as increasingly divergent from RNC and NC rate trends. In 2008, the ENC rate was 17% greater than RNC.
- The age-adjusted cancer – all sites mortality trends for all regions are decreasing with ENC decreasing at the fastest rate (12% over 10 years) but continuing to have the highest rates. All regions are not projected to achieve the *Healthy People 2010* goal of less than 159.9 deaths per 100,000.
- The cancer – all sites mortality rates for White and non-White males are decreasing. Non-White males have seen the greatest decrease from 1999-2008 (24% decrease) while White females have reached the *HP2010* goal of fewer than 159.9 deaths per 100,000.
- Both Whites and non-White cancer mortality trends have been decreasing over the 10-year period (11% and 16% decreases, respectively) but the non-White rate remains 18% greater than the White rate in 2008.
- The decreasing 10-year 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 7.1 iv. Cancer - All Sites:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020



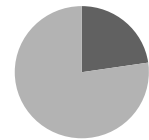
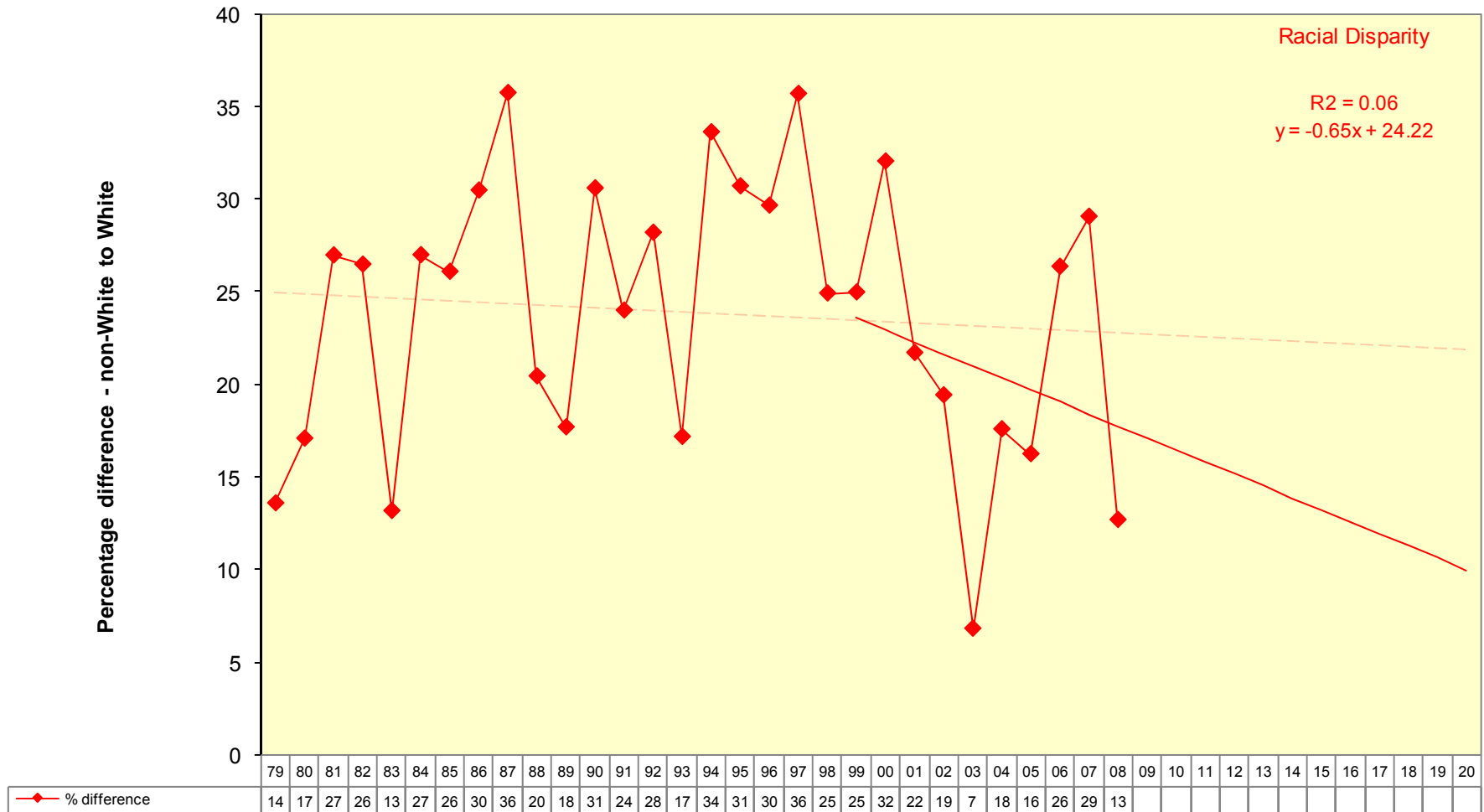


Figure 7.1 v. Cancer - All Sites:
Measuring disparity in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

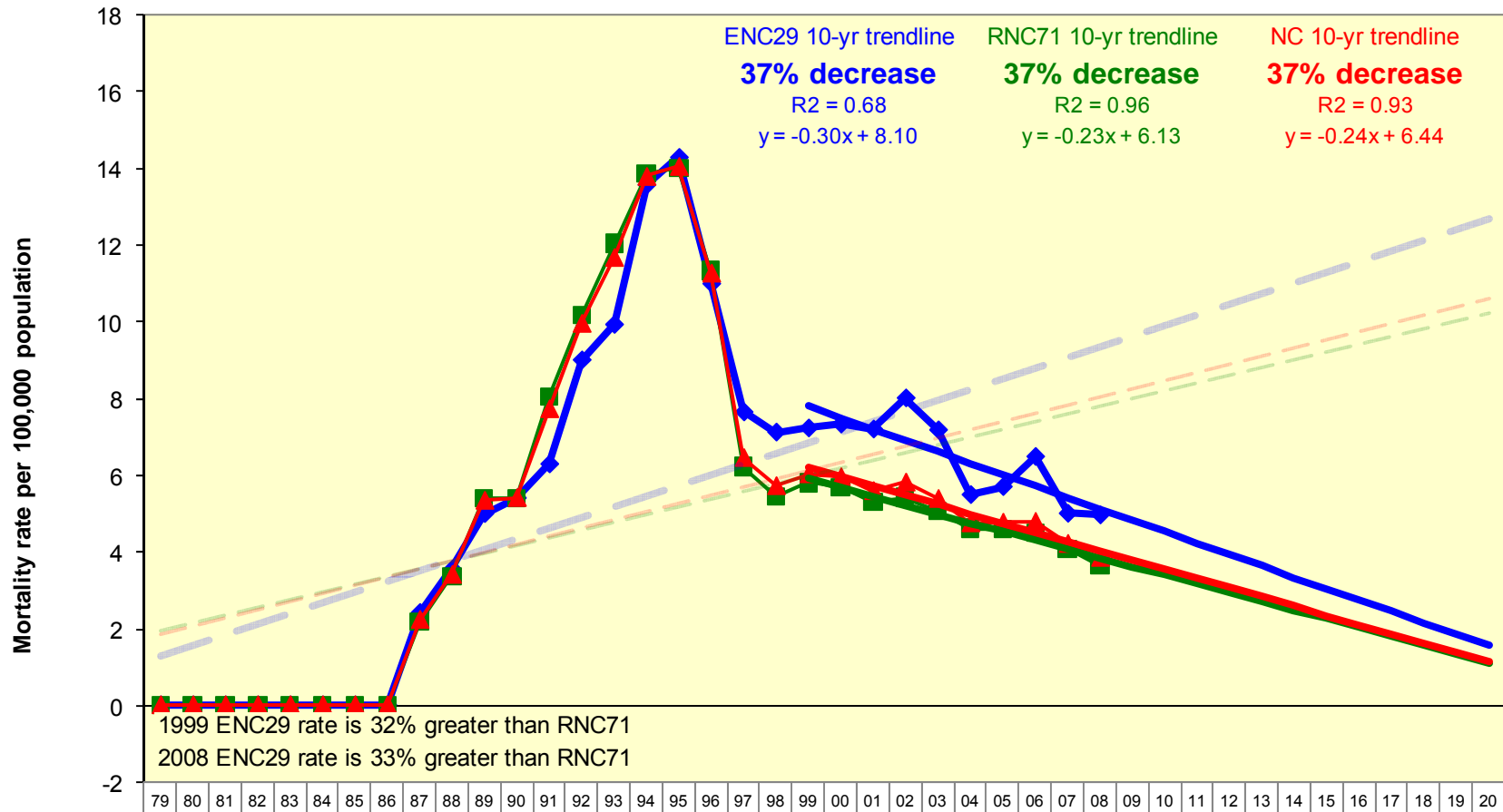
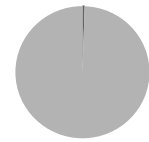


HIV Disease

- According to the 10-year trend lines for HIV mortality, rates are decreasing for all regions but ENC has the greater rate of decrease suggesting convergence with RNC and NC in the future. Although the ENC rate has been decreasing, it is still 33% greater than RNC in 2008.
- The age-adjusted rates for all NC regions are similar and are decreasing, suggesting convergence in the future. Based on current projections, the goal set by *Healthy People 2010* of 0.7 deaths per 100,000 will not be met by any region in NC.
- Non-White males continue to have the highest rates of age-adjusted mortality for all demographic groups. White males had the greatest rate of decline (52% over 10 years) of all groups. Convergence of all trends is projected in the future.
- From 1999-2008, the non-White age-adjusted HIV mortality rate has decreased by 38% but remains 1138% greater than the White rate. Age-adjusted mortality rates for Whites decreased by 45% in a reliable trend.
- In a moderately reliable trend, the 10 year period shows a 129% increase 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 7.2 i. HIV Disease:
Trends in mortality rates for ENC29, RNC71, and NC,
1979-2008 with projections to 2020



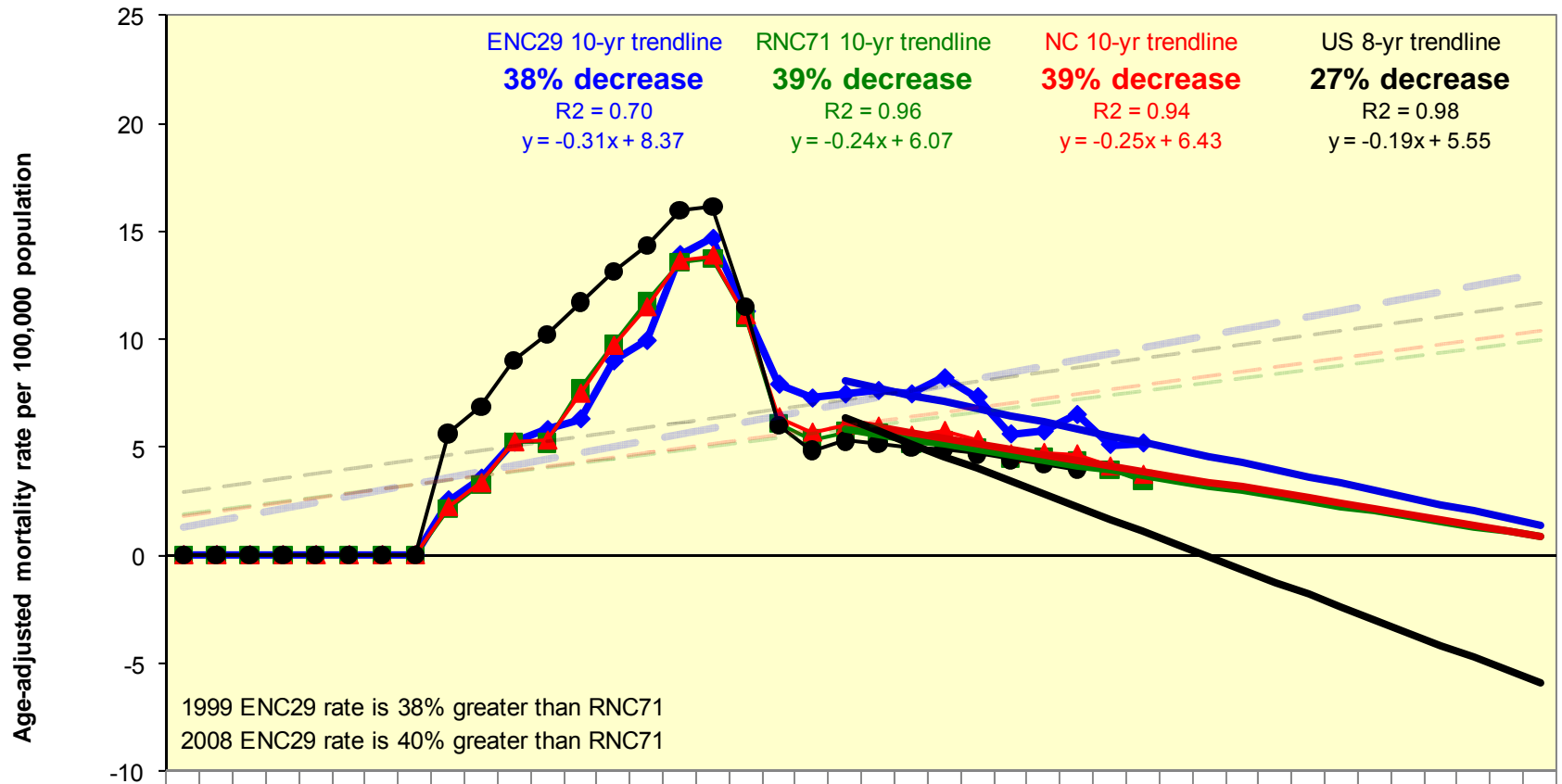
1999 ENC29 rate is 32% greater than RNC71
2008 ENC29 rate is 33% greater than RNC71

	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20					
ENC29	0	0	0	0	0	0	0	0	2	4	5	5	6	9	10	14	14	11	8	7	7	7	7	8	7	5	6	6	5	5																	
RNC71	0	0	0	0	0	0	0	0	2	3	5	5	8	10	12	14	14	11	6	5	6	6	5	5	5	5	5	4	4	4																	
NC	0	0	0	0	0	0	0	0	2	3	5	5	8	10	12	14	14	11	6	6	6	6	6	6	5	5	5	5	4	4																	

Comparison of Fitted Rates in 1999			
ENC29	RNC71	NC	
	24% LT	20% LT	ENC29
32% GT		5% GT	RNC71
26% GT	5% LT		NC

Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	
	25% LT	21% LT	ENC29
33% GT		5% GT	RNC71
27% GT	5% LT		NC

Figure 7.2 ii. HIV Disease:
Trends in age-adjusted mortality rates for ENC29, RNC71, NC, and US,
1979-2008 with projections to 2020



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20								
ENC29	0	0	0	0	0	0	0	0	3	4	5	6	6	9	10	14	15	11	8	7	7	8	7	8	7	6	6	7	5	5																				
RNC71	0	0	0	0	0	0	0	0	2	3	5	5	8	10	12	14	14	11	6	5	6	6	5	5	5	5	5	4	4	3																				
NC	0	0	0	0	0	0	0	0	2	3	5	5	7	10	11	14	14	11	6	6	6	6	6	6	5	5	5	5	4	4																				
US	0	0	0	0	0	0	0	0	6	7	9	10	12	13	14	16	16	12	6	5	5	5	5	5	5	5	4	4	4																					

Comparison of Fitted Rates in 1999				Comparison of Fitted Rates in 2008			
ENC29	RNC71	NC	US	ENC29	RNC71	NC	US
38% GT	27% LT	23% LT	34% LT	40% GT	29% LT	25% LT	30% LT
30% GT	5% LT	6% GT	9% LT	33% GT	5% LT	6% GT	2% LT
51% GT	9% GT	16% GT		43% GT	2% GT	7% GT	

Figure 7.2 iv. HIV Disease:
Trends in age-adjusted mortality rates by race for ENC29,
1979-2008 with projections to 2020

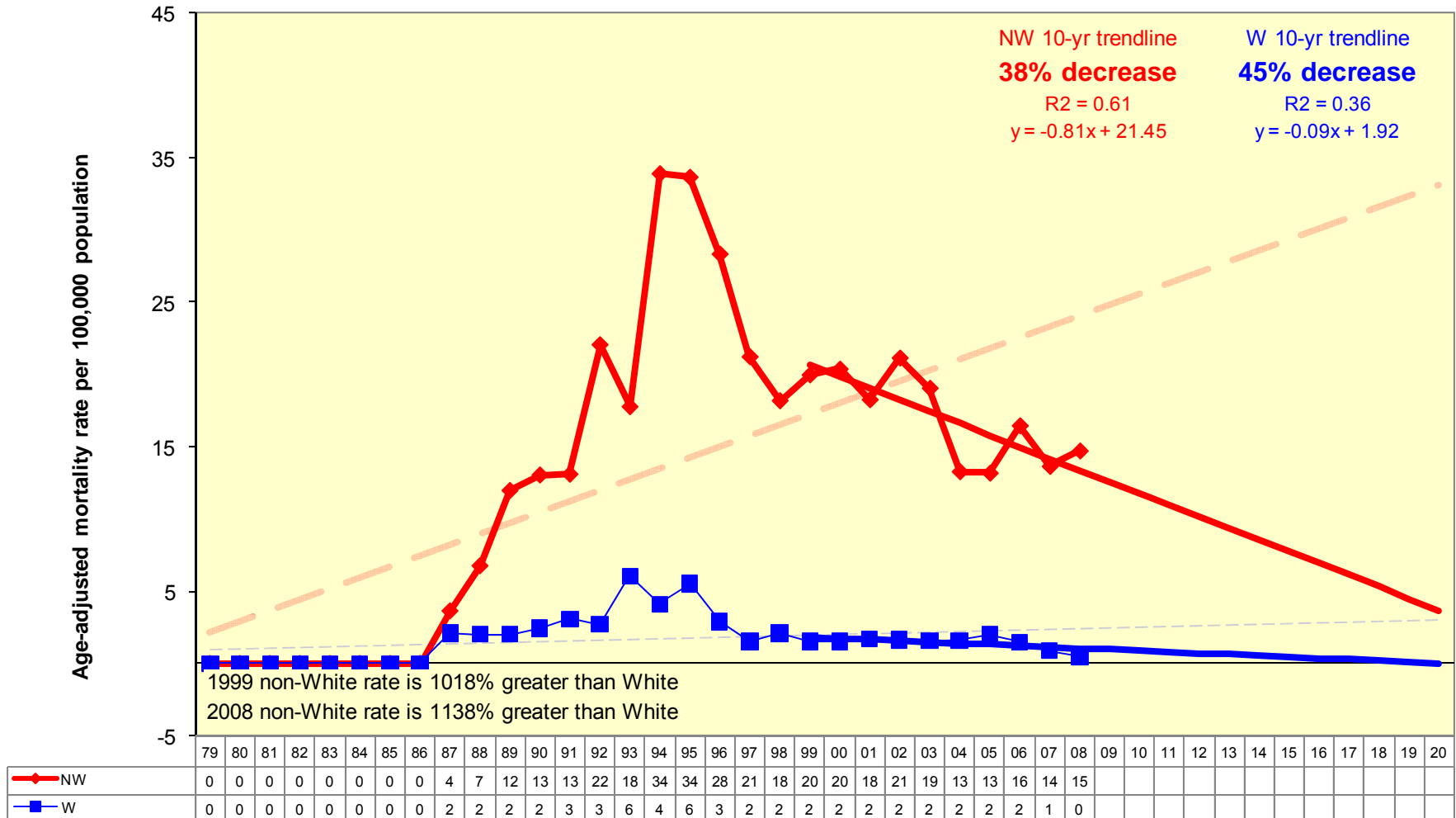
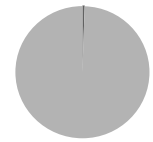
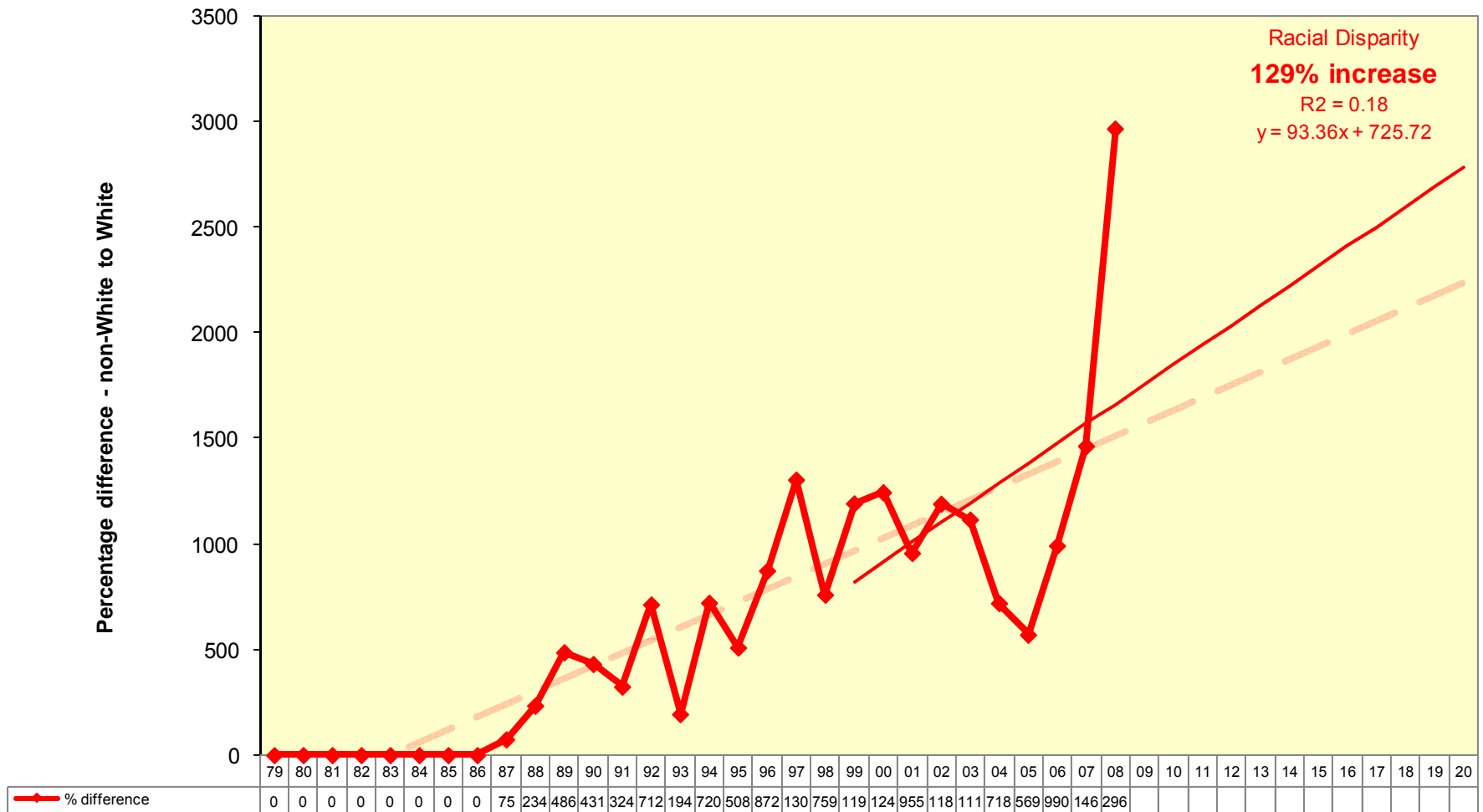
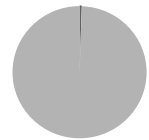


Figure 7.2 v. HIV Disease:
 Measuring disparity in age-adjusted mortality rates by race for ENC29,
 1979-2008 with projections to 2020



8. Appendix

Disease	ICD 10 Code	ICD 9 Code
Diseases of Heart	I00-I09, I11, I13, I20-I51	390-398, 402, 404, 410-429
Cerebrovascular Disease	I60-I69	430-434, 436-438
Atherosclerosis	I70	440
Cancer - All Sites	C00-C97	140-208
Cancer - Lip, Oral Cavity, and Pharynx	C00-C14	140-149
Cancer - Stomach	C16	151
Cancer - Colon, Rectum, and Anus	C18-C21	153-154
Cancer - Liver	C22	155
Cancer - Pancreas	C25	157
Cancer - Larynx	C32	161
Cancer - Trachea, Bronchus, and Lung	C33-C34	162
Cancer - Malignant Melanoma of Skin	C43	172
Cancer - Breast	C50	174-175
Cancer - Cervix Uteri	C53	180
Cancer - Ovary	C56	183.0
Cancer - Prostate	C61	185
Cancer - Bladder	C67	188
Cancer - Brain	C71	
Cancer - Non-Hodgkin's Lymphoma	C82-C85	200, 202
Cancer - Leukemia	C91-C95	204-208
HIV Disease	B20-B24	042-044
Septicemia	A40-A41	038
Diabetes Mellitus	E10-E14	250
Pneumonia and Influenza	J10-J18	480-487
Chronic Lower Respiratory Diseases	J40-J47	490-494, 496
Chronic Liver Disease and Cirrhosis	K70, K73-K74	571
Nephritis, Nephrotic Syndrome, and Nephrosis	N00-N07, N17-N19, N25-N27	580-589
Unintentional Motor Vehicle Injuries	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	E810-E825
All Other Unintentional Injuries and Adverse Effects	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	E800-E807, E826-E829, E830-E848, E929.0, E929.1, E850-E869, E880-E928, E929.2-E929.9
Suicide	X60-X84, Y87.0	E950-E959
Homicide	X85-Y09, Y87.1	E960-E969
Legal Intervention	Y35, Y89.0	E970-E978
Alzheimer's Disease	G30	331.0