# Cancers of the Colon and Rectum

# Evidence of Disparities between Blacks and Whites in Illinois

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## Executive Summary

An evaluation of colorectal cancer with emphasis on black/white comparisons was conducted using incidence data from the Illinois Department of Public Health's State Cancer Registry for 1986 to 1997 and Illinois mortality data over 1979 to 1998. Cancers of the colon and rectum rank among the top 5 for incidence and mortality among both blacks and whites in Illinois.

With respect to colorectal cancer incidence, blacks had higher rates than whites for colon and rectum and colon excluding rectum, whereas whites, particularly males, had higher rates than blacks for rectum. Statistically significant declines in incidence for colon and rectum, colon excluding rectum, and rectum were observed among whites but not for blacks in Illinois. No significant changes in colorectal cancer incidence trends for blacks were detected.

For mortality, black Illinoisans showed strikingly higher death rates than their white counterparts from combined colon and rectum, colon excluding rectum and rectal cancers. Statistically significant declines were observed among whites in Illinois for all three colorectal site categories but no changes were noted among blacks.

Colorectal cancer incidence increases with advancing age for both blacks and whites. Age-specific cancer incidence rates tended to be higher among blacks than whites for younger age groups. A cross over point at about 70 to 79 years of age for colon excluding rectum and 50 to 59 years for rectal cancer is evident where white incidence rates then exceed those for blacks. In contrast, black age-specific colorectal cancer mortality rates exceed those observed for whites in just about every site-specific, age-sex group. Only white males have slightly higher age-specific mortality rates than black males in the 70 to 79 and 80 years and older age groups.

Blacks have more cancer incidence diagnosed in the proximal colon subsites than whites. Conversely, cancer incidence rates among whites are higher for subsites in the distal colon. These observations have been apparent for studies on black and white populations outside of Illinois. Significant declines in distal colon cancer incidence were observed for whites, both sexes, males and females but only for black females in Illinois over 1986 to 1997. In addition, a significant decrease in proximal colon cancer incidence was only observed for white males in Illinois.

Stage of disease is an important predictor of prognostic outcomes for cancer. Earlier stage diagnoses are associated with more positive outcomes. Consistently, whites were diagnosed with more localized (early stage) colorectal cancer incidence than blacks. Conversely, blacks were diagnosed at the distant (late stage) more frequently than their white counterparts in Illinois.

Healthy People, the national initiative established in 1979 to provide a framework for improving of the nation's health, has identified the theme, elimination of disparities in health and disease outcomes, for its 2010 plan. The present evaluation of cancers of the colon and rectum does, indeed, reveal increasing disparities between blacks and whites in Illinois that must be addressed in next decades to not only improve the health of all Illinoisans but assure that the improvement reaches all racial/ethnic groups in the state.

## Introduction

Cancers of the colon and rectum combined are among the most commonly diagnosed cancers in Illinois. Likewise, colorectal cancer ranks high among the leading causes of death for Illinoisans. Despite the fact that incidence and mortality have declined in recent years, Illinois' overall burden of colorectal cancer is still enormous. It has been projected that, for the year 2000, 7,062 new cases of colorectal cancer will be reported to the Illinois State Cancer Registry (ISCR) and 2,797 Illinoisans will die due to the disease. In addition, a recent evaluation examining cancer incidence, 1990-1997, and cancer mortality, 1990-1998, in Illinois showed combined colon and rectum to be the third highest cancer incidence and mortality site for males and females of all races, as well as blacks and whites following prostate (male), breast (female), and lung and bronchus.[1,2]

Although the overall colorectal cancer burden is shared by both blacks and whites, some unique differences between the races have been noted in the literature. Variations in colorectal cancer between whites and blacks have been reported for overall incidence, sex-specific and age-specific patterns, anatomic subsite incidence, time trends, stage at diagnosis and mortality outcomes.[3] These issues prompted the present evaluation of cancers of the colon and rectum occurring among Illinois residents emphasizing the similarities and differences observed for blacks and whites. Specifically, this evaluation asked the following questions regarding differences in cancers of the colon and rectum between blacks and whites in Illinois.

Does the incidence of colorectal cancer differ between Illinois' blacks and whites?

How does cancer mortality compare for blacks and whites in Illinois?

What is the magnitude of colorectal cancer incidence and mortality differences between blacks and whites and males and females in Illinois?

What age-specific colorectal cancer incidence and mortality patterns appear between Illinois' blacks and whites?

Are there cancer incidence differences in colorectal anatomic subsites between blacks and whites in the Illinois population?

Does stage of disease differ when colorectal cancers are diagnosed for Illinois' blacks compared with whites?

What are the public health implications of the colorectal cancer profiles for black and white Illinoisans?

## Methods

### Cancer Cases

Cancer incidence data are from the Illinois Department of Public Health, Division of Epidemiologic Studies, Illinois State Cancer Registry (ISCR). ISCR is the only source of population-based cancer incidence data for the state. Newly diagnosed cancer cases are reported to ISCR by health care facilities and other cancer registries inside and outside of the state where Illinois residents are diagnosed and treated for cancer. The database files used for this evaluation include years 1986 through 1997 and reflect the status of ISCR as of December 1999.

### Cancer Deaths

The Illinois Department of Public Health's death master files for years 1979 to 1998 were the source of cancer mortality data for this report. The underlying cause of death on Illinois death certificates was used to identify cancer deaths from colon and rectum.

### Site Categories and Terminology

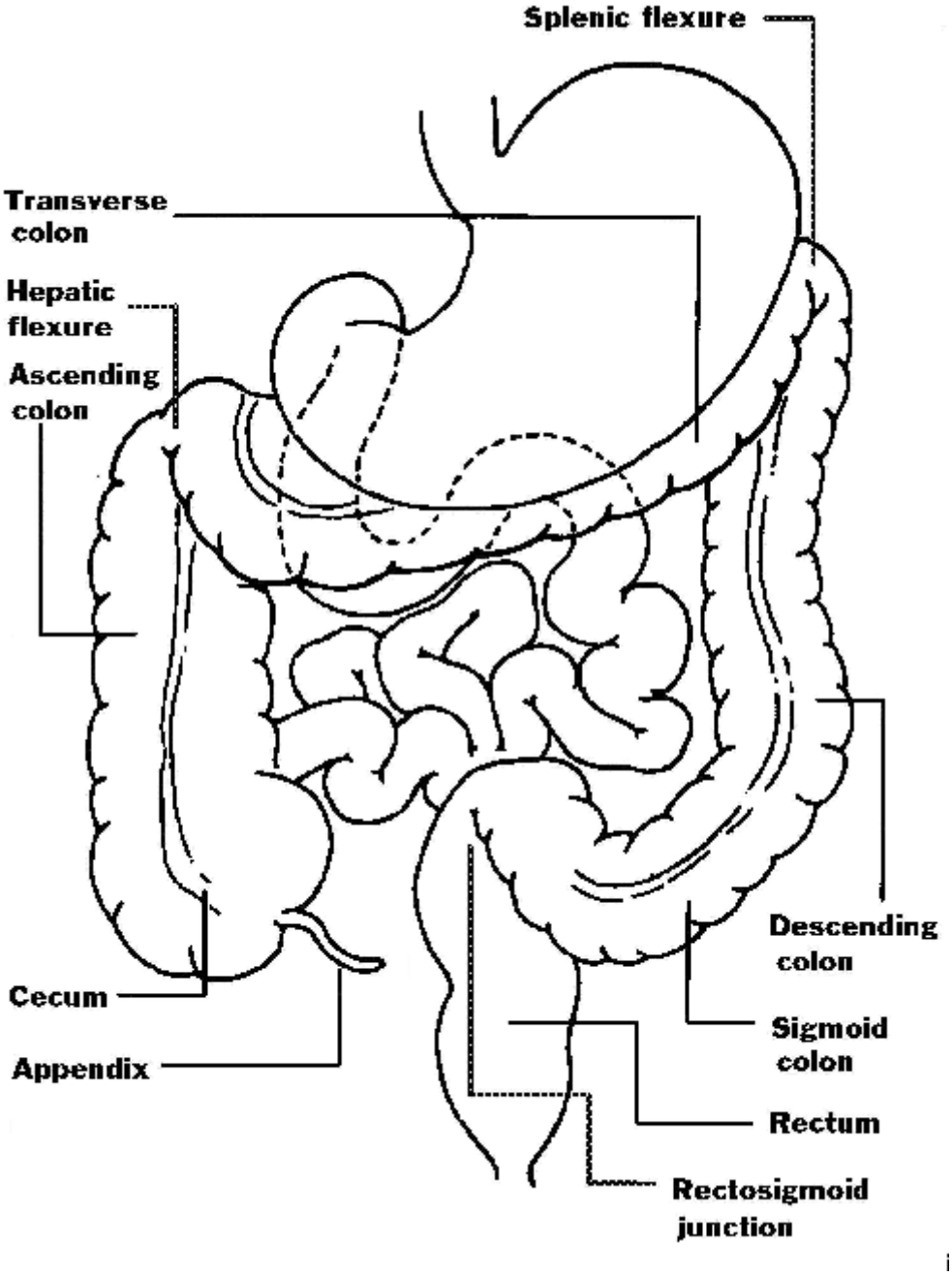
The *International Classification of Diseases for Oncology* (ICD-O-2) codes were used to define colon and rectum cancer incidence sites.[4-6] For mortality, the *International Classification of Diseases* (ICD-9) codes for underlying cause of death defined the colorectal cancer mortality sites.[4,5,7] The 1979 to 1998 time frame was selected for mortality because ICD-9 codes went in effect beginning in 1979, thereby, assuring consistency over a 20-year period. Conversions were made for both incidence and mortality using the scheme established by the National Cancer Institute (NCI) Surveillance, Epidemiology and End Results (SEER) program as shown in Appendix A.

Figure 1 presents an anatomic diagram of the digestive system that details the colorectal subsites. For this report, three major site categories include colon and rectum, colon excluding rectum, and rectum and rectosigmoid junction. "Colon and rectum" refers to all anatomic subsites shown in Figure 1 combined. "Colon excluding rectum" includes all combined anatomic sites except for rectum and rectosigmoid junction. The rectum and rectosigmoid junction comprise the third major site category. Analyses were conducted on both incidence and mortality data for those three major colorectal site categories. All subsites on Figure 1, as well as large intestine, NOS, were analyzed for cancer incidence in Illinois. Additional analyses were done for combined proximal sites (cecum, appendix, ascending colon, hepatic flexure, transverse colon, splenic flexure and descending colon) and combined distal sites (sigmoid colon, rectosigmoid junction and rectum).

### Population Estimates

Denominators used for rate calculations were Illinois' resident population estimates for whites and blacks from the U.S. Bureau of the Census for 1979 through 1998. These data were accessed via the Internet.[8]

**Figure 1.**
**Anatomy of the Digestive System**
**Colon and Rectum Subsites**




SOURCE: National Cancer Institute, Office of Cancer Communications, Bethesda, MD 20892

## Statistical Analyses

The SEER Stat software package (version 3.0), developed by Information Management Services Inc. (IMS) for the NCI, was used to calculate frequencies, percentages, age-adjusted cancer incidence and mortality rates, and 95 percent confidence limits. Rates are expressed per 100,000 population and are age-adjusted by the direct method to the 1970 U.S. standard million population.

Trend analyses for rates were also performed using the SEER Stat software package. Estimated annual percentage change (EAPC) for age-adjusted cancer incidence and mortality rates for trend analyses over selected time periods was estimated by fitting a regression line to the natural logarithm of the rates (dependent variable) using calendar year as the independent variable. Trend analyses for rate ratios (ratio of two average annual age-adjusted rates) were estimated using the same methods employed for age-adjusted rates as described above but with the natural logarithms of the rate ratios for the dependent variable. The formulas for rate calculations and confidence intervals are displayed in Appendix A. Confidence intervals for rate ratios were calculated using a formula based on approximate normal distributions.[9,10]

Joinpoint analysis, a statistical methodology developed by the Statistical Research and Applications Branch of the NCI and IMS, was employed to determine changes in trends over successive segments of time and the quantity of increase or decrease within each time segment. The method was applied to Illinois' incidence (1986-1997) and mortality (1979-1998) data for colorectal cancer. The rate of change is tested to determine whether it is different from zero.[11]

Most graphics are displayed using aggregate years to better illustrate trends by reducing data fluctuations, especially when small numbers appear for a single year. Such aggregation allows an overall visual evaluation of colorectal cancer incidence and mortality over the respective time periods of study. However, aggregated data would generate superficially high precision for coefficients in trend analyses. These coefficients were not used. Rather, coefficients based on individual years were used as statistical summary for all trend assessments.

## Findings

### Does the incidence of colorectal cancer differ between Illinois' blacks and whites?

Table 1 displays colorectal cancer counts, average annual age-adjusted rates and 95 percent confidence intervals over 1986 to 1997 for the three major colorectal cancer sites for blacks and whites by sex. As shown, higher rates for blacks than whites appear for colon and rectum, and colon excluding rectum for both sexes, males and females. All differences were statistically significant except for male colon and rectum. Conversely, significantly higher rates for whites than blacks were evident for rectum, both sexes and males. It should be noted that for both blacks and whites, the majority of colorectal cancer incidence appears in the colon excluding rectum site (70 percent to 80 percent) with the remainder diagnosed in the rectum or rectosigmoid junction.

Because joinpoint analyses demonstrated no subtrends for any site-race-sex group, EAPCs reflect the trend over the entire period of 1986 to 1997. EAPCs for 1986 to 1997 showed no significant changes for blacks in any site-race-sex group. However, most EAPCs were in the direction that was suggestive of an increase in colorectal cancers for blacks. In contrast, whites showed statistically significant decreases for all site-race-sex groups under evaluation with the exception of colon excluding rectum for white females.

Figures 2, 3 and 4 graphically display trends using five-year moving average annual age-adjusted incidence rates for race-sex groups across the ISCR 1986 to 1997 database for the three colorectal cancer sites. The declines described for whites for all three colorectal sites are apparent in the figures. White males had the highest incidence rates until around 1990-1994 when rates for black males exceed those observed for whites (Figure 2). For colon excluding rectum, the highest rates are observed for black males followed by white males then black females and finally white females across the entire time period (Figure 3). In contrast, cancer incidence rates for rectum and rectosigmoid junction are substantially higher for white males than the other race-sex groups, then black males, followed by white females and lastly, black females (Figure 4).

Statistical comparisons of five-year aggregate rates for blacks to whites show all rates for black females to be significantly higher than their white counterparts for combined colon and rectum (Figure 2). In the later five-year aggregate time periods, the differences for combined colon and rectum also are significantly higher for blacks than whites for both sexes and males. For colon excluding rectum, all comparisons were significantly higher for blacks than whites for both sexes and females, and most also were significant for males (Figure 3). Conversely, whites have significantly higher cancer incidence rates for rectum and rectosigmoid junction than do blacks in Illinois (Figure 4). Although white rates were higher for both sexes, males and females compared with their black counterparts, the differences were only statistically significant for both sex and male comparisons.

**Table 1.**
**Cancer Incidence, Average Annual Rates and Trends**
**Colon and Rectum, Blacks and Whites by Sex, Illinois, 1986-1997**

| Site/Sex/Race | 1986-1997 | | | | |
|---|---|---|---|---|---|
| | Count | AAR | LCI | UCI | EAPC |
| **Colon and Rectum** | | | | | |
| **Both Sexes** | | | | | |
| Blacks | 8,559 | 50.6* | 49.5 | 51.6 | 0.61 |
| Whites | 69,681 | 47.2 | 46.9 | 47.6 | -0.83# |
| **Males** | | | | | |
| Blacks | 4,007 | 58.8 | 57.0 | 60.7 | 0.82 |
| Whites | 34,327 | 57.3 | 56.7 | 57.9 | -1.04# |
| **Females** | | | | | |
| Blacks | 4,552 | 45.0* | 43.7 | 46.4 | 0.28 |
| Whites | 35,354 | 39.9 | 39.5 | 40.4 | -0.74# |
| **Colon excluding Rectum** | | | | | |
| **Both Sexes** | | | | | |
| Blacks | 6,616 | 39.2* | 38.2 | 40.1 | 0.73 |
| Whites | 50,539 | 33.8 | 33.5 | 34.1 | -0.80# |
| **Males** | | | | | |
| Blacks | 3,027 | 44.7* | 43.1 | 46.3 | 1.09 |
| Whites | 23,784 | 39.6 | 39.1 | 40.1 | -1.15# |
| **Females** | | | | | |
| Blacks | 3,589 | 35.6* | 34.4 | 36.8 | 0.26 |
| Whites | 26,755 | 29.8 | 29.4 | 30.1 | -0.56 |
| **Rectum and Rectosigmoid** | | | | | |
| **Both Sexes** | | | | | |
| Blacks | 1,943 | 11.4 | 10.9 | 11.9 | 0.18 |
| Whites | 19,142 | 13.4* | 13.2 | 13.6 | -0.89# |
| **Males** | | | | | |
| Blacks | 980 | 14.1 | 13.2 | 15.1 | -0.09 |
| Whites | 10,543 | 17.7* | 17.4 | 18.0 | -0.81# |
| **Females** | | | | | |
| Blacks | 963 | 9.5 | 8.9 | 10.1 | 0.45 |
| Whites | 8,599 | 10.2 | 9.9 | 10.4 | -1.27# |

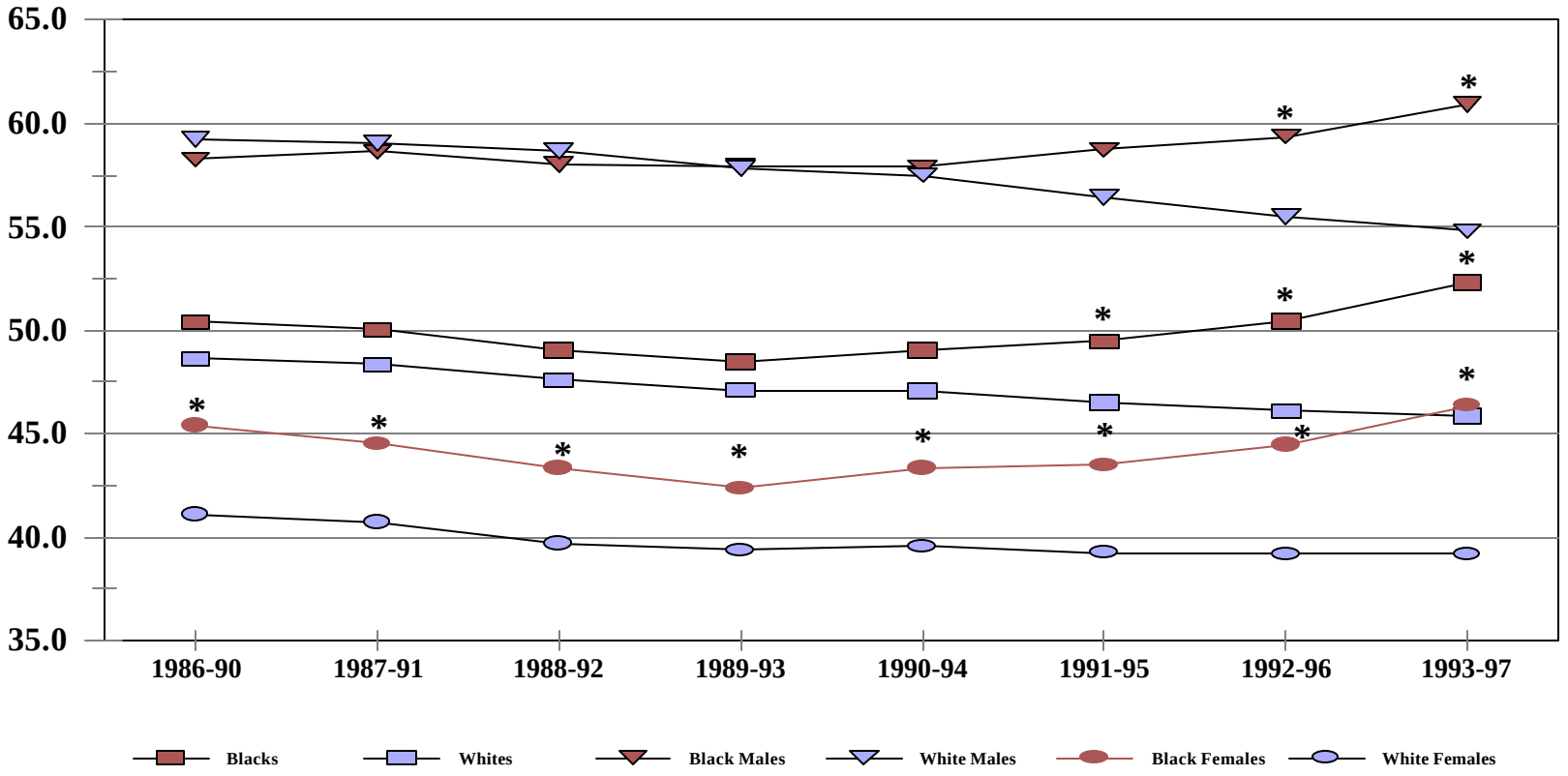
Average annual age-adjusted rates (AAR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population. Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.

*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).

# EAPC is statistically different from zero ($p<0.05$).

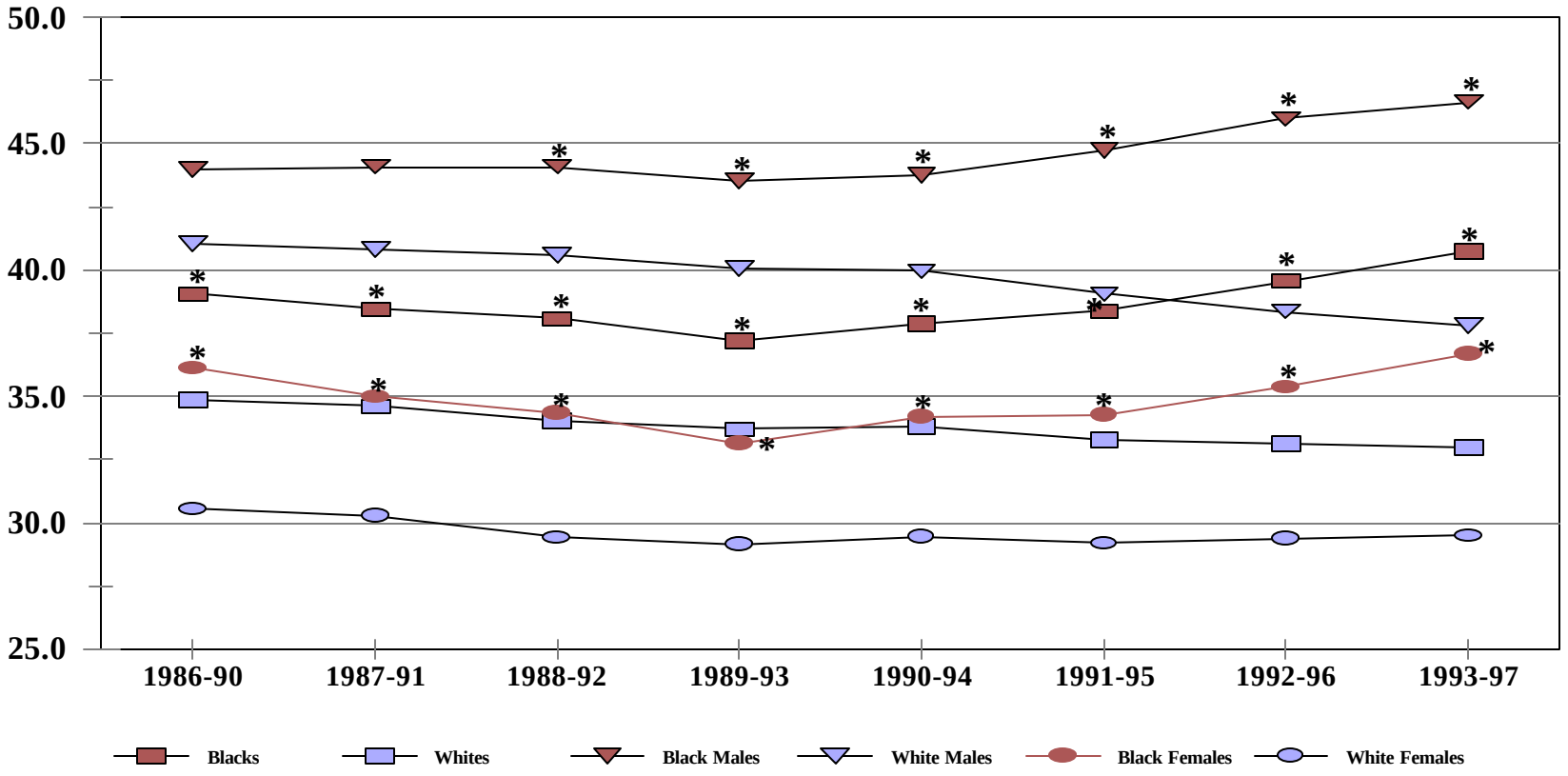
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Figure 2.**
**Five-year Average Annual Age-adjusted Cancer Incidence Rates for Colon and Rectum**
**Blacks and Whites by Sex, Illinois, 1986-1997**



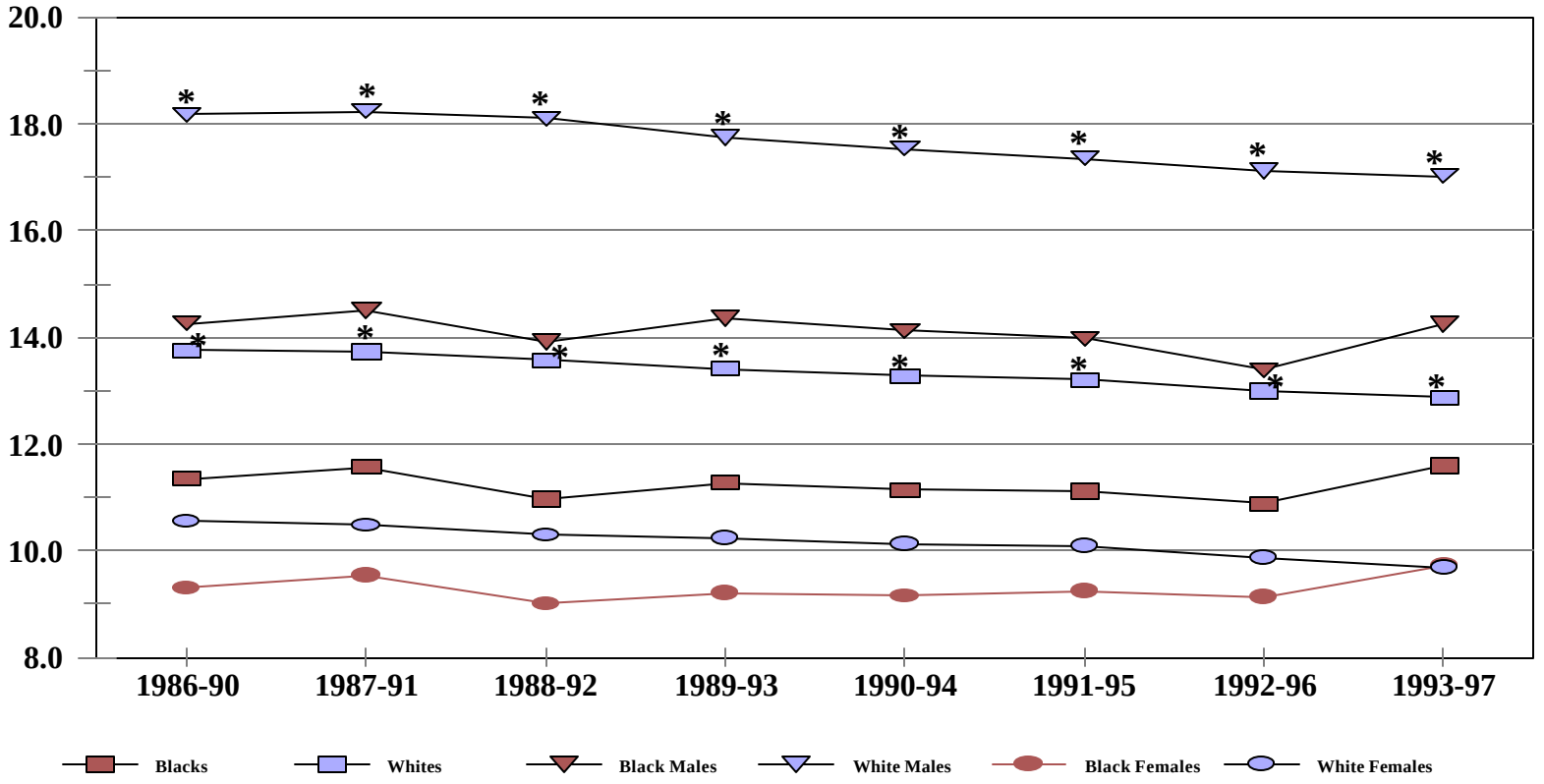

Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Figure 3.**
**Five-year Average Annual Age-adjusted Cancer Incidence Rates for Colon excluding Rectum**
**Blacks and Whites by Sex, Illinois, 1986-1997**




Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Figure 4.**
**Five-year Average Annual Age-adjusted Cancer Incidence Rates for Rectum and Rectosigmoid Junction**
**Blacks and Whites by Sex, Illinois, 1986-1997**




Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**How does colorectal cancer mortality compare between blacks and whites in Illinois?**

Table 2 shows colorectal cancer mortality counts, average annual age-adjusted rates and 95 percent confidence intervals for 1979 through 1998, for blacks and whites by sex in Illinois. Joinpoint analyses did show changes in the trends for some site-sex-race groups under evaluation. Thus, joinpoint trends and subtrend EAPCs are presented in Table 2.

The majority of deaths for both blacks and whites were due to cancers occurring in the colon excluding rectum (approximately 85 percent to 90 percent) with the remaining 10 percent to 15 percent from cancers of the rectum or rectosigmoid junction. As shown, blacks had higher cancer mortality rates over 1979 to 1998 than whites for both sexes, males and females for all three major colorectal site categories. All differences were statistically significant except for black/white male comparisons for rectum and rectosigmoid junction.

EAPCs were not significant for any site-sex-race group for blacks over 1979 to 1998 (Table 2). However, the colorectal cancer mortality trends declined significantly for whites in every site-sex-race group over the 20-year time period.

Joinpoint analysis detected subtrends only for whites in colon and rectum, both sexes and males; colon excluding rectum, both sexes and males; and rectum and rectosigmoid junction, both sexes, males and females. For colon and rectum, and colon excluding rectum, subtrends for earlier years showed some decline followed by more dramatic, statistically significant declines over the latter part of the 20-year time frame. The pattern for rectum and rectosigmoid junction cancer deaths among whites was just the opposite of colon and rectum, and colon excluding rectum. That is, the early subtrends over 1979 to 1991 showed a large (almost 5 percent per year) statistically significant decline followed by no change from 1991 to 1998 for all white gender classification groups.

Figures 5, 6 and 7 show graphic trends over 1979 to 1998 using five-year moving average annual age-adjusted colorectal cancer mortality rates by race and sex. The consistent declines for whites in colon and rectum (Figure 5), colon excluding rectum (Figure 6) and rectum and rectosigmoid junction (Figure 7) are most apparent in the graphs. Such declines never appeared for blacks across the 20 years. Also evident for all three colorectal cancer sites is that the highest mortality rates are observed for black males followed by white males, then black females and finally, white females.

Statistical comparisons between blacks and whites are presented for the 1979 to 1998 time period in Table 2 and for the five-year aggregate periods in figures 5, 6 and 7. With the exception of rectum and rectosigmoid junction for males, black rates were significantly greater than white rates for every site-sex-race group comparison (Table 2). Significantly and consistently higher average annual age-adjusted cancer mortality rates for blacks compared with whites were apparent when examining the five-year moving average annual age-adjusted rates for colon and rectum (Figure 5) and colon excluding rectum (Figure 6). For rectal cancer mortality (Figure 7), black rates were higher than white rates but statistically significant differences were not consistent across 1979 to 1998.

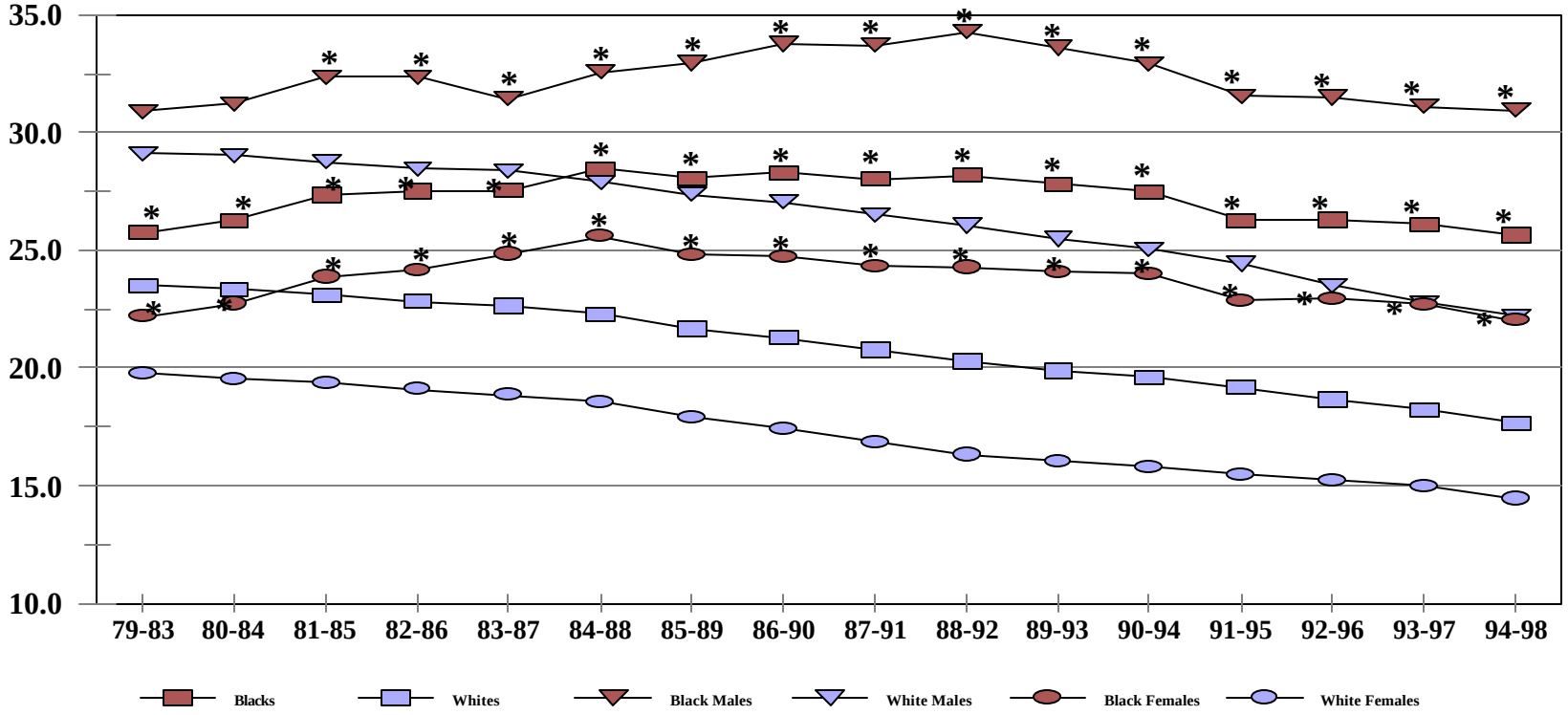
**Table 2.**
**Cancer Deaths, Average Annual Rates and Trends**
**Colon and Rectum Sites, Blacks and Whites by Sex, Illinois, 1979-1998**

| | 1979-1998 | | | | | Trend 1 | | Trend 2 | |
|---|---|---|---|---|---|---|---|---|---|
| **Site/Sex//Race** | **Count** | **AAR** | **LCI** | **UCI** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** |
| **Colon and Rectum** | | | | | | | | | |
| **Both Sexes** | | | | | | | | | |
| Blacks | 7,249 | 26.9* | 26.3 | 27.6 | -0.04 | | | | |
| Whites | 51,576 | 20.8 | 20.6 | 21.0 | -1.91# | 1979-85 | -0.80 | 1985-98 | -2.26# |
| **Males** | | | | | | | | | |
| Blacks | 3,460 | 32.0* | 30.9 | 33.1 | 0.19 | | | | |
| Whites | 25,490 | 26.0 | 25.7 | 26.4 | -1.81# | 1979-90 | -1.05# | 1990-98 | -2.98# |
| **Females** | | | | | | | | | |
| Blacks | 3,789 | 23.5* | 22.7 | 24.2 | -0.20 | | | | |
| Whites | 26,086 | 17.2 | 17.0 | 17.4 | -2.11# | | | | |
| | | | | | | | | | |
| **Colon excluding Rectum** | | | | | | | | | |
| **Both Sexes** | | | | | | | | | |
| Blacks | 6,338 | 23.6* | 23.0 | 24.2 | 0.10 | | | | |
| Whites | 44,123 | 17.7 | 17.6 | 17.9 | -1.69# | 1979-87 | -0.40 | 1987-98 | -2.50# |
| **Males** | | | | | | | | | |
| Blacks | 2,986 | 27.6* | 26.6 | 28.7 | 0.31 | | | | |
| Whites | 21,407 | 21.9 | 21.6 | 22.2 | -1.50# | 1979-90 | -0.24 | 1990-98 | -3.44# |
| **Females** | | | | | | | | | |
| Blacks | 3,352 | 20.8* | 20.1 | 21.5 | -0.03 | | | | |
| Whites | 22,716 | 14.9 | 14.7 | 15.1 | -1.94# | | | | |
| | | | | | | | | | |
| **Rectum and Rectosigmoid** | | | | | | | | | |
| **Both Sexes** | | | | | | | | | |
| Blacks | 911 | 3.4* | 3.1 | 3.6 | -0.98 | | | | |
| Whites | 7,453 | 3.0 | 3.0 | 3.1 | -3.15# | 1979-91 | -4.69# | 1991-98 | 0.40 |
| **Males** | | | | | | | | | |
| Blacks | 474 | 4.3 | 4.0 | 4.8 | -0.51 | | | | |
| Whites | 4,083 | 4.2 | 4.0 | 4.3 | -3.29# | 1979-91 | -4.84# | 1991-98 | 0.19 |
| **Females** | | | | | | | | | |
| Blacks | 437 | 2.7* | 2.4 | 2.9 | -1.43 | | | | |
| Whites | 3,370 | 2.2 | 2.2 | 2.3 | -3.21# | 1979-91 | -4.88# | 1991-98 | 0.64 |

Average annual age-adjusted rates (AAR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
# EAPC is statistically different from zero ($p<.05$).

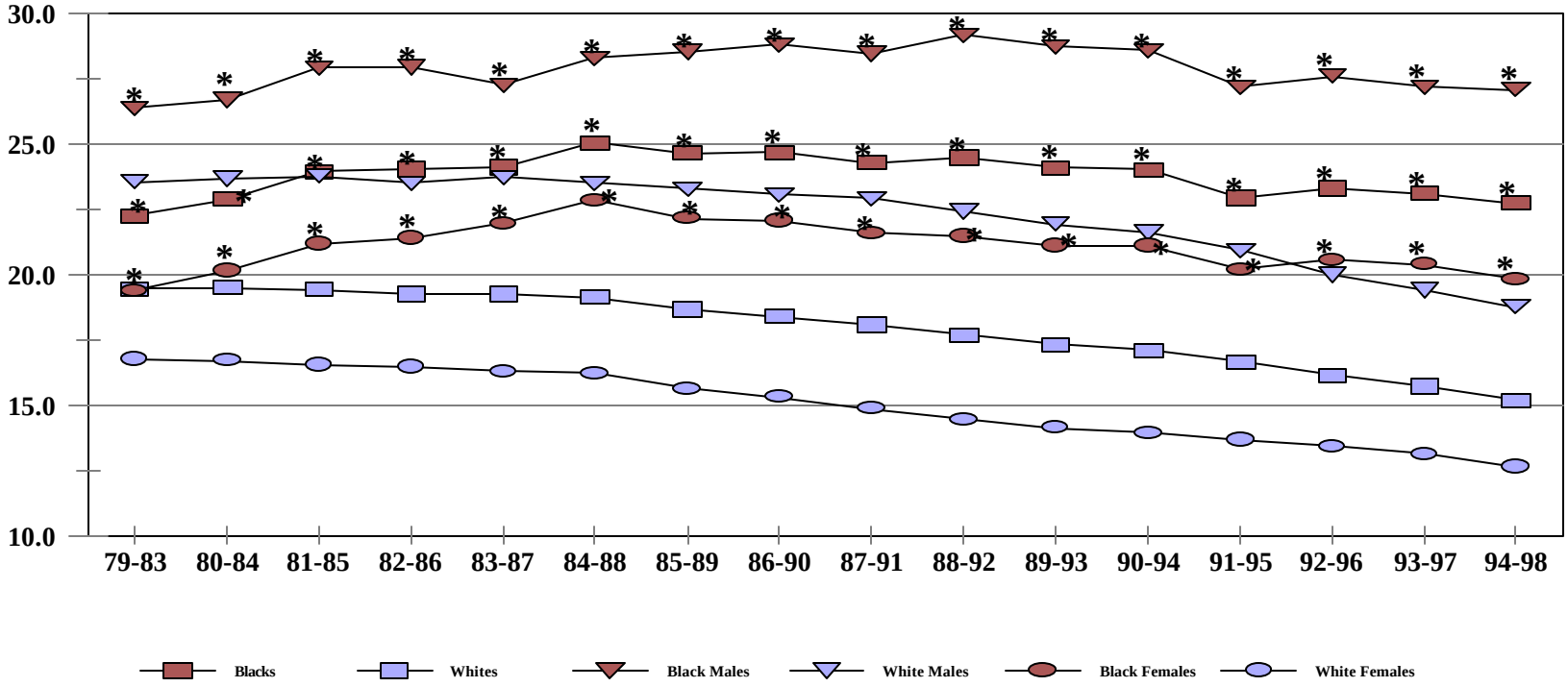
SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Figure 5.**
**Five-year Average Annual Age-adjusted Cancer Mortality Rates for Colon and Rectum**
**Blacks and Whites by Sex, Illinois, 1979-1998**



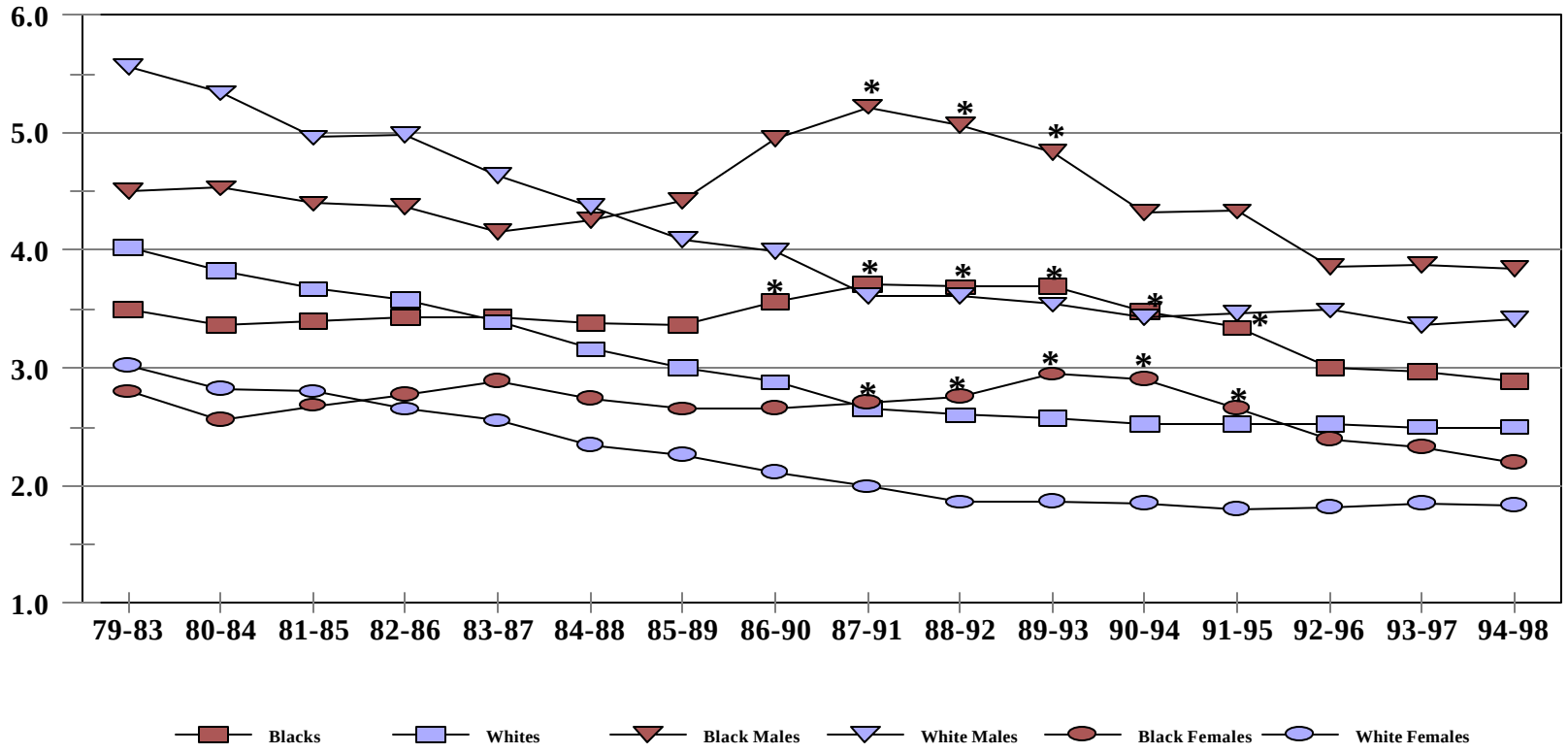

Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
Source: Illinois Department of Public Health, Death Master Files, 1979-1998

**Figure 6.**
**Five-year Average Annual Age-adjusted Cancer Mortality Rates for Colon excluding Rectum**
**Blacks and Whites by Sex, Illinois, 1979-1998**




Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
Source: Illinois Department of Public Health, Death Master Files, 1979-1998

**Figure 7.**
**Five-year Average Annual Age-adjusted Cancer Mortality Rates for Rectum and Rectosigmoid Junction**
**Blacks and Whites by Sex, Illinois, 1979-1998**




Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
*Race is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
Source: Illinois Department of Public Health, Death Master Files, 1979-1998

**What is the magnitude of colorectal cancer incidence and mortality differences between blacks and whites and males and females in Illinois?**

Table 3 presents average annual rate ratio comparisons for blacks to whites by sex for colorectal cancer incidence over 1986 to 1997 and cancer mortality for 1979 to 1998. Proportionately, blacks have more colorectal cancer than whites in Illinois for all colorectal site comparisons with the exception of cancer incidence for rectum and rectosigmoid junction. Blacks in Illinois have proportionately about 7 percent more colon and rectum cancer incidence and 30 percent more mortality than their white counterparts. The greatest disparity is observed for females when colon excluding rectum is considered. For this site, black females are observed to have 19 percent more cancer incidence and 39 percent more deaths than do white females. Black males have 13 percent more cancer incidence and 26 percent greater mortality from colon excluding rectum than white males in Illinois. Conversely, black males and females have, respectively, 20 percent less and 7 percent less than their white counterparts for rectum and rectosigmoid junction cancer incidence. However, mortality from cancers of the rectum and rectosigmoid junction were proportionately higher for blacks than whites for both sexes.

Trend analyses for black to white rate ratios are summarized in Table 3 and graphically displayed in figures 8 and 9. Significant increasing disparities in trends are apparent for colon and rectum (both sexes and males) and colon excluding rectum (both sexes). For mortality, all EAPCs for black to white ratios were statistically significant for all major colorectal sites with the exception of cancer mortality from rectum for females. Ratio trends displayed in figures 8 and 9 indicate increasing disparities between blacks and whites except for rectum where the rate ratio declined during the 1990s. Black to white rate ratios for each five-year aggregate time period are presented for incidence and mortality in tables 4 and 5, respectively.

Table 3 also presents male to female rate ratios for the total cancer incidence (1986-1997) and mortality (1979-1998) time periods. Consistently, both black and white males have proportionately more colorectal cancer incidence and mortality than their black and white female counterparts, and the male to female difference is greater for whites than blacks in all colorectal site comparisons. The greatest differences are for white males, who have 74 percent more rectal cancer diagnosed than black males, and for white females with 86 percent more death from rectal cancer than black females in Illinois. Trend analyses were only significant for whites showing a 0.45 percent increase in the male to female rate ratio for cancer deaths from colon excluding rectum over 1979 to 1998. Male to female rate ratios for every five-year time period were significantly different from 1.0 (tables 4 and 5).

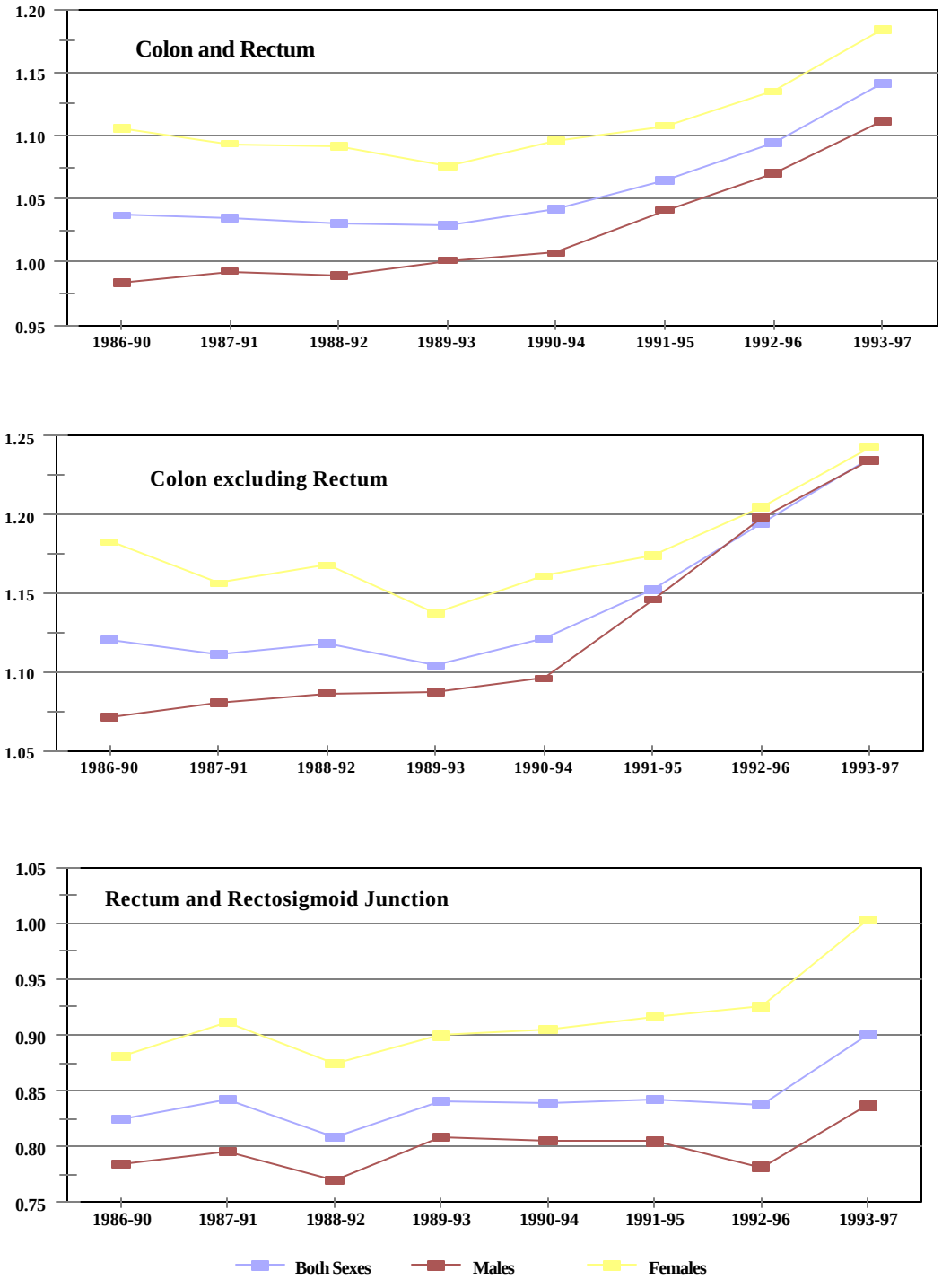
**Table 3.**
**Summary Statistics**
**Rate Ratios for Average Annual Age-adjusted Rates**
**Colorectal Cancer Incidence 1986-1997 and Mortality 1979-1998, Illinois**

| | Cancer Incidence, 1986-1997 | | | | Cancer Mortality, 1979-1998 | | | |
|---|---|---|---|---|---|---|---|---|
| | Colon and Rectum | | | | Colon and Rectum | | | |
| | RR | LCI | UCI | EAPC | RR | LCI | UCI | EAPC |
| **Blacks to Whites** | | | | | | | | |
| Both Sexes | 1.07* | 1.06 | 1.08 | 1.43# | 1.30* | 1.29 | 1.30 | 1.89# |
| Males | 1.03* | 1.02 | 1.04 | 1.86# | 1.23* | 1.22 | 1.24 | 2.01# |
| Females | 1.13* | 1.12 | 1.14 | 1.02 | 1.37* | 1.36 | 1.38 | 1.93# |
| **Males to Females** | | | | | | | | |
| Blacks | 1.31* | 1.28 | 1.33 | 0.53 | 1.36* | 1.33 | 1.39 | 0.39 |
| Whites | 1.43* | 1.42 | 1.45 | -0.31 | 1.52* | 1.50 | 1.53 | 0.31 |
| | Colon excluding Rectum | | | | Colon excluding Rectum | | | |
| | RR | LCI | UCI | EAPC | RR | LCI | UCI | EAPC |
| **Blacks to Whites** | | | | | | | | |
| Both Sexes | 1.16* | 1.15 | 1.17 | 1.54# | 1.33* | 1.32 | 1.34 | 1.80# |
| Males | 1.13* | 1.12 | 1.14 | 2.24 | 1.26* | 1.25 | 1.28 | 1.81# |
| Females | 1.19* | 1.18 | 1.21 | 0.82 | 1.39* | 1.38 | 1.41 | 1.92# |
| **Males to Females** | | | | | | | | |
| Blacks | 1.26* | 1.22 | 1.29 | 0.83 | 1.33* | 1.29 | 1.36 | 0.34 |
| Whites | 1.33* | 1.32 | 1.34 | -0.59 | 1.47* | 1.45 | 1.48 | 0.45# |
| | Rectum and Rectosigmoid Junction | | | | Rectum and Rectosigmoid Junction | | | |
| | RR | LCI | UCI | EAPC | RR | LCI | UCI | EAPC |
| **Blacks to Whites** | | | | | | | | |
| Both Sexes | 0.85* | 0.84 | 0.87 | 1.07 | 1.10* | 1.08 | 1.12 | 2.21# |
| Males | 0.80* | 0.78 | 0.82 | 0.72 | 1.04* | 1.01 | 1.07 | 2.84# |
| Females | 0.93* | 0.91 | 0.95 | 1.72 | 1.18* | 1.15 | 1.22 | 1.81 |
| **Males to Females** | | | | | | | | |
| Blacks | 1.49* | 1.43 | 1.55 | -0.54 | 1.63* | 1.54 | 1.73 | 0.93 |
| Whites | 1.74* | 1.72 | 1.76 | 0.46 | 1.86* | 1.82 | 1.89 | 0.09 |

Rate ratios (RR) are the ratios of black to white or male to female rates per 100,000 and age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rate ratios.
* Rate ratio is significantly different from 1.0 ($p<0.05$).
# EAPC is significantly different from zero ($p<0.05$).

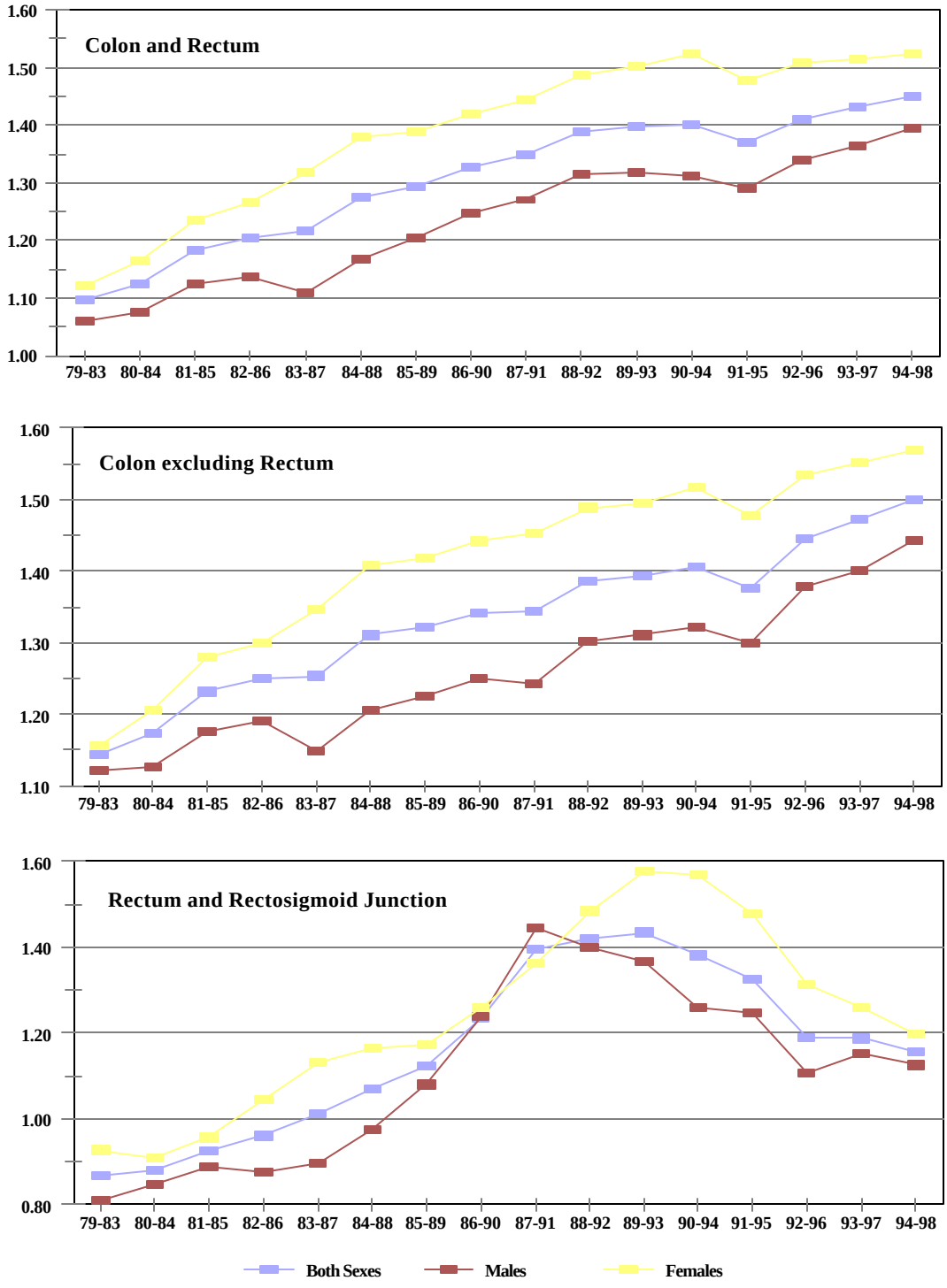
Source: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999, and Death Master Files, 1979-1998

**Figure 8.**
**Rate Ratios of Five-year Average Annual Age-adjusted Colorectal Cancer Incidence Rates**
**Blacks to Whites by Sex, Illinois, 1986-1997**




Rate ratios are the ratio of two average annual age-adjusted rates per 100,000 and age-adjusted to the 1970 U.S. standard million population.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Figure 9.**
**Rate Ratios of Five-year Average Annual Age-adjusted Colorectal Cancer Mortality Rates**
**Blacks to Whites by Sex, Illinois, 1979-1998**




Rate ratios are the ratio of average annual age-adjusted rates per 100,000
and age-adjusted to the 1970 U.S. standard million population.
SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Table 4.**
**Rate Ratios of Five-Year Average Annual Age-adjusted Colorectal Cancer Incidence Rates**
**Blacks to Whites by Sex and Males to Females, Illinois, 1986-1997**

**Colon and Rectum**

| | Blacks to Whites | | | | | | | | | Males to Females | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Both Sexes | | | Males | | | Females | | | Blacks | | | Whites | | |
| Years | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI |
| 1986-90 | 1.04* | 1.03 | 1.05 | 0.98 | 0.97 | 1.00 | 1.11* | 1.09 | 1.12 | 1.28* | 1.24 | 1.33 | 1.44* | 1.43 | 1.46 |
| 1987-91 | 1.03* | 1.02 | 1.05 | 0.99 | 0.98 | 1.01 | 1.09* | 1.08 | 1.11 | 1.32* | 1.27 | 1.36 | 1.45* | 1.43 | 1.47 |
| 1988-92 | 1.03* | 1.02 | 1.04 | 0.99 | 0.97 | 1.01 | 1.09* | 1.08 | 1.11 | 1.34* | 1.29 | 1.38 | 1.48* | 1.46 | 1.49 |
| 1989-93 | 1.03* | 1.02 | 1.04 | 1.00 | 0.98 | 1.02 | 1.08* | 1.06 | 1.09 | 1.37* | 1.32 | 1.41 | 1.47* | 1.45 | 1.48 |
| 1990-94 | 1.04* | 1.03 | 1.05 | 1.01 | 0.99 | 1.02 | 1.10* | 1.08 | 1.11 | 1.34* | 1.29 | 1.38 | 1.45* | 1.44 | 1.47 |
| 1991-95 | 1.06* | 1.05 | 1.08 | 1.04* | 1.02 | 1.06 | 1.11* | 1.09 | 1.12 | 1.35* | 1.31 | 1.40 | 1.44* | 1.42 | 1.45 |
| 1992-96 | 1.09* | 1.08 | 1.11 | 1.07* | 1.05 | 1.09 | 1.13* | 1.12 | 1.15 | 1.33* | 1.29 | 1.38 | 1.42* | 1.40 | 1.43 |
| 1993-97 | 1.14* | 1.13 | 1.15 | 1.11* | 1.09 | 1.13 | 1.18* | 1.17 | 1.20 | 1.31* | 1.27 | 1.36 | 1.40* | 1.38 | 1.42 |

**Colon excluding Rectum**

| | Blacks to Whites | | | | | | | | | Males to Females | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Both Sexes | | | Males | | | Females | | | Blacks | | | Whites | | |
| Years | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI |
| 1986-90 | 1.12* | 1.11 | 1.13 | 1.07* | 1.05 | 1.09 | 1.18* | 1.16 | 1.20 | 1.22* | 1.17 | 1.27 | 1.34* | 1.33 | 1.36 |
| 1987-91 | 1.11* | 1.10 | 1.12 | 1.08* | 1.06 | 1.10 | 1.16* | 1.14 | 1.17 | 1.26* | 1.21 | 1.31 | 1.35* | 1.33 | 1.37 |
| 1988-92 | 1.12* | 1.10 | 1.13 | 1.09* | 1.07 | 1.11 | 1.17* | 1.15 | 1.19 | 1.28* | 1.23 | 1.34 | 1.38* | 1.36 | 1.40 |
| 1989-93 | 1.10* | 1.09 | 1.12 | 1.09* | 1.07 | 1.11 | 1.14* | 1.12 | 1.16 | 1.31* | 1.26 | 1.37 | 1.37* | 1.36 | 1.39 |
| 1990-94 | 1.12* | 1.11 | 1.13 | 1.10* | 1.08 | 1.12 | 1.16* | 1.14 | 1.18 | 1.28* | 1.23 | 1.33 | 1.36* | 1.34 | 1.38 |
| 1991-95 | 1.15* | 1.14 | 1.17 | 1.15* | 1.13 | 1.17 | 1.17* | 1.16 | 1.19 | 1.31* | 1.26 | 1.36 | 1.34* | 1.32 | 1.36 |
| 1992-96 | 1.19* | 1.18 | 1.21 | 1.20* | 1.18 | 1.22 | 1.20* | 1.19 | 1.22 | 1.30* | 1.25 | 1.35 | 1.31* | 1.29 | 1.33 |
| 1993-97 | 1.24* | 1.22 | 1.25 | 1.23* | 1.21 | 1.25 | 1.24* | 1.22 | 1.26 | 1.27* | 1.22 | 1.32 | 1.28* | 1.26 | 1.30 |

**Rectum and Rectosigmoid Junction**

| | Blacks to Whites | | | | | | | | | Males to Females | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Both Sexes | | | Males | | | Females | | | Blacks | | | Whites | | |
| Years | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI |
| 1986-90 | 0.82* | 0.80 | 0.85 | 0.78* | 0.75 | 0.81 | 0.88* | 0.85 | 0.91 | 1.53* | 1.43 | 1.64 | 1.72* | 1.69 | 1.76 |
| 1987-91 | 0.84* | 0.82 | 0.86 | 0.80* | 0.77 | 0.83 | 0.91* | 0.88 | 0.94 | 1.52* | 1.42 | 1.62 | 1.74* | 1.71 | 1.77 |
| 1988-92 | 0.81* | 0.79 | 0.83 | 0.77* | 0.74 | 0.80 | 0.87* | 0.84 | 0.91 | 1.55* | 1.44 | 1.65 | 1.76* | 1.72 | 1.79 |
| 1989-93 | 0.84* | 0.82 | 0.86 | 0.81* | 0.78 | 0.84 | 0.90* | 0.87 | 0.93 | 1.56* | 1.46 | 1.66 | 1.74* | 1.70 | 1.77 |
| 1990-94 | 0.84* | 0.82 | 0.86 | 0.81* | 0.78 | 0.83 | 0.91* | 0.87 | 0.94 | 1.54* | 1.44 | 1.64 | 1.73* | 1.70 | 1.77 |
| 1991-95 | 0.84* | 0.82 | 0.86 | 0.80* | 0.78 | 0.83 | 0.92* | 0.88 | 0.95 | 1.51* | 1.41 | 1.61 | 1.72* | 1.69 | 1.75 |
| 1992-96 | 0.84* | 0.81 | 0.86 | 0.78* | 0.75 | 0.81 | 0.93* | 0.89 | 0.96 | 1.47* | 1.37 | 1.56 | 1.73* | 1.70 | 1.77 |
| 1993-97 | 0.90* | 0.88 | 0.92 | 0.84* | 0.81 | 0.87 | 1.00 | 0.97 | 1.04 | 1.47* | 1.37 | 1.56 | 1.76* | 1.72 | 1.79 |

Rates used for rate ratios are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rate ratios.
* Rate ratio is significantly different from 1.0 ($p<0.05$).

Source: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 5.**
**Rate Ratios of Five-Year Average Annual Age-adjusted Colorectal Cancer Mortality Rates**
**Blacks to Whites by Sex and Males to Females, Illinois, 1979-1998**

**Colon and Rectum**

| | Blacks to Whites | | | | | | | | | Males to Females | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Both Sexes | | | Males | | | Females | | | Blacks | | | Whites | | |
| Years | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI |
| 1979-83 | 1.10* | 1.08 | 1.11 | 1.06* | 1.04 | 1.09 | 1.12* | 1.10 | 1.15 | 1.39* | 1.32 | 1.46 | 1.47* | 1.45 | 1.50 |
| 1980-84 | 1.13* | 1.11 | 1.14 | 1.08* | 1.05 | 1.10 | 1.16* | 1.14 | 1.19 | 1.37* | 1.31 | 1.44 | 1.49* | 1.46 | 1.51 |
| 1981-85 | 1.18* | 1.17 | 1.20 | 1.13* | 1.10 | 1.15 | 1.23* | 1.21 | 1.26 | 1.35* | 1.29 | 1.42 | 1.49* | 1.46 | 1.51 |
| 1982-86 | 1.20* | 1.19 | 1.22 | 1.14* | 1.11 | 1.16 | 1.26* | 1.24 | 1.29 | 1.34* | 1.27 | 1.40 | 1.49* | 1.47 | 1.51 |
| 1983-87 | 1.22* | 1.20 | 1.23 | 1.11* | 1.08 | 1.13 | 1.32* | 1.29 | 1.34 | 1.27* | 1.20 | 1.33 | 1.51* | 1.48 | 1.53 |
| 1984-88 | 1.28* | 1.26 | 1.29 | 1.17* | 1.14 | 1.19 | 1.38* | 1.36 | 1.40 | 1.27* | 1.21 | 1.34 | 1.50* | 1.48 | 1.53 |
| 1985-89 | 1.29* | 1.28 | 1.31 | 1.20* | 1.18 | 1.23 | 1.39* | 1.36 | 1.41 | 1.33* | 1.27 | 1.39 | 1.53* | 1.51 | 1.55 |
| 1986-90 | 1.33* | 1.31 | 1.35 | 1.25* | 1.22 | 1.27 | 1.42* | 1.39 | 1.44 | 1.37* | 1.30 | 1.43 | 1.55* | 1.53 | 1.58 |
| 1987-91 | 1.35* | 1.33 | 1.37 | 1.27* | 1.25 | 1.29 | 1.44* | 1.42 | 1.47 | 1.39* | 1.32 | 1.45 | 1.57* | 1.55 | 1.60 |
| 1988-92 | 1.39* | 1.37 | 1.41 | 1.32* | 1.29 | 1.34 | 1.49* | 1.46 | 1.51 | 1.41* | 1.35 | 1.47 | 1.60* | 1.57 | 1.62 |
| 1989-93 | 1.40* | 1.38 | 1.42 | 1.32* | 1.29 | 1.34 | 1.50* | 1.48 | 1.53 | 1.39* | 1.33 | 1.46 | 1.59* | 1.57 | 1.62 |
| 1990-94 | 1.40* | 1.38 | 1.42 | 1.31* | 1.29 | 1.34 | 1.52* | 1.50 | 1.55 | 1.37* | 1.31 | 1.43 | 1.59* | 1.56 | 1.61 |
| 1991-95 | 1.37* | 1.35 | 1.39 | 1.29* | 1.27 | 1.32 | 1.48* | 1.45 | 1.50 | 1.38* | 1.32 | 1.44 | 1.58* | 1.55 | 1.60 |
| 1992-96 | 1.41* | 1.39 | 1.43 | 1.34* | 1.31 | 1.36 | 1.51* | 1.48 | 1.53 | 1.37* | 1.31 | 1.43 | 1.54* | 1.52 | 1.57 |
| 1993-97 | 1.43* | 1.41 | 1.45 | 1.36* | 1.34 | 1.39 | 1.52* | 1.49 | 1.54 | 1.37* | 1.31 | 1.43 | 1.52* | 1.50 | 1.55 |
| 1994-98 | 1.45* | 1.43 | 1.47 | 1.39* | 1.37 | 1.42 | 1.52* | 1.50 | 1.55 | 1.41* | 1.35 | 1.47 | 1.54* | 1.51 | 1.56 |

**Colon excluding Rectum**

| | Blacks to Whites | | | | | | | | | Males to Females | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Both Sexes | | | Males | | | Females | | | Blacks | | | Whites | | |
| Years | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI |
| 1979-83 | 1.14* | 1.12 | 1.16 | 1.12* | 1.09 | 1.15 | 1.16* | 1.13 | 1.18 | 1.36* | 1.29 | 1.44 | 1.41* | 1.38 | 1.43 |
| 1980-84 | 1.17* | 1.15 | 1.19 | 1.13* | 1.10 | 1.15 | 1.21* | 1.18 | 1.23 | 1.32* | 1.25 | 1.40 | 1.42* | 1.39 | 1.44 |
| 1981-85 | 1.23* | 1.21 | 1.25 | 1.17* | 1.15 | 1.20 | 1.28* | 1.25 | 1.31 | 1.32* | 1.25 | 1.39 | 1.44* | 1.41 | 1.46 |
| 1982-86 | 1.25* | 1.23 | 1.27 | 1.19* | 1.16 | 1.22 | 1.30* | 1.27 | 1.33 | 1.31* | 1.24 | 1.38 | 1.43* | 1.40 | 1.45 |
| 1983-87 | 1.25* | 1.24 | 1.27 | 1.15* | 1.12 | 1.18 | 1.35* | 1.32 | 1.37 | 1.24* | 1.17 | 1.31 | 1.46* | 1.43 | 1.48 |
| 1984-88 | 1.31* | 1.29 | 1.33 | 1.20* | 1.18 | 1.23 | 1.41* | 1.38 | 1.43 | 1.24* | 1.17 | 1.31 | 1.45* | 1.42 | 1.47 |
| 1985-89 | 1.32* | 1.30 | 1.34 | 1.23* | 1.20 | 1.25 | 1.42* | 1.39 | 1.44 | 1.29* | 1.22 | 1.35 | 1.49* | 1.46 | 1.52 |
| 1986-90 | 1.34* | 1.32 | 1.36 | 1.25* | 1.22 | 1.28 | 1.44* | 1.42 | 1.47 | 1.31* | 1.24 | 1.37 | 1.51* | 1.48 | 1.53 |
| 1987-91 | 1.34* | 1.32 | 1.36 | 1.24* | 1.22 | 1.27 | 1.45* | 1.43 | 1.48 | 1.32* | 1.25 | 1.38 | 1.54* | 1.52 | 1.57 |
| 1988-92 | 1.39* | 1.37 | 1.40 | 1.30* | 1.27 | 1.33 | 1.49* | 1.46 | 1.51 | 1.36* | 1.29 | 1.42 | 1.55* | 1.53 | 1.58 |
| 1989-93 | 1.39* | 1.37 | 1.41 | 1.31* | 1.28 | 1.34 | 1.49* | 1.47 | 1.52 | 1.36* | 1.30 | 1.43 | 1.55* | 1.53 | 1.58 |
| 1990-94 | 1.40* | 1.39 | 1.42 | 1.32* | 1.30 | 1.35 | 1.52* | 1.49 | 1.54 | 1.35* | 1.29 | 1.42 | 1.55* | 1.53 | 1.58 |
| 1991-95 | 1.38* | 1.36 | 1.40 | 1.30* | 1.27 | 1.33 | 1.48* | 1.45 | 1.50 | 1.35* | 1.28 | 1.41 | 1.53* | 1.51 | 1.56 |
| 1992-96 | 1.44* | 1.43 | 1.46 | 1.38* | 1.35 | 1.41 | 1.53* | 1.51 | 1.56 | 1.34* | 1.28 | 1.41 | 1.49* | 1.47 | 1.52 |
| 1993-97 | 1.47* | 1.45 | 1.49 | 1.40* | 1.37 | 1.43 | 1.55* | 1.53 | 1.58 | 1.34* | 1.27 | 1.40 | 1.48* | 1.45 | 1.51 |
| 1994-98 | 1.50* | 1.48 | 1.52 | 1.44* | 1.42 | 1.47 | 1.57* | 1.54 | 1.60 | 1.37* | 1.30 | 1.43 | 1.49* | 1.46 | 1.51 |

**Rectum and Rectosigmoid Junction**

| | Blacks to Whites | | | | | | | | | Males to Females | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Both Sexes | | | Males | | | Females | | | Blacks | | | Whites | | |
| Years | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI | RR | LCI | UCI |
| 1979-83 | 0.87* | 0.83 | 0.91 | 0.81* | 0.75 | 0.86 | 0.93* | 0.87 | 0.99 | 1.61* | 1.41 | 1.81 | 1.84* | 1.78 | 1.90 |
| 1980-84 | 0.88* | 0.84 | 0.92 | 0.85* | 0.79 | 0.90 | 0.91* | 0.85 | 0.97 | 1.77* | 1.56 | 1.98 | 1.89* | 1.83 | 1.96 |
| 1981-85 | 0.93* | 0.88 | 0.97 | 0.89* | 0.83 | 0.95 | 0.96 | 0.89 | 1.02 | 1.64* | 1.44 | 1.84 | 1.77* | 1.71 | 1.83 |
| 1982-86 | 0.96 | 0.92 | 1.00 | 0.88* | 0.82 | 0.94 | 1.05 | 0.98 | 1.11 | 1.58* | 1.38 | 1.77 | 1.88* | 1.82 | 1.94 |
| 1983-87 | 1.01 | 0.97 | 1.06 | 0.90* | 0.84 | 0.96 | 1.13* | 1.07 | 1.20 | 1.44* | 1.25 | 1.63 | 1.82* | 1.76 | 1.88 |
| 1984-88 | 1.07* | 1.02 | 1.11 | 0.97 | 0.91 | 1.04 | 1.17* | 1.10 | 1.23 | 1.55* | 1.37 | 1.74 | 1.86* | 1.79 | 1.93 |
| 1985-89 | 1.12* | 1.08 | 1.17 | 1.08* | 1.02 | 1.14 | 1.17* | 1.10 | 1.24 | 1.67* | 1.48 | 1.86 | 1.81* | 1.74 | 1.88 |
| 1986-90 | 1.24* | 1.19 | 1.28 | 1.24* | 1.18 | 1.30 | 1.26* | 1.19 | 1.33 | 1.86* | 1.67 | 2.05 | 1.89* | 1.82 | 1.96 |
| 1987-91 | 1.39* | 1.35 | 1.44 | 1.45* | 1.38 | 1.51 | 1.36* | 1.29 | 1.43 | 1.93* | 1.74 | 2.11 | 1.81* | 1.74 | 1.89 |
| 1988-92 | 1.42* | 1.37 | 1.47 | 1.40* | 1.33 | 1.47 | 1.48* | 1.41 | 1.56 | 1.84* | 1.66 | 2.02 | 1.95* | 1.87 | 2.02 |
| 1989-93 | 1.43* | 1.39 | 1.48 | 1.37* | 1.30 | 1.43 | 1.58* | 1.51 | 1.65 | 1.64* | 1.47 | 1.81 | 1.89* | 1.82 | 1.97 |
| 1990-94 | 1.38* | 1.33 | 1.43 | 1.26* | 1.19 | 1.33 | 1.57* | 1.49 | 1.64 | 1.49* | 1.32 | 1.66 | 1.85* | 1.78 | 1.93 |
| 1991-95 | 1.33* | 1.28 | 1.37 | 1.25* | 1.18 | 1.31 | 1.48* | 1.40 | 1.55 | 1.63* | 1.45 | 1.81 | 1.93* | 1.85 | 2.00 |
| 1992-96 | 1.19* | 1.14 | 1.24 | 1.11* | 1.04 | 1.17 | 1.31* | 1.24 | 1.39 | 1.62* | 1.43 | 1.80 | 1.92* | 1.84 | 1.99 |
| 1993-97 | 1.19* | 1.14 | 1.24 | 1.15* | 1.08 | 1.22 | 1.26* | 1.19 | 1.33 | 1.67* | 1.47 | 1.86 | 1.82* | 1.75 | 1.89 |
| 1994-98 | 1.16* | 1.11 | 1.20 | 1.13* | 1.06 | 1.19 | 1.20* | 1.12 | 1.27 | 1.76* | 1.56 | 1.95 | 1.87* | 1.80 | 1.94 |

Rates used for rate ratios are deaths per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rate ratios.
* Rate ratio is significantly different from 1.0 ($p<0.05$).
Source: Illinois Department of Public Health, Death Master Files, 1979-1998

**What age-specific colorectal cancer incidence and mortality patterns appear between Illinois' blacks and whites?**

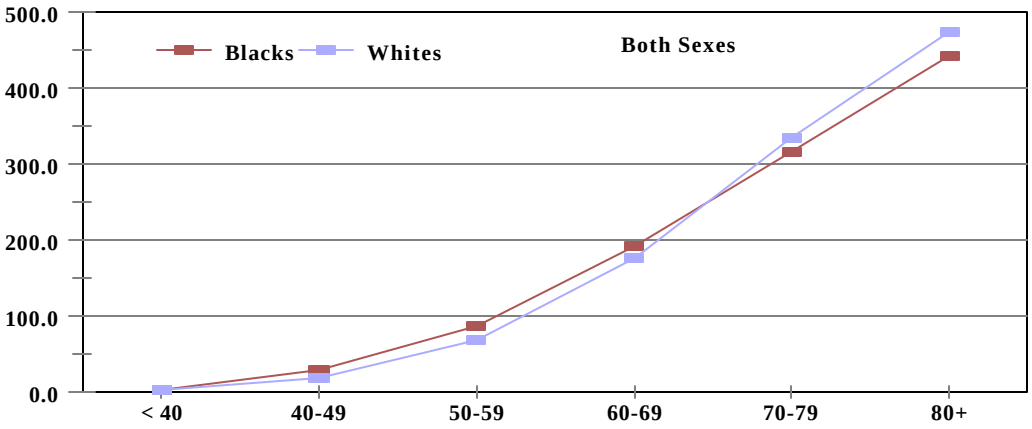
Figures 10, 11 and 12 contain graphs that display average annual age-specific cancer incidence rates of blacks and whites for colon and rectum sites during 1986 to 1997. It is important to note that combined colon and rectum cancer incidence is higher for blacks than whites in younger age groups until a cross over takes place around 60 to 69 years for males and 70 to 79 years of age for females (Figure 10). For colon excluding rectum, the crossover appears at 70 to 79 years for all gender classifications (Figure 11). This pattern is not apparent for cancers diagnosed in the rectum and rectosigmoid junction. As shown in Figure 12, age-specific rates for rectum and rectosigmoid junction are very similar between blacks and whites for age groups, < 40, 40-49 and 50-59. From age 50 years, rectal cancer incidence begins to steeply rise for both race groups but to a much greater extent among whites, both males and females.

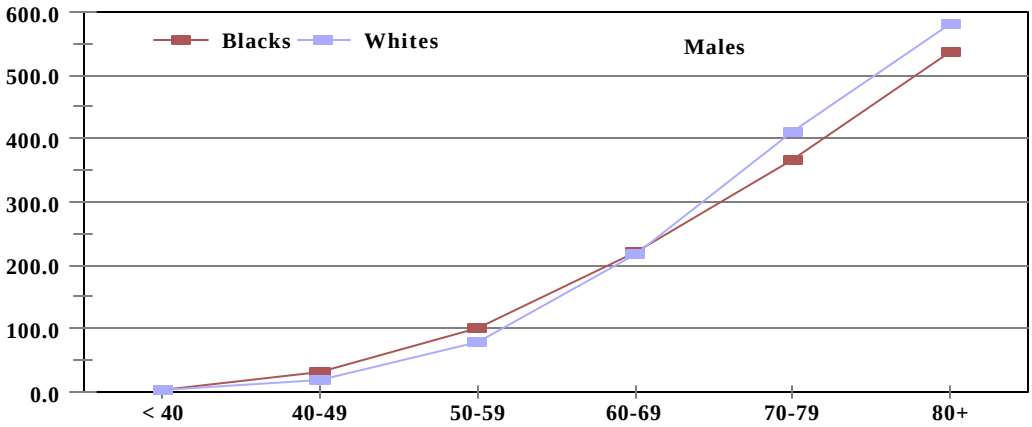
Trend analyses of age-specific cancer incidence rates and overall black/white comparisons for the three colorectal sites during 1986 to 1997 are summarized in tables 6, 7 and 8. For colon and rectum (Table 6), statistically significant increases were only observed for whites, both sexes and males in the less than 40 years of age group and black males 60 to 69 years of age. Significant decreases were observed for whites, both sexes, age groups 50-59, 60-69, 70-79 and 80+; white males, age groups 50-59, 70-79 and 80+; white females, age group 60-69; and black females, age group 50-59. Joinpoint analyses suggested subtrends for whites, both sexes, age group 40-49; blacks, both sexes, age group 70-79; and black males, age group 60-69. However, none of the subtrends were found to be statistically significant.

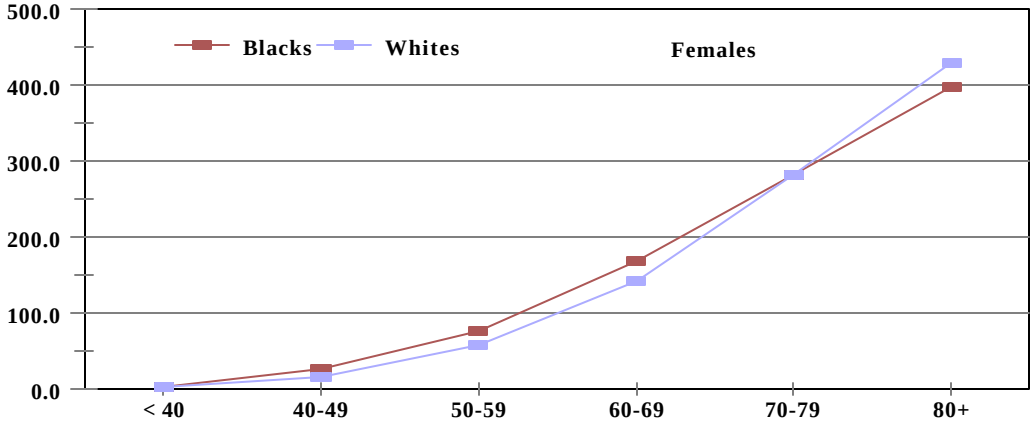
For colon excluding rectum (Table 7), the only statistically significant increase in cancer incidence rates was observed for 60- to 69-year-old black males of the magnitude of 2.74 percent per year over 1986 to 1997. Declines were significant among only whites, both sexes, age groups 50-59, 60-69, and 70-79 years. Black females, ages 50 to 59 years, showed significant decreases in cancer incidence of colon excluding rectum over 1986 to 1997. Subtrends were detected through joinpoint analyses for whites, both sexes, age group 40-49; blacks, both sexes, age group 50-59; blacks, both sexes, age group 70-79; and black males, age group 60-69. The subtrends were only significant for blacks, both sexes, 50 to 59 years of age, where a statistically significant decline of 7.57 percent per year was demonstrated over 1986 to 1989 and then a significant increase of 1.86 percent per year occurred from 1989 to 1997.

Table 8 shows that for rectum and rectosigmoid junction significant increases over 1986 to 1997 were observed for whites, both sexes, who were less than 40 years or 40 to 49 years of age, 40 to 49 year old white males, and white females ages less than 40 years. Decreases were significant for whites, both sexes, age groups 60-69, 70-79, and 80+; white males ages 70 to 79 years; and white females ages 60 to 69 years. None of the EAPCs for the black, age-sex-race groups were statistically significant and joinpoint analyses did not detect any subtrends over 1986 to 1997.

**Figure 10.**
**Average Annual Age-specific Cancer Incidence Rates for Blacks and Whites by Sex**
**Colon and Rectum, Illinois, 1986-1997**

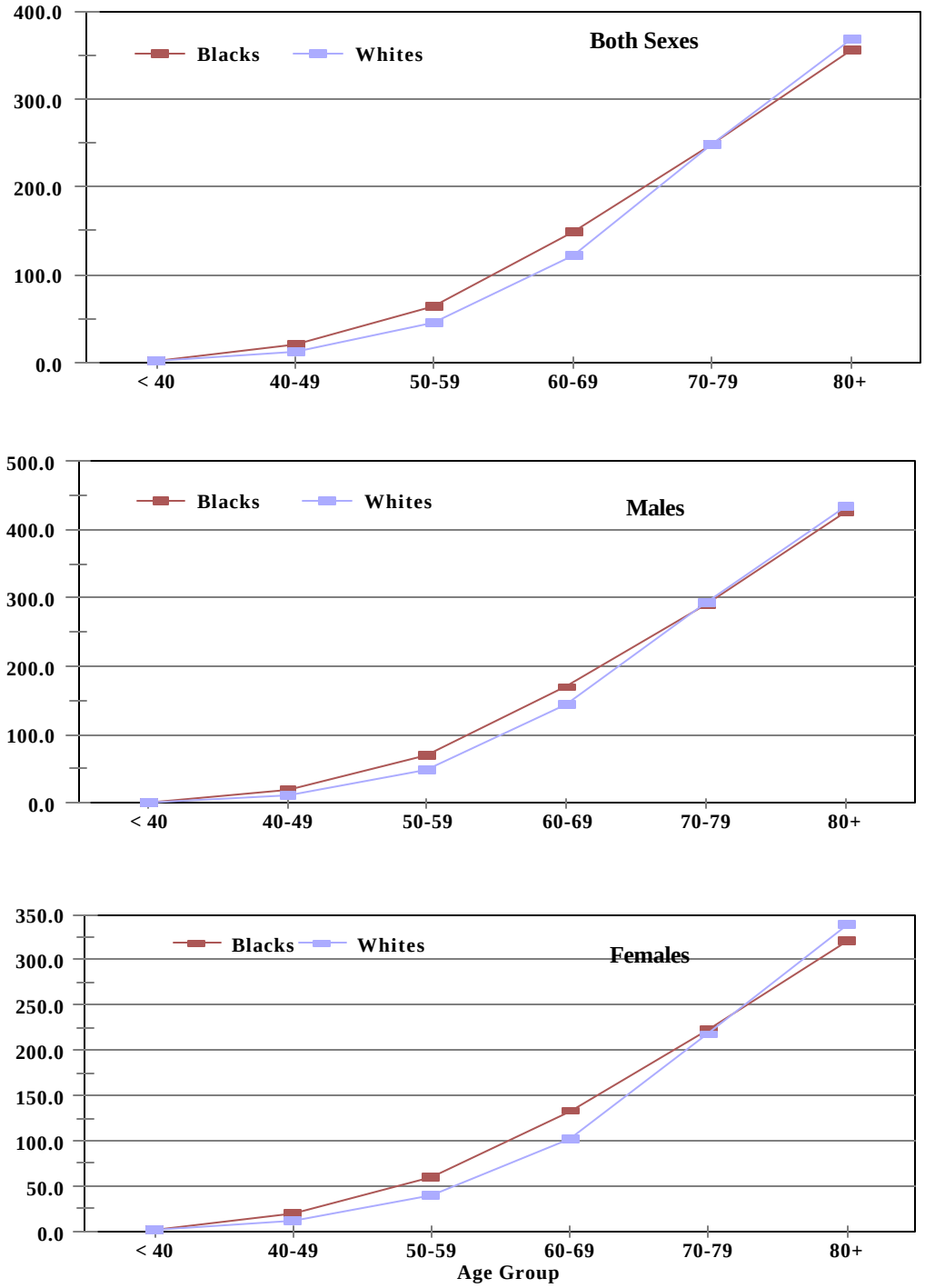


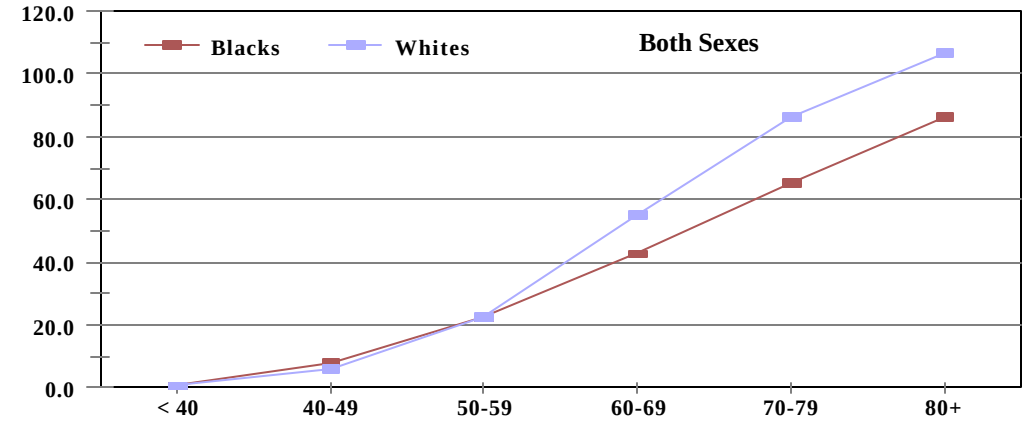

Average annual age-specific rates are per 100,000.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

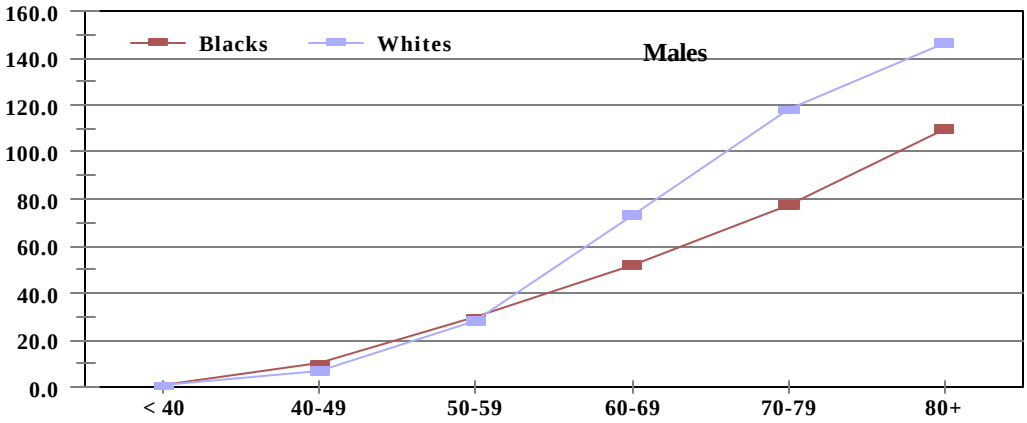
**Figure 11.**
**Average Annual Age-specific Cancer Incidence Rates for Blacks and Whites by Sex**
**Colon excluding Rectum, Illinois, 1986-1997**

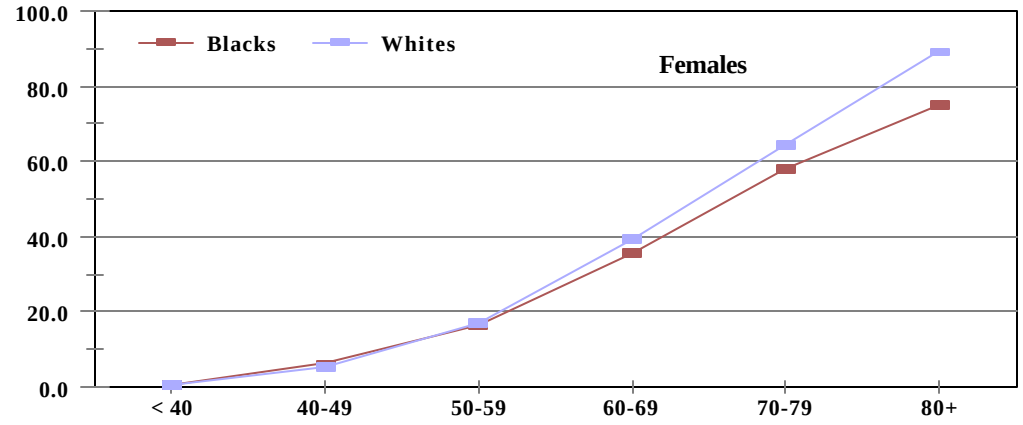



Average annual age-specific rates are per 100,000.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Figure 12.**
**Average Annual Age-specific Cancer Incidence Rates for Blacks and Whites by Sex**
**Rectum and Rectosigmoid Junction, Illinois, 1986-1997**




Average annual age-specific rates are per 100,000.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 6.**
**Age-specific Cancer Incidence, Average Annual Rates and Trends, Colon and Rectum, Blacks and Whites by Sex, Illinois, 1986-1997**

| | | 1986-1997 | | | | | Trend 1 | | Trend 2 | | Trend 3 | | Trend 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age Group | Sex/Race | Count | ASR | LCI | UCI | EAPC | Range of Years | EAPC | Range of Years | EAPC | Range of Years | EAPC | Range of Years | EAPC |
| | **Both Sexes** | | | | | | | | | | | | | |
| < 40 | Blacks | 228 | 1.6 | 1.4 | 1.8 | 0.24 | | | | | | | | |
| | Whites | 1,054 | 1.6 | 1.5 | 1.6 | 1.68# | | | | | | | | |
| 40-49 | Blacks | 678 | 28.1* | 26.0 | 30.3 | -0.29 | | | | | | | | |
| | Whites | 2,694 | 17.8 | 17.2 | 18.5 | 0.27 | 1985-94 | -0.93 | 1994-97 | 4.94 | | | | |
| 50-59 | Blacks | 1,450 | 87.0* | 82.6 | 91.6 | -0.51 | | | | | | | | |
| | Whites | 7,288 | 67.5 | 65.9 | 69.0 | -1.27# | | | | | | | | |
| 60-69 | Blacks | 2,459 | 191.6* | 184.1 | 199.3 | 0.37 | | | | | | | | |
| | Whites | 16,870 | 176.6 | 174.0 | 179.3 | -0.77# | | | | | | | | |
| 70-79 | Blacks | 2,315 | 314.7 | 302.0 | 327.8 | 1.23 | 1986-88 | 12.37 | 1988-91 | -8.86 | 1991-95 | 8.70 | 1995-97 | -6.92 |
| | Whites | 23,817 | 334.6* | 330.3 | 338.9 | -0.97# | | | | | | | | |
| 80+ | Blacks | 1,429 | 442.0 | 419.3 | 465.5 | 1.77 | | | | | | | | |
| | Whites | 17,958 | 474.5 | 467.6 | 481.5 | -0.57# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| < 40 | Blacks | 107 | 1.5 | 1.2 | 1.8 | -0.71 | | | | | | | | |
| | Whites | 546 | 1.6 | 1.4 | 1.7 | 1.95# | | | | | | | | |
| 40-49 | Blacks | 323 | 30.2* | 27.0 | 33.7 | -0.58 | | | | | | | | |
| | Whites | 1,445 | 19.2 | 18.3 | 20.3 | 0.75 | | | | | | | | |
| 50-59 | Blacks | 728 | 99.8* | 92.6 | 107.3 | 1.16 | | | | | | | | |
| | Whites | 4,117 | 78.0 | 75.6 | 80.4 | -1.36# | | | | | | | | |
| 60-69 | Blacks | 1,223 | 221.8 | 209.5 | 234.6 | 1.89# | 1986-88 | 13.31 | 1988-95 | -0.65 | 1995-97 | 9.94 | | |
| | Whites | 9,605 | 217.0 | 212.7 | 221.4 | -0.67 | | | | | | | | |
| 70-79 | Blacks | 1,065 | 367.1 | 345.4 | 389.8 | 0.36 | | | | | | | | |
| | Whites | 11,912 | 411.1* | 403.7 | 418.5 | -1.71# | | | | | | | | |
| 80+ | Blacks | 561 | 536.8 | 493.3 | 583.1 | -0.21 | | | | | | | | |
| | Whites | 6,702 | 581.4 | 567.6 | 595.5 | -0.70# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| < 40 | Blacks | 121 | 1.6 | 1.3 | 1.9 | 1.39 | | | | | | | | |
| | Whites | 508 | 1.5 | 1.4 | 1.7 | 1.47 | | | | | | | | |
| 40-49 | Blacks | 355 | 26.4* | 23.7 | 29.3 | -0.09 | | | | | | | | |
| | Whites | 1,249 | 16.4 | 15.6 | 17.4 | -0.27 | | | | | | | | |
| 50-59 | Blacks | 722 | 77.0* | 71.5 | 82.9 | -2.14# | | | | | | | | |
| | Whites | 3,171 | 57.4 | 55.4 | 59.4 | -1.2 | | | | | | | | |
| 60-69 | Blacks | 1,236 | 168.8* | 159.5 | 178.5 | -0.98 | | | | | | | | |
| | Whites | 7,265 | 141.8 | 138.5 | 145.1 | -1.02# | | | | | | | | |
| 70-79 | Blacks | 1,250 | 280.5 | 265.2 | 296.5 | 1.83 | | | | | | | | |
| | Whites | 11,905 | 282.1 | 277.0 | 287.2 | -0.41 | | | | | | | | |
| 80+ | Blacks | 868 | 396.7 | 370.7 | 424.0 | 2.9 | | | | | | | | |
| | Whites | 11,256 | 427.6 | 419.8 | 435.6 | -0.56 | | | | | | | | |

Average annual age-specific rates (ASR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
# EAPC is statistically different from zero ($p<0.05$).
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 7.**
**Age-specific Cancer Incidence, Average Annual Rates and Trends, Colon excluding Rectum, Blacks and Whites by Sex, Illinois, 1986-1997**

| | | 1986-1997 | | | | | Trend 1 | | Trend 2 | | Trend 3 | | Trend 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age Group | Sex/Race | Count | ASR | LCI | UCI | EAPC | Range of Years | EAPC | Range of Years | EAPC | Range of Years | EAPC | Range of Years | EAPC |
| | **Both Sexes** | | | | | | | | | | | | | |
| < 40 | Blacks | 153 | 1.0 | 0.9 | 1.2 | -0.30 | | | | | | | | |
| | Whites | 695 | 1.0 | 1.0 | 1.1 | 0.65 | | | | | | | | |
| 40-49 | Blacks | 490 | 20.3* | 18.5 | 22.2 | -0.70 | | | | | | | | |
| | Whites | 1,783 | 11.8 | 11.3 | 12.4 | -0.85 | 1986-88 | -10.09 | 1988-97 | -0.34 | | | | |
| 50-59 | Blacks | 1,079 | 64.7* | 60.9 | 68.7 | -0.10 | 1986-89 | -7.57# | 1989-97 | 1.86# | | | | |
| | Whites | 4,856 | 45.0 | 43.7 | 46.2 | -1.39# | | | | | | | | |
| 60-69 | Blacks | 1,911 | 148.9* | 142.3 | 155.7 | 0.61 | | | | | | | | |
| | Whites | 11,604 | 121.5 | 119.3 | 123.7 | -0.71# | | | | | | | | |
| 70-79 | Blacks | 1,833 | 249.2 | 237.9 | 260.8 | 1.27 | 1986-88 | 16.74 | 1988-91 | -10.95 | 1991-95 | 9.64 | 1995-97 | -7.36 |
| | Whites | 17,682 | 248.4 | 244.8 | 252.1 | -0.79# | | | | | | | | |
| 80+ | Blacks | 1,150 | 355.7 | 335.4 | 376.8 | 1.77 | | | | | | | | |
| | Whites | 13,919 | 367.8 | 361.7 | 373.9 | -0.41 | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| < 40 | Blacks | 73 | 1.0 | 0.8 | 1.3 | -0.98 | | | | | | | | |
| | Whites | 352 | 1.0 | 0.9 | 1.1 | 1.52 | | | | | | | | |
| 40-49 | Blacks | 218 | 20.4* | 17.8 | 23.3 | -1.18 | | | | | | | | |
| | Whites | 938 | 12.5 | 11.7 | 13.3 | -0.70 | | | | | | | | |
| 50-59 | Blacks | 512 | 70.2* | 64.2 | 76.5 | 2.50 | | | | | | | | |
| | Whites | 2,623 | 49.7 | 47.8 | 51.6 | -1.58# | | | | | | | | |
| 60-69 | Blacks | 937 | 169.9* | 159.2 | 181.2 | 2.74# | 1986-88 | 15.29 | 1988-97 | 1.35 | | | | |
| | Whites | 6,366 | 143.8 | 140.3 | 147.4 | -0.89# | | | | | | | | |
| 70-79 | Blacks | 841 | 289.9 | 270.6 | 310.2 | -0.06 | | | | | | | | |
| | Whites | 8,494 | 293.1 | 286.9 | 299.4 | -1.64# | | | | | | | | |
| 80+ | Blacks | 446 | 426.7 | 388.0 | 468.2 | -0.15 | | | | | | | | |
| | Whites | 5,011 | 434.7 | 422.7 | 446.9 | -0.55 | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| < 40 | Blacks | 80 | 1.1 | 0.8 | 1.3 | 0.09 | | | | | | | | |
| | Whites | 343 | 1.0 | 0.9 | 1.1 | -0.17 | | | | | | | | |
| 40-49 | Blacks | 272 | 20.2 | 17.9 | 22.8 | 0.10 | | | | | | | | |
| | Whites | 845 | 11.1 | 10.4 | 11.9 | -1.04 | | | | | | | | |
| 50-59 | Blacks | 567 | 60.5 | 55.6 | 65.7 | -2.34# | | | | | | | | |
| | Whites | 2,233 | 40.4 | 38.8 | 42.1 | -1.20 | | | | | | | | |
| 60-69 | Blacks | 974 | 133.0 | 124.8 | 141.6 | -1.20 | | | | | | | | |
| | Whites | 5,238 | 102.2 | 99.5 | 105.0 | -0.57 | | | | | | | | |
| 70-79 | Blacks | 992 | 222.6 | 209.0 | 236.9 | 2.25 | | | | | | | | |
| | Whites | 9,188 | 217.7 | 213.3 | 222.2 | -0.14 | | | | | | | | |
| 80+ | Blacks | 704 | 321.7 | 298.4 | 346.4 | 2.85 | | | | | | | | |
| | Whites | 8,908 | 338.4 | 331.4 | 345.6 | -0.38 | | | | | | | | |

Average annual age-specific rates (ASR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$). # EAPC is statistically different from zero ($p<.05$).
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 8.**
**Age-specific Cancer Incidence, Average Annual Rates and Trends**
**Rectum and Rectosigmoid Junction, Blacks and Whites by Sex, Illinois, 1986-1997**

| | | 1986-1997 | | | | |
|---|---|---|---|---|---|---|
| **Age Group** | **Sex/Race** | **Count** | **ASR** | **LCI** | **UCI** | **EAPC** |
| | **Both Sexes** | | | | | |
| < 40 | Blacks | 75 | 0.5 | 0.4 | 0.6 | 4.67 |
| | Whites | 359 | 0.5 | 0.5 | 0.6 | 3.64# |
| 40-49 | Blacks | 188 | 7.8 | 6.7 | 9.0 | 0.81 |
| | Whites | 911 | 6.0 | 5.6 | 6.4 | 2.56# |
| 50-59 | Blacks | 371 | 22.3 | 20.0 | 24.6 | -1.64 |
| | Whites | 2,432 | 22.5 | 21.6 | 23.4 | -1.02 |
| 60-69 | Blacks | 548 | 42.7 | 39.2 | 46.4 | -0.49 |
| | Whites | 5,266 | 55.1* | 53.7 | 56.6 | -0.92# |
| 70-79 | Blacks | 482 | 65.5 | 59.8 | 71.6 | 1.29 |
| | Whites | 6,135 | 86.2* | 84.0 | 88.4 | -1.46# |
| 80+ | Blacks | 279 | 86.3 | 76.5 | 97.0 | 1.13 |
| | Whites | 4,039 | 106.7* | 103.4 | 110.1 | -1.12# |
| | **Males** | | | | | |
| < 40 | Blacks | 34 | 0.5 | 0.3 | 0.7 | 1.38 |
| | Whites | 194 | 0.6 | 0.5 | 0.6 | 2.50 |
| 40-49 | Blacks | 105 | 9.8* | 8.0 | 11.9 | -1.82 |
| | Whites | 507 | 6.8 | 6.2 | 7.4 | 3.52# |
| 50-59 | Blacks | 216 | 29.6 | 25.8 | 33.8 | -0.70 |
| | Whites | 1,494 | 28.3 | 26.9 | 29.8 | -0.98 |
| 60-69 | Blacks | 286 | 51.9 | 46.0 | 58.2 | 2.28 |
| | Whites | 3,239 | 73.2* | 70.7 | 75.8 | -0.25 |
| 70-79 | Blacks | 224 | 77.2 | 67.4 | 88.0 | -1.96 |
| | Whites | 3,418 | 118.0* | 114.0 | 122.0 | -1.86# |
| 80+ | Blacks | 115 | 110.0 | 90.8 | 132.1 | 2.50 |
| | Whites | 1,691 | 146.7* | 139.8 | 153.8 | -1.10 |
| | **Females** | | | | | |
| < 40 | Blacks | 41 | 0.6 | 0.4 | 0.7 | 7.16 |
| | Whites | 165 | 0.5 | 0.4 | 0.6 | 5.17# |
| 40-49 | Blacks | 83 | 6.2 | 4.9 | 7.6 | 0.03 |
| | Whites | 404 | 5.3 | 4.8 | 5.9 | 1.43 |
| 50-59 | Blacks | 155 | 16.5 | 14.0 | 19.4 | -1.38 |
| | Whites | 938 | 17.0 | 15.9 | 18.1 | -1.20 |
| 60-69 | Blacks | 262 | 35.8 | 31.6 | 40.4 | -0.16 |
| | Whites | 2,027 | 39.6 | 37.8 | 41.3 | -2.20# |
| 70-79 | Blacks | 258 | 57.9 | 51.0 | 65.4 | 0.41 |
| | Whites | 2,717 | 64.4 | 62.0 | 66.8 | -1.28 |
| 80+ | Blacks | 164 | 75.0 | 63.9 | 87.3 | 2.74 |
| | Whites | 2,348 | 89.2 | 85.6 | 92.9 | -1.26 |

Average annual age-specific rates (ASR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population. Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$). # EAPC is statistically different from zero ($p<.05$).

SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

When examining colon and rectum incidence differences in Table 6, black/white comparisons of average annual age-specific rates for 1986 to 1997 showed significantly higher rates for blacks than whites for both sexes, age groups 40-49, 50-59, and 60-69; males, age groups 40-49 and 50-59; and females, age groups 40-49, 50-59, and 60-69. Only whites, both sexes, and white males in the 70 to 79 year age group had higher age-specific cancer incidence from colon and rectum than their black counterparts. As shown in Table 7 for colon excluding rectum, black Illinoisans had significantly higher age-specific rates than whites for both sexes and males, age groups 40-49, 50-59, and 60-69. No other age-sex-race group comparisons for colon excluding rectum were significantly different. Only whites showed significantly higher age-specific incidence rates for rectum and rectosigmoid cancers. As shown in Table 8, whites had significantly greater rates than blacks for both sexes, age groups 60-69, 70-79, and 80+, and for males, age groups 40-49, 60-69, 70-79, and 80+. No significant differences were observed between black and white females in age-specific rectal cancer incidence rates.

Figures 13, 14 and 15 show average annual age-specific cancer mortality rate patterns for blacks and whites for the three colorectal sites over 1979 to 1998. For colon and rectum (Figure 13) and colon excluding rectum (Figure 14), higher age-specific mortality rates are observed for blacks than whites in every age group category. Such age-specific mortality rate differences are less obvious for rectum and rectosigmoid junction (Figure 15). However, black age-specific mortality rates still exceed those for whites with the exceptions of the age-group 70-79 for both sexes, and age groups 70-79 and 80+ years for males where rates are slightly greater for whites than blacks.

Summaries of EAPC trend analysis on age-specific cancer mortality rates are presented in tables 9, 10 and 11 for the three colorectal sites. No statistically significant age-specific mortality rate increases were observed for any age-sex-race group over 1979 to 1998. In contrast, significant decreases were observed for colon and rectum among whites, both sexes, males and females for age groups 40-49, 50-59, 60-69, 70-79, and 80+ (Table 9). For colon excluding rectum (Table 10), significant decreases were observed for whites, both sexes, age groups 40-49, 50-59, 60-69, 70-79, and 80+; white males, age groups 50-59, 60-69, and 70-79; and white females, age groups 50-59, 60-69, 70-79, and 80+. Table 11 shows significant age-specific mortality rate declines for rectum and rectosigmoid junction for whites, both sexes, age groups 40-49, 50-59, 60-69, 70-79, and 80+; and for white males and females, age groups 50-59, 60-69, 70-79, and 80+. The only black group showing a significant age-specific mortality rate trend decline for rectum and rectosigmoid junction was black males, ages 80 years or greater.

For colon and rectum (Table 9), joinpoints were detected for whites, both sexes, age groups 70-79 and 80+; white males, age groups 50-59, 70-79, and 80+; and white females, age group 70-79. For whites, both sexes, age group 70-79, a significant decline in age-specific death rate of 2.77 percent per year was observed from 1985 through 1998. Whites, both sexes, age group 80+, showed two significant subtrend decreases over 1979 to 1998. From 1979 to 1995, a 0.85 percent decrease per year was observed. Then, the decline accelerated to 4.05 percent per year from 1995 to 1998. For white males, age group 50-59, a significant decrease in mortality rate of 5.14 percent per year was observed from 1990 through 1998. Among white males, age group 70-79, the decline occurred from

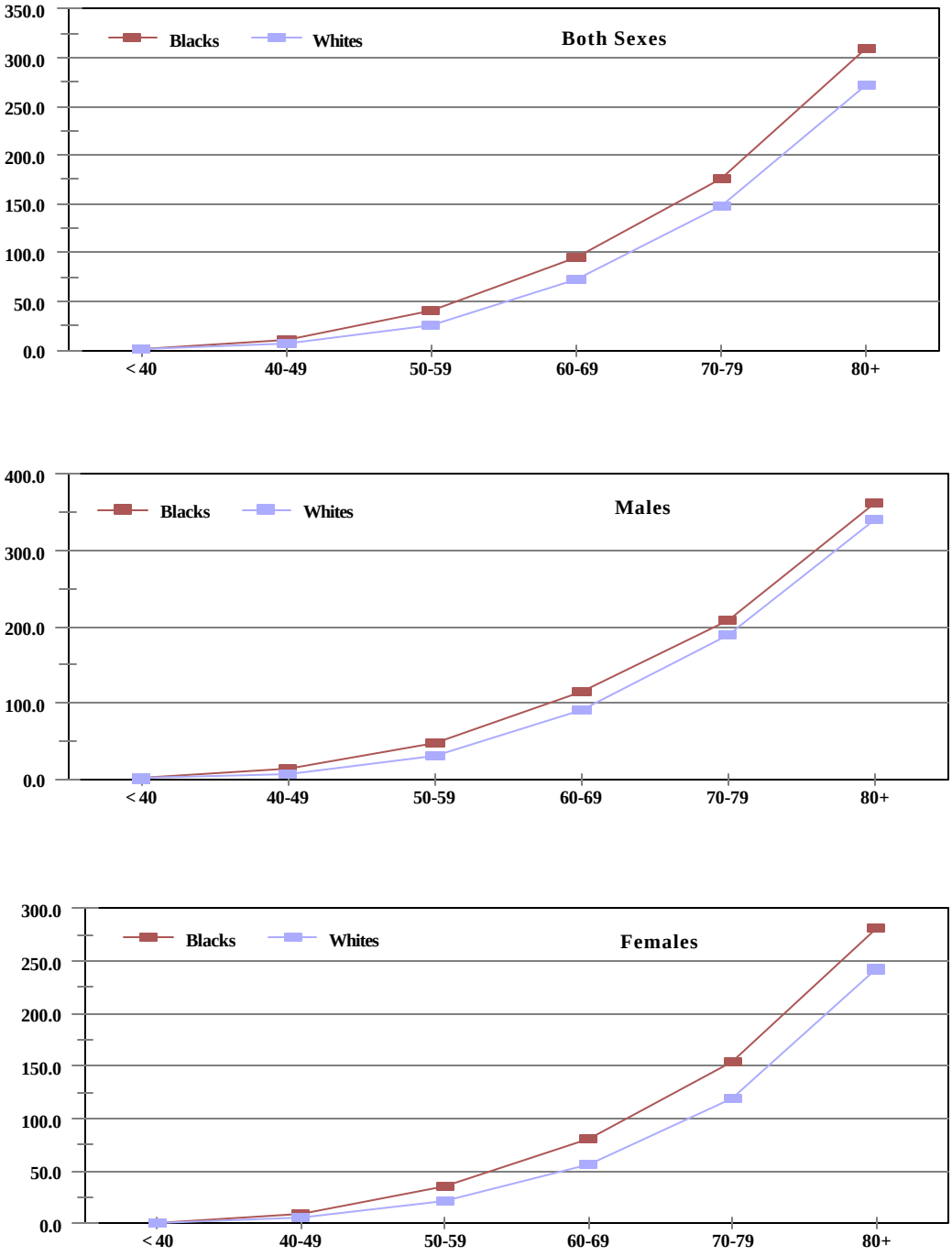
1981 to 1998 and was of the magnitude of 2.52 percent per year. For white males, age group 80+, a significant mortality rate decline of 2.66 percent per year was seen during 1989 to 1998. Finally, white females, age group 70-79, were observed to have an average annual decline of 2.02 percent over 1979 through 1995.

As shown in Table 10, joinpoints were observed for age-specific mortality from colon excluding rectum only among whites and in the same age-sex groups as were observed for colon and rectum. Significant subtrend declines were observed as follows: whites, both sexes, age group 70-79, 2.67 percent per year for years 1985-1998; whites, both sexes, age group 80+, 1.82 percent per year for years 1988-1998; white males, age group 50-59, 7.07 percent per year for years 1991-1998; white males, age group 60-69, 2.82 percent per year for years 1985-1998. Two significant subtrends were seen among white males, age group 80+, and also for white females, age group 70-79. For white males, age group 80+, age-specific cancer mortality from colon excluding rectum significantly increased 1.74 percent per year from 1979 to 1989 and then declined significantly by 3.08 percent per year from 1989 to 1998. Among white females in the 70-79 age group, an annual age-specific mortality decline of 1.66 percent was observed from 1979 to 1995 and then accelerated to 7.62 percent per year over 1995 to 1998.

For trends in age-specific mortality from cancers of the rectum and rectosigmoid junction, changes were detected for whites, both sexes, age group 80+, and for white males, age groups 50-59 and 80+ (Table 11). A significant annual decline of 6.04 percent was observed from 1979 to 1988 for whites, both sexes, age group 80+. Two significant subtrends were apparent over 1979 to 1998 for white males, ages 50 to 59 years. The first subtrend was an increase of 29.49 percent per year for years 1979 to 1981. After a break from 1981 to 1984, a statistically significant decline was detected from 1984 to 1994 of 5.15 percent per year. For white males, age group 80+, a significant annual decrease of 6.85 percent per year in age-specific mortality was observed from 1979 to 1991.

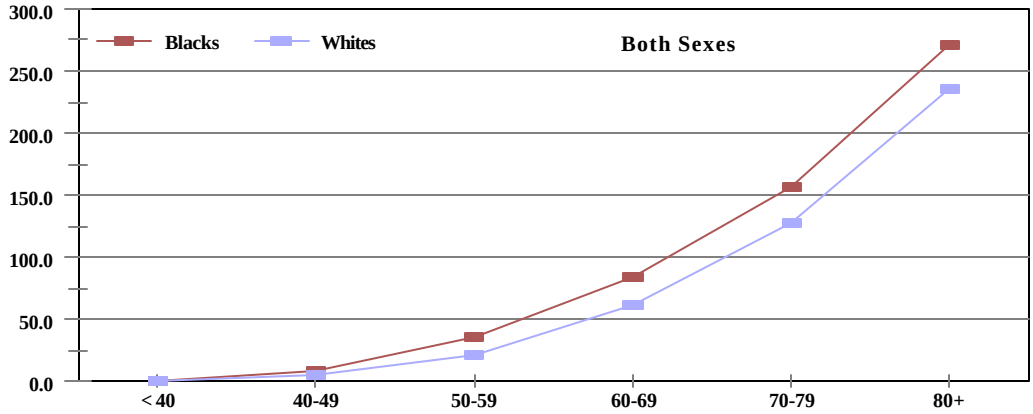
Average annual age-specific mortality rates for cancers of the colon and rectum were significantly higher for blacks than whites in all age-sex-race comparison groups with the exception of males, age group 80+, where the rate for blacks was higher than whites but the comparison was not statistically significant (Table 9). The black/white comparisons for colon excluding rectum in Table 10 revealed similar findings as those for colon and rectum except that the black/white difference for females less than 40 years was not statistically significant. Only the black/white comparisons for both sexes and males, age group 50-59, indicated significantly higher age-specific rectal cancer mortality rates for blacks than whites over 1979 to 1998
(Table 11).

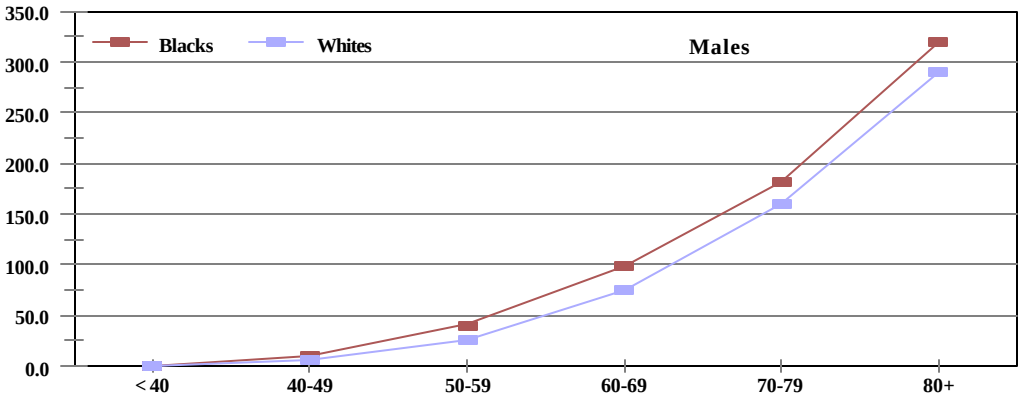
**Figure 13.**
**Average Annual Age-specific Cancer Mortality Rates for Blacks and Whites by Sex**
**Colon and Rectum, Illinois, 1979-1998**

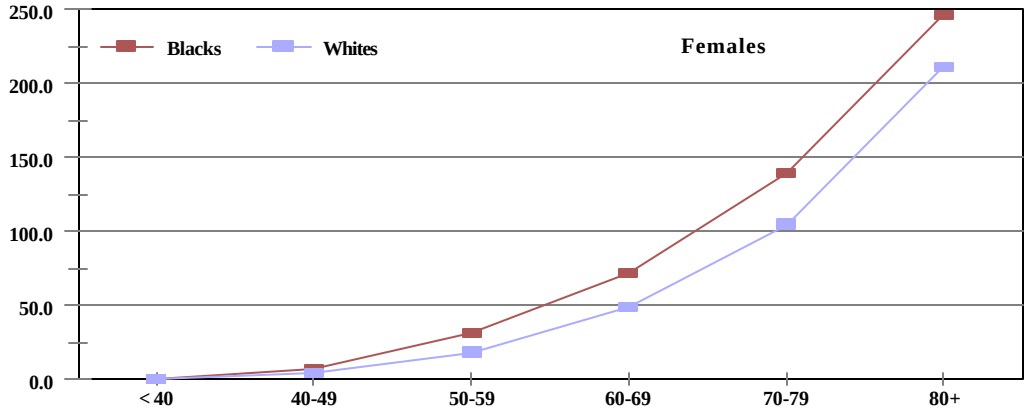



Average annual age-specific rates are per 100,000.
SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Figure 14.**
**Average Annual Age-specific Cancer Mortality Rates for Blacks and Whites by Sex**
**Colon excluding Rectum, Illinois, 1979-1998**

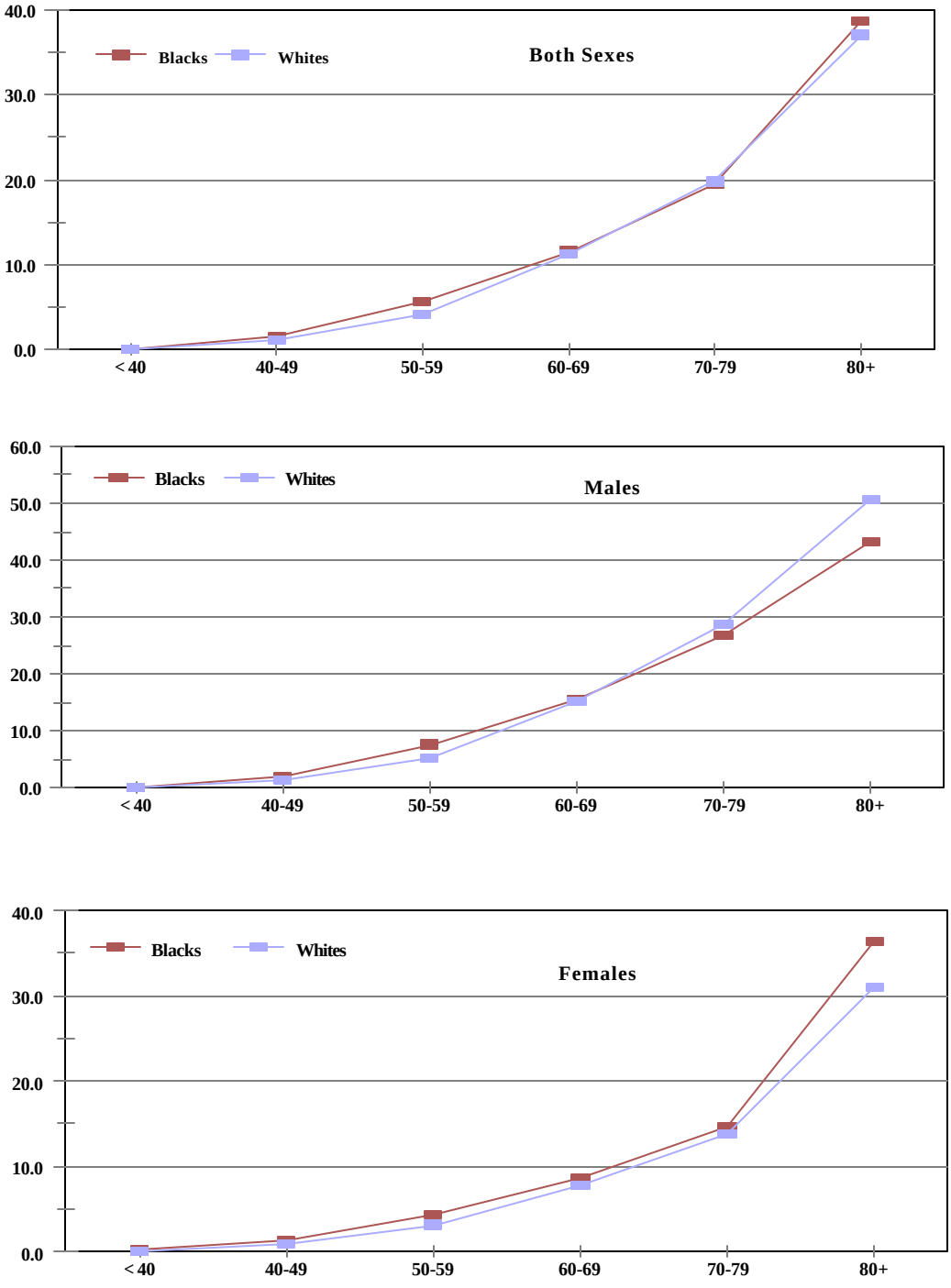



Average annual age-specific rates are per 100,000.
SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Figure 15.**
**Average Annual Age-specific Cancer Mortality Rates for Blacks and Whites by Sex**
**Rectum and Rectosigmoid Junction, Illinois, 1979-1998**




Average annual age-specific rates are per 100,000.
SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Table 9.**
**Age-specific Cancer Mortality, Average Annual Rates and Trends**
**Colon and Rectum, Blacks and Whites by Sex, Illinois, 1979-1998**

| | | 1979-1998 | | | | | Trend 1 | | Trend 2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age Group** | **Sex/Race** | **Count** | **ASR** | **LCI** | **UCI** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** |
| | **Both Sexes** | | | | | | | | | |
| < 40 | Blacks | 170 | 0.7* | 0.6 | 0.8 | 0.15 | | | | |
| | Whites | 524 | 0.5 | 0.4 | 0.5 | -0.61 | | | | |
| 40-49 | Blacks | 399 | 10.5* | 9.5 | 11.6 | -0.46 | | | | |
| | Whites | 1,439 | 6.1 | 5.8 | 6.4 | -1.75# | | | | |
| 50-59 | Blacks | 1,137 | 41.0* | 38.7 | 43.5 | -0.71 | | | | |
| | Whites | 4,861 | 25.9 | 25.2 | 26.6 | -2.63# | | | | |
| 60-69 | Blacks | 1,957 | 95.1* | 91.0 | 99.4 | 0.19 | | | | |
| | Whites | 11,741 | 72.3 | 71.0 | 73.6 | -1.89# | | | | |
| 70-79 | Blacks | 2,060 | 175.5* | 168.0 | 183.2 | 0.14 | | | | |
| | Whites | 16,829 | 147.1 | 144.9 | 149.3 | -2.20# | 1979-85 | -0.45 | 1985-98 | -2.77# |
| 80+ | Blacks | 1,526 | 309.0* | 293.7 | 324.9 | 0.30 | | | | |
| | Whites | 16,182 | 272.3 | 268.1 | 276.5 | -1.10# | 1979-95 | -0.85# | 1995-98 | -4.05# |
| | **Males** | | | | | | | | | |
| < 40 | Blacks | 86 | 0.7* | 0.6 | 0.9 | ~ | | | | |
| | Whites | 280 | 0.5 | 0.4 | 0.5 | 0.47 | | | | |
| 40-49 | Blacks | 210 | 12.5* | 10.9 | 14.3 | 0.07 | | | | |
| | Whites | 786 | 6.7 | 6.3 | 7.2 | -1.75# | | | | |
| 50-59 | Blacks | 585 | 47.8* | 44.0 | 51.8 | 0.19 | | | | |
| | Whites | 2,767 | 30.3 | 29.2 | 31.4 | -2.53# | 1979-90 | -0.89 | 1990-98 | -5.14# |
| 60-69 | Blacks | 1,017 | 114.4* | 107.5 | 121.7 | 0.40 | | | | |
| | Whites | 6,739 | 90.1 | 88.0 | 92.3 | -1.59# | | | | |
| 70-79 | Blacks | 966 | 207.9* | 195.0 | 221.4 | 0.55 | | | | |
| | Whites | 8,725 | 189.0 | 185.0 | 193.0 | -2.17# | 1979-81 | 6.46 | 1981-98 | -2.52# |
| 80+ | Blacks | 596 | 363.3 | 334.7 | 393.7 | -0.43 | | | | |
| | Whites | 6,193 | 340.6 | 332.2 | 349.2 | -1.14# | 1979-89 | 0.14 | 1989-98 | -2.66# |
| | **Females** | | | | | | | | | |
| < 40 | Blacks | 84 | 0.7* | 0.5 | 0.8 | ~ | | | | |
| | Whites | 244 | 0.4 | 0.4 | 0.5 | -1.65 | | | | |
| 40-49 | Blacks | 189 | 9.0* | 7.7 | 10.3 | -0.92 | | | | |
| | Whites | 653 | 5.5 | 5.1 | 6.0 | -1.73# | | | | |
| 50-59 | Blacks | 552 | 35.7* | 32.8 | 38.8 | -1.86 | | | | |
| | Whites | 2,094 | 21.8 | 20.8 | 22.7 | -2.81# | | | | |
| 60-69 | Blacks | 940 | 80.4* | 75.4 | 85.8 | 0.04 | | | | |
| | Whites | 5,002 | 57.1 | 55.6 | 58.7 | -2.39# | | | | |
| 70-79 | Blacks | 1,094 | 154.3* | 145.3 | 163.7 | -0.20 | | | | |
| | Whites | 8,104 | 118.7 | 116.2 | 121.4 | -2.40# | 1979-95 | -2.02# | 1995-98 | -6.69 |
| 80+ | Blacks | 930 | 282.0* | 264.2 | 300.7 | 0.82 | | | | |
| | Whites | 9,989 | 242.1 | 237.4 | 246.9 | -1.09# | | | | |

Average annual age-specific rates (ASR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
# EAPC is statistically different from zero ($p<.0.05$).
~ Statistic could not be calculated.

SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Table 10.**
**Age-specific Cancer Mortality, Average Annual Rates and Trends**
**Colon excluding Rectum, Blacks and Whites by Sex, Illinois, 1979-1998**

| | | 1979-1998 | | | | | Trend 1 | | Trend 2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Age Group | Sex/Race | Count | ASR | LCI | UCI | EAPC | Range of Years | EAPC | Range of Years | EAPC |
| | **Both Sexes** | | | | | | | | | |
| < 40 | Blacks | 138 | 0.6* | 0.5 | 0.7 | -0.38 | | | | |
| | Whites | 424 | 0.4 | 0.3 | 0.4 | -0.97 | | | | |
| 40-49 | Blacks | 337 | 8.9* | 8.0 | 9.9 | -0.11 | | | | |
| | Whites | 1,170 | 5.0 | 4.7 | 5.3 | -1.62# | | | | |
| 50-59 | Blacks | 978 | 35.3* | 33.1 | 37.6 | -0.58 | | | | |
| | Whites | 4,080 | 21.8 | 21.1 | 22.4 | -2.53# | | | | |
| 60-69 | Blacks | 1,718 | 83.5* | 79.6 | 87.6 | 0.30 | | | | |
| | Whites | 9,910 | 61.0 | 59.8 | 62.2 | -1.81# | | | | |
| 70-79 | Blacks | 1,832 | 156.1* | 149.0 | 163.4 | 0.11 | | | | |
| | Whites | 14,560 | 127.2 | 125.2 | 129.3 | -1.95# | 1979-85 | 0.28 | 1985-98 | -2.67# |
| 80+ | Blacks | 1,335 | 270.3* | 256.0 | 285.2 | 0.68 | | | | |
| | Whites | 13,979 | 235.2 | 231.3 | 239.1 | -0.65# | 1979-88 | 0.74 | 1988-98 | -1.82# |
| | **Males** | | | | | | | | | |
| < 40 | Blacks | 74 | 0.6* | 0.5 | 0.8 | ~ | | | | |
| | Whites | 224 | 0.4 | 0.3 | 0.4 | 0.63 | | | | |
| 40-49 | Blacks | 175 | 10.4* | 8.9 | 12.1 | 0.46 | | | | |
| | Whites | 626 | 5.4 | 5.0 | 5.8 | -1.61 | | | | |
| 50-59 | Blacks | 492 | 40.2* | 36.7 | 43.9 | 0.11 | | | | |
| | Whites | 2,291 | 25.1 | 24.0 | 26.1 | -2.46# | 1979-91 | -0.25 | 1991-98 | -7.07# |
| 60-69 | Blacks | 878 | 98.8* | 92.4 | 105.6 | 0.37 | | | | |
| | Whites | 5,597 | 74.8 | 72.9 | 76.8 | -1.40# | | | | |
| 70-79 | Blacks | 842 | 181.2* | 169.2 | 193.8 | 0.66 | | | | |
| | Whites | 7,398 | 160.2 | 156.6 | 163.9 | -1.90# | 1979-85 | 0.87 | 1985-98 | -2.82# |
| 80+ | Blacks | 525 | 320.0 | 293.2 | 348.6 | 0.05 | | | | |
| | Whites | 5,271 | 289.9 | 282.2 | 297.9 | -0.52 | 1979-89 | 1.74# | 1989-98 | -3.08# |
| | **Females** | | | | | | | | | |
| < 40 | Blacks | 64 | 0.5 | 0.4 | 0.6 | ~ | | | | |
| | Whites | 200 | 0.4 | 0.3 | 0.4 | -2.48 | | | | |
| 40-49 | Blacks | 162 | 7.7* | 6.6 | 9.0 | -0.41 | | | | |
| | Whites | 544 | 4.6 | 4.2 | 5.0 | -1.56 | | | | |
| 50-59 | Blacks | 486 | 31.4* | 28.7 | 34.3 | -1.58 | | | | |
| | Whites | 1,789 | 18.6 | 17.8 | 19.5 | -2.70# | | | | |
| 60-69 | Blacks | 840 | 71.9* | 67.1 | 76.9 | 0.28 | | | | |
| | Whites | 4,313 | 49.3 | 47.8 | 50.8 | -2.43# | | | | |
| 70-79 | Blacks | 990 | 139.6* | 131.1 | 148.6 | -0.37 | | | | |
| | Whites | 7,162 | 104.9 | 102.5 | 107.4 | -2.14# | 1979-95 | -1.66# | 1995-98 | -7.62# |
| 80+ | Blacks | 810 | 245.6* | 229.0 | 263.1 | 1.18 | | | | |
| | Whites | 8,708 | 211.1 | 206.7 | 215.6 | -0.73# | | | | |

Average annual age-specific rates (ASR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
# EAPC is statistically different from zero ($p<.0.05$).
~Statistic could not be calculated.

SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Table 11.**
**Age-specific Cancer Mortality, Average Annual Rates and Trends, Rectum and Rectosigmoid Junction, Blacks and Whites by Sex, Illinois, 1979-1998**

| | | 1979-1998 | | | | | Trend 1 | | Trend 2 | | Trend 3 | | Trend 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age Group | Sex/Race | Count | ASR | LCI | UCI | EAPC | Range of Years | EAPC | Range of Years | EAPC | Range of Years | EAPC | Range of Years | EAPC |
| | **Both Sexes** | | | | | | | | | | | | | |
| < 40 | Blacks | 32 | 0.1 | 0.1 | 0.2 | ~ | | | | | | | | |
| | Whites | 100 | 0.1 | 0.1 | 0.1 | 0.57 | | | | | | | | |
| 40-49 | Blacks | 62 | 1.6 | 1.3 | 2.1 | -1.58 | | | | | | | | |
| | Whites | 269 | 1.1 | 1.0 | 1.3 | -2.18# | | | | | | | | |
| 50-59 | Blacks | 159 | 5.7* | 4.9 | 6.7 | -0.86 | | | | | | | | |
| | Whites | 781 | 4.2 | 3.9 | 4.5 | -3.14# | | | | | | | | |
| 60-69 | Blacks | 239 | 11.6 | 10.2 | 13.2 | -0.93 | | | | | | | | |
| | Whites | 1,831 | 11.3 | 10.8 | 11.8 | -2.37# | | | | | | | | |
| 70-79 | Blacks | 228 | 19.4 | 17.0 | 22.1 | 0.76 | | | | | | | | |
| | Whites | 2,269 | 19.8 | 19.0 | 20.7 | -3.77# | | | | | | | | |
| 80+ | Blacks | 191 | 38.7 | 33.4 | 44.6 | -2.30 | | | | | | | | |
| | Whites | 2,203 | 37.1 | 35.5 | 38.6 | -3.68# | 1979-88 | -6.04# | 1988-98 | -1.62 | | | | |
| | **Males** | | | | | | | | | | | | | |
| < 40 | Blacks | 12 | 0.1 | 0.0 | 0.2 | ~ | | | | | | | | |
| | Whites | 56 | 0.1 | 0.1 | 0.1 | 0.90 | | | | | | | | |
| 40-49 | Blacks | 35 | 2.1 | 1.4 | 2.9 | ~ | | | | | | | | |
| | Whites | 160 | 1.4 | 1.2 | 1.6 | -2.10 | | | | | | | | |
| 50-59 | Blacks | 93 | 7.6* | 6.1 | 9.3 | 0.53 | | | | | | | | |
| | Whites | 476 | 5.2 | 4.8 | 5.7 | -2.90# | 1979-81 | 29.49# | 1981-84 | 8.72 | 1984-94 | -5.15# | 1994-98 | 7.64 |
| 60-69 | Blacks | 139 | 15.6 | 13.2 | 18.5 | 0.29 | | | | | | | | |
| | Whites | 1,142 | 15.3 | 14.4 | 16.2 | -2.52# | | | | | | | | |
| 70-79 | Blacks | 124 | 26.7 | 22.2 | 31.8 | 0.21 | | | | | | | | |
| | Whites | 1,327 | 28.7 | 27.2 | 30.3 | -3.63# | | | | | | | | |
| 80+ | Blacks | 71 | 43.3 | 33.8 | 54.6 | -4.73# | | | | | | | | |
| | Whites | 922 | 50.7 | 47.5 | 54.1 | -4.20# | 1979-91 | -6.85# | 1991-98 | 1.51 | | | | |
| | **Females** | | | | | | | | | | | | | |
| < 40 | Blacks | 20 | 0.2 | 0.1 | 0.2 | ~ | | | | | | | | |
| | Whites | 44 | 0.1 | 0.1 | 0.1 | ~ | | | | | | | | |
| 40-49 | Blacks | 27 | 1.3 | 0.8 | 1.9 | ~ | | | | | | | | |
| | Whites | 109 | 0.9 | 0.8 | 1.1 | -2.09 | | | | | | | | |
| 50-59 | Blacks | 66 | 4.3 | 3.3 | 5.4 | ~ | | | | | | | | |
| | Whites | 305 | 3.2 | 2.8 | 3.6 | -3.44# | | | | | | | | |
| 60-69 | Blacks | 100 | 8.6 | 7.0 | 10.4 | -2.60 | | | | | | | | |
| | Whites | 689 | 7.9 | 7.3 | 8.5 | -2.37# | | | | | | | | |
| 70-79 | Blacks | 104 | 14.7 | 12.0 | 17.8 | 1.20 | | | | | | | | |
| | Whites | 942 | 13.8 | 12.9 | 14.7 | -4.31# | | | | | | | | |
| 80+ | Blacks | 120 | 36.4 | 30.2 | 43.5 | -0.94 | | | | | | | | |
| | Whites | 1,281 | 31.0 | 29.4 | 32.8 | -3.32# | | | | | | | | |

Average annual age-specific rates (ASR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
# EAPC is statistically different from zero ($p<0.05$).
~ Statistic could not be calculated.
SOURCE: Illinois Department of Public Health, Death Master Files, 1979-1998

**Are there cancer incidence differences in colorectal anatomic subsites between blacks and whites in the Illinois population?**

Reports in the literature have noted differences between blacks and whites in subsites where cancers of the colon and rectum originate.[12-15] Figure 16 displays average annual cancer incidence rates during 1986 to 1997 for colorectal subsites for blacks and whites. As shown, rates are higher for blacks than whites when the proximal sites including cecum, ascending colon, hepatic flexure, transverse colon, splenic flexure and descending colon are evaluated. A shift toward higher rates for whites compared with blacks takes place at the more distal point of the sigmoid colon and persists for rectosigmoid junction and rectum. When subsites are collapsed into proximal and distal classifications, the differences are apparent for both sexes, males and females (Figure 17). The greatest proximal to distal rate differences for race-sex groups appear for white males and the least rate differences are evident for white females. Illinois blacks display higher rates than whites in the proximal sites of the colon and whites show higher rates than blacks for the more distal segments of the colon and rectum, an observation that is completely consistent with previous reports.

Colorectal cancer subsite incidence for Illinois' blacks and whites over 1986 to 1997 are presented in tables 12, 13 and 14. Significant annual age-adjusted rate increases appeared for white males, appendix; whites, both sexes, ascending colon; whites, both sexes, males and females, hepatic flexure (Table 12). It should be noted that significant increases in the colorectal cancer category, large intestine, NOS, were evident for all sex-race groups with the exception of black females, which may have implications for registry quality control operations. Significant annual age-adjusted cancer incidence rate declines were observed during 1986 to 1997 for white males, cecum; all white sex-race groups as well as black males, transverse colon,; white males, splenic flexure; all white-sex groups, descending colon; all black and white-sex groups with the exception of black males, sigmoid colon; all white-sex groups, rectosigmoid junction; and white females, rectum (Table 12). No significant increases were apparent when the collapsed subsite categories, proximal and distal large intestine, were evaluated (Table 13). However, significant declines were observed for white males, proximal; and for whites, both sexes, males and females, distal.

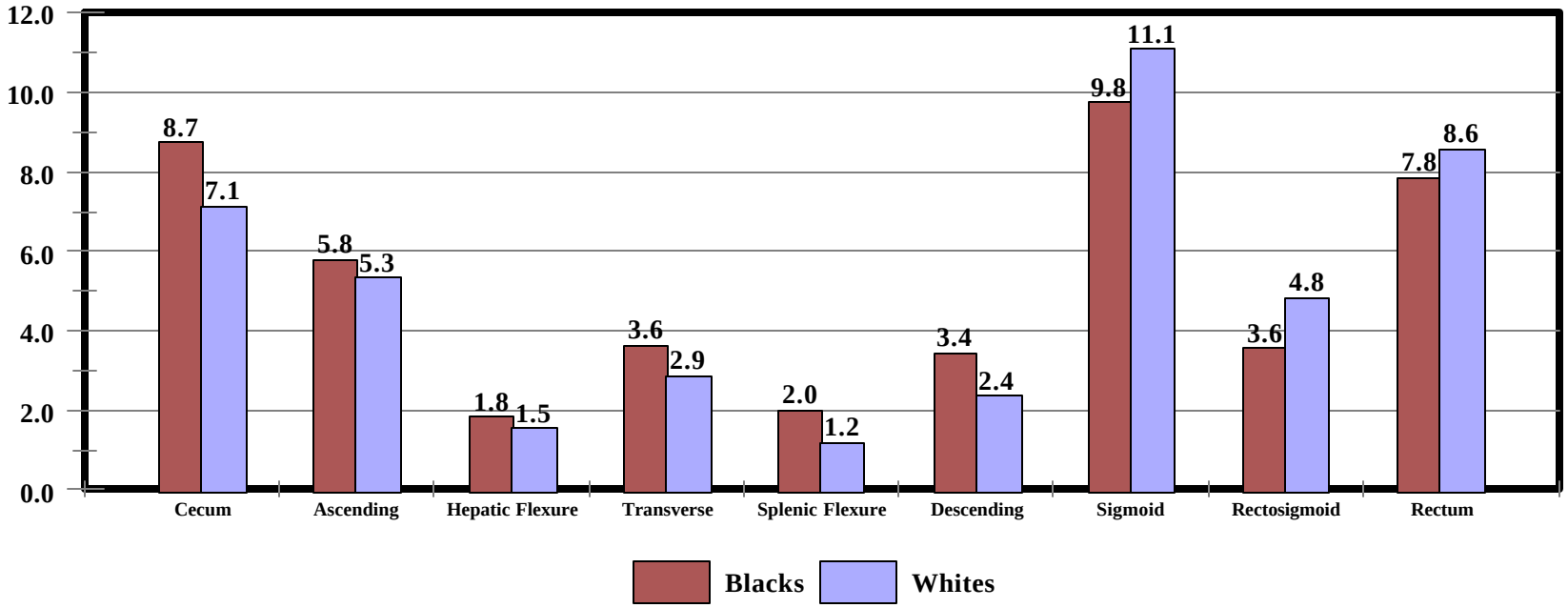
Joinpoint analyses showed several subsite subtrends among sex-race groups including blacks, both sexes and females, cecum; and white males, sigmoid colon (Table12). In Table 13, subtrends were evident for black females, distal large intestine. However, the only statistically significant subtrend appeared for blacks, both sexes, cecum (Table 12), where an increase of 6.85 percent per year was evident over 1991 to 1997.

In Table 12, black/white comparisons of average annual age-adjusted rates for 1986 to 1997 showed significantly higher rates for blacks than whites among both sexes, males and females, for cecum, transverse colon, splenic flexure, and descending colon. In addition, blacks had higher hepatic flexure incidence rates than whites for both sexes. Conversely, significantly higher incidence rates were observed for whites than blacks in cancers of the sigmoid colon and rectum (both sexes and males) and rectosigmoid junction (both sexes, males and females). In Table 13, black rates were higher than

whites for proximal large intestine in all three sex-group comparisons and for distal large intestine rates for both sexes. White rates were significantly higher than those observed for blacks in the distal large intestine black/white comparison for both sexes.

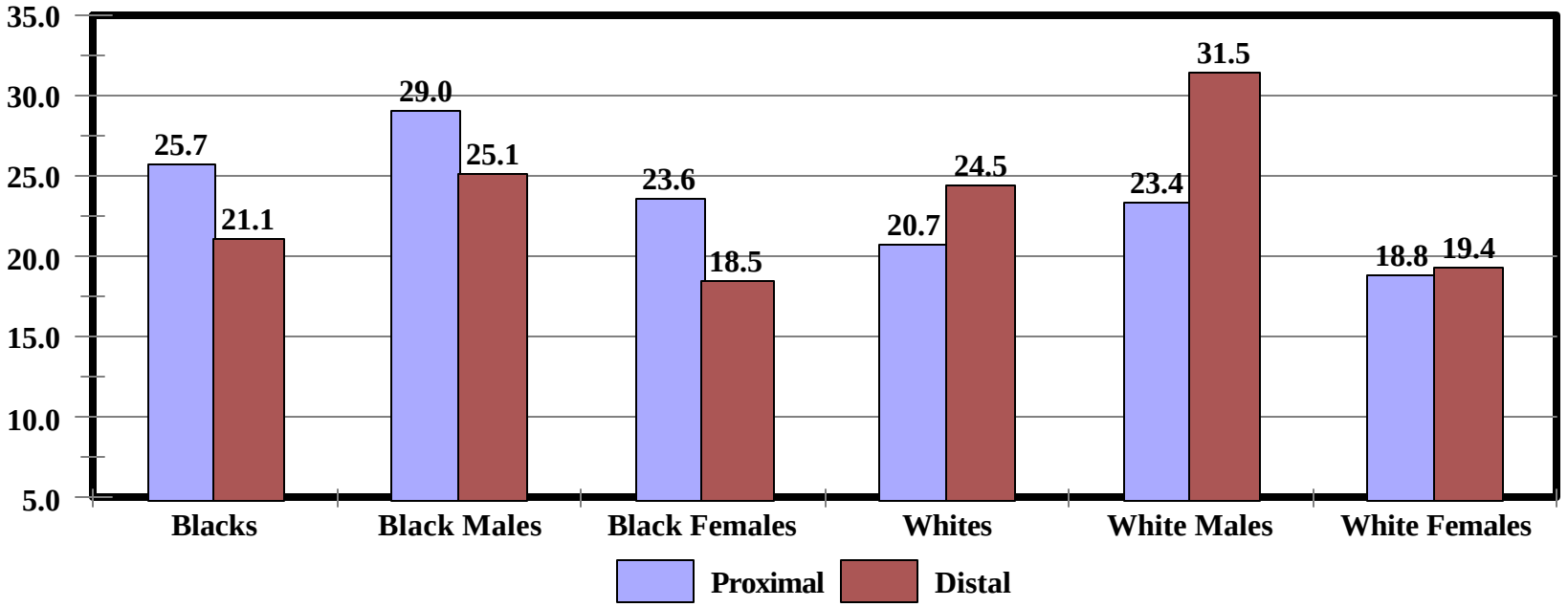
Although subsite differences emerge for black/white rate comparisons, it is useful to make note of the subsite counts and distributions when evaluating the total colorectal cancer burden and establishing strategies to effectively deal with the problem. Table 14 presents colorectal subsites by frequency in descending order. As shown, sigmoid colon and rectum (distal sites) and cecum and ascending colon (proximal sites) account for approximately two-thirds of all colorectal cancer incidence over 1986 to 1997 for both blacks and whites in Illinois.

**Figure 16.**
**Average Annual Age-adjusted Cancer Incidence Rates for Blacks and Whites, Both Sexes**
**Colon and Rectum Subsites, Illinois, 1986-1997**




Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Figure 17.**
**Average Annual Age-adjusted Cancer Incidence Rates for Blacks and Whites by Sex**
**Colon and Rectum Subsites, Proximal vs. Distal, Illinois, 1986-1997**




Proximal sites include cecum, appendix, ascending colon, hepatic flexure, transverse colon, splenic flexure and descending colon.
Distal sites include sigmoid colon, rectosigmoid junction and rectum.

Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 12.**
**Cancer Incidence, Average Annual Age-Adjusted Rates and Trends, Colon and Rectum Subsites, Blacks and Whites by Sex, Illinois, 1986-1997**

| | | 1986-1997 | | | | | Trend 1 | | Trend 2 | | Trend 3 | | Trend 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subsite** | **Sex/Race** | **Count** | **AAR** | **LCI** | **UCI** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** |
| **Cecum** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 1,474 | 8.7* | 8.3 | 9.2 | 0.75 | 1986-88 | 12.26 | 1988-91 | -12.11 | 1991-97 | 6.85# | | |
| | Whites | 10,941 | 7.1 | 7.0 | 7.3 | -0.63 | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 630 | 9.3* | 8.6 | 10.1 | 1.63 | | | | | | | | |
| | Whites | 4,635 | 7.7 | 7.4 | 7.9 | -1.27# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 844 | 8.3* | 7.8 | 8.9 | 0.06 | 1986-88 | 6.04 | 1988-92 | -11.35 | 1992-95 | 15.48 | 1995-97 | 1.43 |
| | Whites | 6,306 | 6.7 | 6.5 | 6.9 | -0.08 | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Appendix** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 57 | 0.3 | 0.2 | 0.4 | 2.78 | | | | | | | | |
| | Whites | 466 | 0.4 | 0.3 | 0.4 | 1.62 | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 24 | 0.3 | 0.2 | 0.5 | ~ | | | | | | | | |
| | Whites | 214 | 0.4 | 0.3 | 0.4 | 3.55# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 33 | 0.3 | 0.2 | 0.4 | ~ | | | | | | | | |
| | Whites | 252 | 0.4 | 0.3 | 0.4 | -0.28 | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Ascending Colon** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 972 | 5.8 | 5.4 | 6.2 | 2.65 | | | | | | | | |
| | Whites | 8,148 | 5.3 | 5.2 | 5.4 | 0.66# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 428 | 6.3 | 5.8 | 7.0 | 1.51 | | | | | | | | |
| | Whites | 3,565 | 5.9 | 5.7 | 6.1 | 0.49 | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 544 | 5.4 | 5.0 | 5.9 | 3.34 | | | | | | | | |
| | Whites | 4,583 | 4.9 | 4.8 | 5.1 | 0.72 | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Hepatic Flexure** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 310 | 1.8* | 1.6 | 2.0 | -0.75 | | | | | | | | |
| | Whites | 2,324 | 1.5 | 1.5 | 1.6 | 2.26# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 154 | 2.3 | 1.9 | 2.6 | 2.16 | | | | | | | | |
| | Whites | 1,100 | 1.8 | 1.7 | 1.9 | 2.39# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 156 | 1.5 | 1.3 | 1.8 | -3.61 | | | | | | | | |
| | Whites | 1,224 | 1.3 | 1.2 | 1.4 | 1.83# | | | | | | | | |

Average annual age-adjusted rates (AAR) are cases per 100,000 and are age-adjusted to the 1970 U.S. standard million population. Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates. *Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$). #EAPC is statistically different from zero ($p<0.05$). ~ Statistic could not be calculated.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 12. (continued)**
**Cancer Incidence, Average Annual Age-Adjusted Rates and Trends, Colon and Rectum Subsites, Blacks and Whites by Sex, Illinois, 1986-1997**

| | | 1986-1997 | | | | | Trend 1 | | Trend 2 | | Trend 3 | | Trend 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subsite** | **Sex/Race** | **Count** | **AAR** | **LCI** | **UCI** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** |
| **Transverse Colon** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 614 | 3.6* | 3.4 | 3.9 | -1.19 | | | | | | | | |
| | Whites | 4,338 | 2.8 | 2.8 | 2.9 | -1.80# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 297 | 4.4* | 3.9 | 4.9 | -2.94# | | | | | | | | |
| | Whites | 1,899 | 3.1 | 3.0 | 3.3 | -2.08# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 317 | 3.2* | 2.8 | 3.5 | 0.70 | | | | | | | | |
| | Whites | 2,439 | 2.6 | 2.5 | 2.8 | -1.51# | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Splenic Flexure** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 340 | 2.0* | 1.8 | 2.2 | -0.99 | | | | | | | | |
| | Whites | 1,754 | 1.2 | 1.1 | 1.2 | -1.05 | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 163 | 2.4* | 2.0 | 2.8 | -3.75 | | | | | | | | |
| | Whites | 960 | 1.6 | 1.5 | 1.7 | -2.41# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 177 | 1.8* | 1.5 | 2.0 | 1.41 | | | | | | | | |
| | Whites | 794 | 0.9 | 0.8 | 1.0 | 0.49 | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Descending Colon** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 579 | 3.4* | 3.2 | 3.7 | -1.24 | | | | | | | | |
| | Whites | 3,449 | 2.4 | 2.3 | 2.4 | -3.75# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 272 | 4.0* | 3.5 | 4.5 | 0.50 | | | | | | | | |
| | Whites | 1,747 | 2.9 | 2.8 | 3.1 | -3.86# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 307 | 3.1* | 2.8 | 3.5 | -2.69 | | | | | | | | |
| | Whites | 1,702 | 2.0 | 1.9 | 2.1 | -3.66# | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Sigmoid Colon** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 1,648 | 9.8 | 9.3 | 10.2 | -1.01# | | | | | | | | |
| | Whites | 15,997 | 11.1 * | 10.9 | 11.3 | -2.16# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 747 | 11.0 | 10.2 | 11.8 | 0.22 | | | | | | | | |
| | Whites | 8,218 | 13.8 * | 13.5 | 14.1 | -2.30# | 1986-92 | -0.25 | 1992-95 | -8.21 | 1995-97 | 5.99 | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 901 | 9.0 | 8.4 | 9.6 | -2.35# | | | | | | | | |
| | Whites | 7,779 | 9.2 | 9.0 | 9.4 | -2.18# | | | | | | | | |

Average annual age-adjusted rates (AAR) are cases per 100,000 and are age-adjusted to the 1970 U.S. standard million population. Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates. *Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$). #EAPC is statistically different from zero ($p<0.05$). ~ Statistic could not be calculated.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 12. (continued)**
**Cancer Incidence, Average Annual Age-Adjusted Rates and Trends, Colon and Rectum Subsites, Blacks and Whites by Sex, Illinois, 1986-1997**

| | | 1986-1997 | | | | | Trend 1 | | Trend 2 | | Trend 3 | | Trend 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subsite** | **Sex/Race** | **Count** | **AAR** | **LCI** | **UCI** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** |
| **Large Intestine, NOS** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 622 | 3.7* | 3.4 | 4.0 | 8.39# | 1986-91 | -9.29 | 1991-94 | 45.52 | 1994-97 | -9.92 | | |
| | Whites | 3,122 | 2.0 | 2.0 | 2.1 | 4.71# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 312 | 4.7* | 4.2 | 5.2 | 8.93# | | | | | | | | |
| | Whites | 1,446 | 2.4 | 2.3 | 2.5 | 4.13# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 310 | 3.0* | 2.7 | 3.4 | 7.88 | 1986-91 | -12.62 | 1991-94 | 55.22 | 1994-97 | -15.01 | | |
| | Whites | 1,676 | 1.8 | 1.7 | 1.8 | 5.43# | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Rectosigmoid Junction** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 600 | 3.6 | 3.3 | 3.8 | -0.53 | | | | | | | | |
| | Whites | 6,940 | 4.8* | 4.7 | 5.0 | -1.99# | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 280 | 4.1 | 3.6 | 4.6 | -1.54 | | | | | | | | |
| | Whites | 3,755 | 6.3* | 6.1 | 6.5 | -2.05# | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 320 | 3.2 | 2.8 | 3.6 | -0.45 | | | | | | | | |
| | Whites | 3,185 | 3.8* | 3.6 | 3.9 | -2.14# | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Rectum** | **Both Sexes** | | | | | | | | | | | | | |
| | Blacks | 1,343 | 7.8 | 7.4 | 8.3 | 0.51 | | | | | | | | |
| | Whites | 12,202 | 8.6* | 8.4 | 8.7 | -0.26 | | | | | | | | |
| | **Males** | | | | | | | | | | | | | |
| | Blacks | 700 | 10.0 | 9.3 | 10.8 | 0.27 | | | | | | | | |
| | Whites | 6,788 | 11.4* | 11.1 | 11.7 | -0.10 | | | | | | | | |
| | **Females** | | | | | | | | | | | | | |
| | Blacks | 643 | 6.3 | 5.8 | 6.8 | 0.74 | | | | | | | | |
| | Whites | 5,414 | 6.4 | 6.2 | 6.6 | -0.75# | | | | | | | | |

Average annual age-adjusted rates (AAR) are cases per 100,000 and are age-adjusted to the 1970 U.S. standard million population. Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates. *Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$). #EAPC is statistically different from zero ($p<0.05$). ~ Statistic could not be calculated.
SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 13.**
**Cancer Incidence, Average Annual Age-Adjusted Rates and Trends**
**Proximal and Distal Large Intestine, Blacks and Whites, Illinois, 1986-1997**

| | | 1986-1997 | | | | | Trend 1 | | Trend 2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Subsite** | **Sex/Race** | **Count** | **AAR** | **LCI** | **UCI** | **EAPC** | **Range of Years** | **EAPC** | **Range of Years** | **EAPC** |
| **Proximal** | **Both Sexes** | | | | | | | | | |
| | Blacks | 4,346 | 25.7* | 25.0 | 26.5 | 0.39 | | | | |
| | Whites | 17,300 | 18.8 | 18.5 | 19.1 | -0.31 | | | | |
| | **Males** | | | | | | | | | |
| | Blacks | 1,968 | 29.0* | 27.7 | 30.4 | 0.26 | | | | |
| | Whites | 14,120 | 23.4 | 23.0 | 23.8 | -1.02# | | | | |
| | **Females** | | | | | | | | | |
| | Blacks | 2,378 | 23.6* | 22.6 | 24.5 | 0.36 | | | | |
| | Whites | 17,300 | 18.8 | 18.5 | 19.1 | -0.31 | | | | |
| | | | | | | | | | | |
| **Distal** | **Both Sexes** | | | | | | | | | |
| | Blacks | 3,591 | 21.1* | 20.4 | 21.8 | -0.37 | | | | |
| | Whites | 16,378 | 19.4 | 19.0 | 19.7 | -1.70# | | | | |
| | **Males** | | | | | | | | | |
| | Blacks | 1,727 | 25.1 | 23.9 | 26.3 | 0.08 | | | | |
| | Whites | 18,761 | 31.5* | 31.0 | 31.9 | -1.45# | | | | |
| | **Females** | | | | | | | | | |
| | Blacks | 1,864 | 18.5 | 17.7 | 19.4 | -0.93# | 1986-89 | -4.91 | 1989-97 | 0.14 |
| | Whites | 16,378 | 19.4 | 19.0 | 19.7 | -1.70# | | | | |

Proximal sites include cecum, appendix, ascending colon, hepatic flexure, transverse colon, splenic flexure, and descending colon. Distal sites include sigmoid colon, rectosigmoid junction, and rectum.
Average annual age-adjusted rates (AAR) are cases per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).
# EAPC is statistically different from zero ($p<0.05$).

SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 14.**
**Colorectal Cancer Incidence Subsites for Blacks and Whites**
**Frequencies and Percent in Descending Rank Order**
**Illinois, 1986-1997**

| Blacks | | | Whites | | |
|---|---|---|---|---|---|
| **Site** | **Count** | **%** | **Site** | **Count** | **%** |
| Sigmoid Colon | 1,648 | 19.3 | Sigmoid Colon | 15,997 | 23.0 |
| Cecum | 1,474 | 17.2 | Rectum | 12,202 | 17.5 |
| Rectum | 1,343 | 15.7 | Cecum | 10,941 | 15.7 |
| Ascending Colon | 972 | 11.4 | Ascending Colon | 8,148 | 11.7 |
| Large Intestine, NOS | 622 | 7.3 | Rectosigmoid Junction | 6,940 | 10.0 |
| Transverse Colon | 614 | 7.2 | Transverse Colon | 4,338 | 6.2 |
| Rectosigmoid Junction | 600 | 7.0 | Descending Colon | 3,449 | 4.9 |
| Descending Colon | 579 | 6.8 | Large Intestine, NOS | 3,122 | 4.5 |
| Splenic Flexure | 340 | 4.0 | Hepatic Flexure | 2,324 | 3.3 |
| Hepatic Flexure | 310 | 3.6 | Splenic Flexure | 1,754 | 2.5 |
| Appendix | 57 | 0.7 | Appendix | 466 | 0.7 |
| All Sites | 8,559 | 100.0 | All Sites | 69,681 | 100.0 |

SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

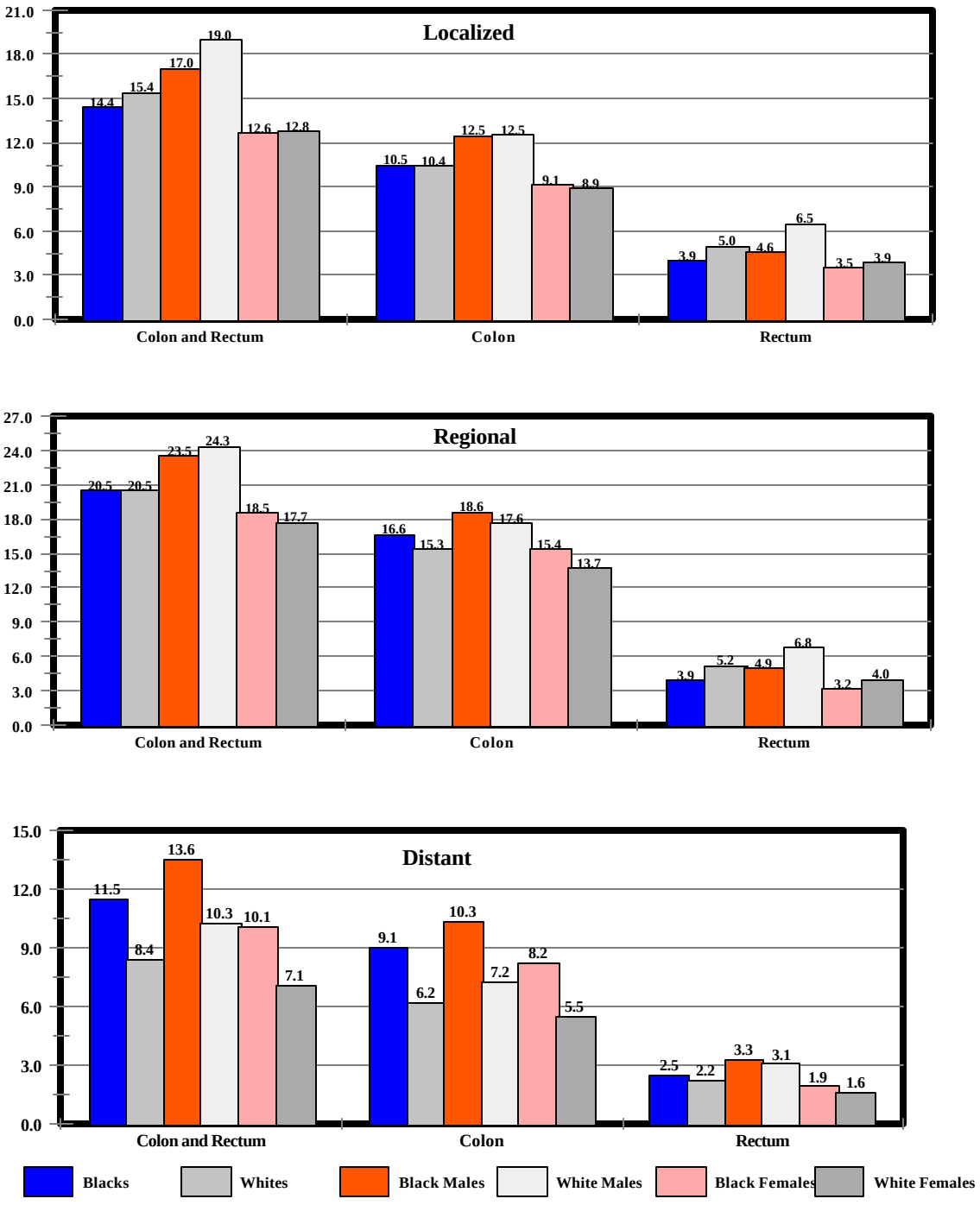
**Does stage of disease differ when colorectal cancers are diagnosed for Illinois' blacks compared with whites?**

Stage at the time of cancer diagnosis is extremely important when considering issues including treatment strategies, quality of life, costs, and survival. Generally, detection during earlier stages is associated with more favorable health outcomes. Stage of disease at colorectal cancer diagnosis was evaluated using both percentage and age-adjusted incidence rates for localized, regional, and distant stage classifications.

Figure 18 presents the percentage of cases diagnosed at localized, regional, and distant stages by race-sex groups for the three colorectal site categories during 1986 to 1997. For the earlier, localized stage cases, percentages for whites exceed those for their black counterparts among both sexes, males and females. For the late or distant stage diagnosis, findings were just the opposite. That is, percentages of distant stage cases were greater among blacks than whites for every race-sex group. For regional stage cases, proportionately more white cases than blacks presented with the regional stage at the time of diagnosis. It should be noted that more than 40 percent of colon excluding rectum cases are diagnosed in the regional stage for both blacks and whites suggesting the need for better screening approaches for both race groups. Larger proportions of rectal cancer cases were diagnosed at the localized stage than colon excluding rectum.

Table 15 shows colorectal cancer incidence and average annual age-adjusted rates for stage of disease at diagnosis for blacks and whites by sex over 1986 to 1997. For colon and rectum, whites, both sexes and males, have significantly higher localized stage diagnoses than their black counterparts. Significantly higher rates for distant diagnoses for colon and rectum were observed for blacks, both sexes and females, compared with their white counterparts. For colon excluding rectum, significantly higher age-adjusted incidence rates for blacks than whites were seen for regional and distant stages, both sexes; distant stage, males and females; and regional stage, females. For rectum and rectosigmoid junction, whites had significantly higher age-adjusted incidence rates than blacks for localized stage, both sexes and males; and for regional stage diagnoses, both sexes, males and females.

**Figure 18.**
**Percent Stage of Disease at Cancer Diagnosis for Blacks and Whites by Sex**
**Colon and Rectum Sites, Illinois, 1986-1997**




SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**Table 15.**
**Stage of Disease at Diagnosis**
**Cancer Incidence and Average Annual Age-adjusted Rates, Blacks and Whites by Sex**
**Colon and Rectum Sites, Illinois, 1986-1997**

| | | Colon and Rectum | | | | Colon excluding Rectum | | | | Rectum and Rectosigmoid Junction | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **Sex/Race** | **Count** | **AAR** | **LCI** | **UCI** | **Count** | **AAR** | **LCI** | **UCI** | **Count** | **AAR** | **LCI** | **UCI** |
| | **Both Sexes** | | | | | | | | | | | | |
| **Localized** | Blacks | 2,430 | 14.4 | 13.8 | 15.0 | 1,758 | 10.5 | 10.0 | 11.0 | 672 | 3.9 | 3.6 | 4.3 |
| | Whites | 22,735 | 15.4* | 15.2 | 15.6 | 15,603 | 10.4 | 10.3 | 10.6 | 7,132 | 5.0* | 4.9 | 5.1 |
| **Regional** | Blacks | 3,470 | 20.5 | 19.8 | 21.2 | 2,808 | 16.6* | 16.0 | 17.3 | 662 | 3.9 | 3.6 | 4.2 |
| | Whites | 30,085 | 20.5 | 20.2 | 20.7 | 22,834 | 15.3 | 15.1 | 15.5 | 7,251 | 5.2* | 5.0 | 5.3 |
| **Distant** | Blacks | 1,953 | 11.5* | 11.0 | 12.0 | 1,535 | 9.0* | 8.6 | 9.5 | 418 | 2.4 | 2.2 | 2.7 |
| | Whites | 12,119 | 8.4 | 8.3 | 8.6 | 8,970 | 6.2 | 6.1 | 6.3 | 3,149 | 2.2 | 2.2 | 2.3 |
| | **Males** | | | | | | | | | | | | |
| **Localized** | Blacks | 1,158 | 17.0 | 16.0 | 18.0 | 841 | 12.5 | 11.6 | 13.4 | 317 | 4.6 | 4.1 | 5.1 |
| | Whites | 11,387 | 19.0* | 18.6 | 19.4 | 7,512 | 12.5 | 12.2 | 12.8 | 3,875 | 6.5* | 6.3 | 6.7 |
| **Regional** | Blacks | 1,608 | 23.5 | 22.4 | 24.7 | 1,264 | 18.6 | 17.6 | 19.7 | 344 | 4.9 | 4.4 | 5.5 |
| | Whites | 14,599 | 24.3 | 23.9 | 24.7 | 10,580 | 17.6 | 17.2 | 17.9 | 4,019 | 6.8* | 6.6 | 7.0 |
| **Distant** | Blacks | 938 | 13.6 | 12.7 | 14.5 | 712 | 10.3* | 9.6 | 11.1 | 226 | 3.3 | 2.8 | 3.7 |
| | Whites | 6,126 | 10.3 | 10.0 | 10.5 | 4,321 | 7.2 | 7.0 | 7.4 | 1,805 | 3.0 | 2.9 | 3.2 |
| | **Females** | | | | | | | | | | | | |
| **Localized** | Blacks | 1,272 | 12.6 | 12.0 | 13.4 | 917 | 9.1 | 8.6 | 9.8 | 355 | 3.5 | 3.1 | 3.9 |
| | Whites | 11,348 | 12.8 | 12.5 | 13.0 | 8,091 | 8.9 | 8.7 | 9.1 | 3,257 | 3.9 | 3.7 | 4.0 |
| **Regional** | Blacks | 1,862 | 18.5 | 17.7 | 19.4 | 1,544 | 15.4* | 14.6 | 16.2 | 318 | 3.2 | 2.8 | 3.5 |
| | Whites | 15,486 | 17.7 | 17.4 | 18.0 | 12,254 | 13.7 | 13.5 | 14.0 | 3,232 | 4.0* | 3.8 | 4.1 |
| **Distant** | Blacks | 1,015 | 10.1* | 9.5 | 10.8 | 823 | 8.2* | 7.6 | 8.8 | 192 | 1.9 | 1.6 | 2.2 |
| | Whites | 5,993 | 7.1 | 6.9 | 7.3 | 4,649 | 5.5 | 5.3 | 5.6 | 1,344 | 1.6 | 1.5 | 1.7 |

Average annual age-adjusted (AAR) are per 100,000 and are age-adjusted to the 1970 U.S. standard million population.
Lower confidence intervals (LCI) and upper confidence intervals (UCI) are 95 percent for rates.
*Rate is significantly greater for the race group in the between-race comparisons for the same sex category ($p<0.05$).

SOURCE: Illinois Department of Public Health, Illinois State Cancer Registry, December 1999

**What are the public health implications of the colorectal cancer profiles for black and white Illinoisans?**

In Illinois, both blacks and whites experience a great disease burden from cancers of the colon and rectum. The colorectal cancer trends and patterns of incidence and mortality observed through this evaluation are, for the most part, consistent with other reports in the literature.[19-21]

The fact that, overall, these cancers are on the decline both in Illinois and nationally is most encouraging. However, decreases in colorectal cancer incidence and mortality have occurred primarily among the white population in Illinois while incidence and mortality trends among Illinois' blacks have remained basically flat. Because of the differences in trends, disparities in both colorectal cancer incidence and mortality between the two races actually are on the rise.

Healthy People, the national initiative established in 1979 to provide a framework for improving of the nation's health, has identified the elimination of disparities in health and disease outcomes in its 2010 plan.[22] The present evaluation of cancers of the colon and rectum does, indeed, reveal an increasing disparity between blacks and whites in Illinois that must be addressed in the coming decades to not only improve the health of all Illinoisans but to assure that the improvement reaches all racial/ethnic groups in the state.

The reasons for decreasing incidence and mortality of cancers of the colon and rectum are not clear. The lack of established screening protocols and the low utilization of current screening methods suggest that other factors may be responsible for the decline. Possible explanations may be increased adenomatous polyp removal, more effective treatment protocols, aspirin or estrogen replacement usage, or changes in population dietary patterns.[23-28] It is important to understand what, in fact, is responsible for the observed declines and then to implement public health programs to promote health and behavior changes that will accelerate reductions in incidence and mortality from colorectal cancer. Further studies in this area are clearly needed.

Presently, screening approaches and national recommendations are being intensively evaluated by the responsible, authoritative agencies. Evaluations of colorectal cancer incidence and mortality like the one presented in this report should assist policy and decision makers to develop programs to effectively address the target groups most in need of screening and preventive interventions, and to monitor trends that measure the success or failures of these efforts.

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# Appendix A

## Standard Site Analysis Categories:

## ICD-O-2 Codes for Colorectal Cancer Incidence

## ICD-9 Codes for Colorectal Cancer Mortality

**Standard Site Analysis Categories with ICD-O-2 Codes for Colorectal Cancer Incidence and ICD-9 Codes for Colorectal Cancer Mortality**

**Colorectal Cancer Incidence**

| Site Category | ICD-O-2 Codes | Recode Group Code@ |
|---|---|---|
| COLON EXCLUDING RECTUM# | | 21040* |
| Cecum | C18.0 | 21041 |
| Appendix | C18.1 | 21042 |
| Ascending Colon | C18.2 | 21043 |
| Hepatic Flexure | C18.3 | 21044 |
| Transverse Colon | C18.4 | 21045 |
| Splenic Flexure | C18.5 | 21046 |
| Descending Colon | C18.6 | 21047 |
| Sigmoid Colon | C18.7 | 21048 |
| Large Intestine, NOS | C18.8 - C18.9<br>C26.0 | 21049 |
| RECTUM AND RECTOSIGMOID# | | 21050* |
| Rectosigmoid Junction | C19.9 | 21051 |
| Rectum | C20.9 | 21052 |

**Colorectal Cancer Mortality**

| Site Category | ICD-9 Codes | Recode Group Code@ |
|---|---|---|
| Colon excluding Rectum | 153.0 -153.9<br>159.0 | 21040 |
| Rectum and Rectosigmoid Junction | 154.0 -154.1 | 21050 |

@ Five-digit code identifying the recoded analysis category used in SEER computer programs
# Categories are aggregated from the groups indented under them.
* Indicates aggregated recode categories that are not assigned to individual cases but are used in calculating aggregate statistics.

# Appendix B

# Formulas for Rates

## Algorithms for Rates

### Crude Rate

A crude rate is the number of cases per 100,000 in a given population.

$$cruderate = \frac{count}{population} \times 100{,}000$$

### Age-Adjusted Rate

An age-adjusted rate is a weighted average of crude rates, where the crude rates are calculated for different age groups and the weights are the proportions of persons in the corresponding age groups of a standard population. Several sets of standard populations are included in SEER*Stat. These include the total U.S. populations (1940, 1950, 1960, 1970, 1980, and 1990), an estimate of the U.S. 2000 population, 1991 Canadian population, and the world population. The age-adjusted rate for an age group comprised of the ages x through y is calculated using the following formula:

$$aarate_{x-y} = \sum_{i=x}^{y} \left[ \left( \frac{count_i}{pop_i} \right) \times 100{,}000 \times \left( \frac{stdmil_i}{\sum_{j=x}^{y} stdmil_j} \right) \right]$$

where counti is the number of cases for the ith age group, popi is the relevant population for the same age group, and stdmili is the standard population for the same age group.

### Standard Error for a Crude Rate

This calculation assumes that the cancer counts have Poisson distributions.

$$SE_{crude} = \frac{\sqrt{count}}{population} \times 100{,}000$$

### Standard Error for an Age-Adjusted Rate

This calculation assumes that the cancer counts have Poisson distributions. Suppose that the age-adjusted rate is comprised of age groups x through y.

$$SE_{AArate} = \left[ \sum_{i=x}^{y} \left( \frac{stdmil_i}{\sum_{j=x}^{y} stdmil_j} \right)^2 \times \left( \frac{count_i}{population_i^2} \right) \right]^{1/2} \times 100{,}000$$

### Crude Rate Confidence Intervals

The endpoints of a p ? 100% confidence interval are calculated as:

$$CI_{low} = \frac{\left( \frac{1}{2} \left( ChiInv\left( \frac{p}{2}, 2 \times count \right) \right) \right)}{population} \times 100{,}000$$

$$CI_{high} = \frac{\left( \frac{1}{2} \left( ChiInv\left( 1 - \frac{p}{2}, 2 \times (count + 1) \right) \right) \right)}{population} \times 100{,}000$$

where Chi Inv(p,r) is the inverse of the chi-squared distribution function evaluated at p and with r degrees of freedom, and we define Chi Inv (p,0) = 0.

Although the normal approximation may be used with the standard errors to obtain confidence intervals when the count is large, we use the above exact method that holds even with small counts (see Johnson and Kotz, 1969, or Fay and Feuer, 1997). When the count is large the 2 methods produce similar results.

**Age-Adjusted Rate Confidence Intervals**

Suppose that the age-adjusted rate is comprised of age groups x through y, and let:

$$w_i = \frac{stdmil_i}{\left( pop_i \times \sum_{j=x}^{y} stdmil_j \right)}$$

$$w_m = \max\left( w_i \right)$$

$$v = \sum_{i=x}^{y} \left( w_i^2 \times count_i \right)$$

The endpoints of a p x 100% confidence interval are calculated as:

$$CI_{low} = \left( \frac{v}{2 \times rate} \right) \times \left( ChiInv\left( \frac{p}{2}, \frac{\left( 2 \times rate^2 \right)}{v} \right) \right) \times 100{,}000$$

$$CI_{high} = \left( \frac{v + w_m^2}{2\left( rate + w_m \right)} \right) \times \left( ChiInv\left( 1 - \frac{p}{2}, \frac{2\left( rate + w_m \right)^2}{\left( v + w_m^2 \right)} \right) \right) \times 100{,}000$$

This method for calculating the confidence interval was developed in Fay and Feuer (1997). The method produces similar confidence limits to the standard normal approximation when the counts are large and the population being studied is similar to the standard population. In other cases, the above method is more likely to ensure proper coverage.

**Note**

The rate used in the above formulas is not per 100,000 population.

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