



SCHS Studies

A Publication of the State Center for Health Statistics

1908 Mail Service Center • Raleigh, NC 27699-1908
(919) 733-4728 • www.schs.state.nc.us/SCHS

No. 161

February 2010

Colorectal Cancer Incidence, Mortality, Stage at Diagnosis, and Treatment Patterns among Whites and African Americans in North Carolina

by

Sohrab Ali, MPH, MIS, MA, Statistician

Seth Tyree, MA, Epidemiologist

Abstract

Objectives: This study examines colorectal cancer incidence and mortality, as well as stage at diagnosis and treatment patterns among whites and African Americans in North Carolina.

Methods: Data from the North Carolina Central Cancer Registry (CCR) on new colorectal cancer cases were used to examine the racial differences in incidence, stage at diagnosis, and treatment. Data on colorectal cancer deaths were obtained from the Vital Statistics unit of the State Center for Health Statistics. Data from the North Carolina Behavioral Risk Factors Surveillance System (BRFSS) were used to examine screening behavior, smoking, diet, exercise, and obesity.

Results: The age-adjusted colorectal cancer incidence rates and mortality rates for African Americans are substantially higher than those for whites. Mortality is higher when colorectal cancer is diagnosed at a later stage for both whites and African Americans, and African Americans are more likely to be diagnosed with distant stage colorectal cancer compared to whites. African Americans were somewhat less likely to receive surgery, chemotherapy, and/or radiation therapy. Colorectal cancer mortality rates for both whites and African Americans have been declining in recent years.

Conclusions: The results of this study indicate that racial disparities in colorectal cancer incidence and mortality rates persist in North Carolina. African Americans are less likely to receive appropriate screening and less likely to engage in behaviors that reduce the risk of developing or dying from colorectal cancer.

Introduction

In the United States, colorectal cancer ranks as the fourth most common cancer and the second leading cause of cancer-related deaths in both men and women. The American Cancer Society has estimated that in the United States there will be 153,760 new colorectal cancer cases and 52,180 deaths as a result of colorectal cancer in 2007.¹

The North Carolina Central Cancer Registry (CCR) is responsible for monitoring the cancer burden on the citizens of North Carolina. All health care providers are required by law to report all cancer cases diagnosed or treated in North Carolina to the CCR. Every year, about 4,311 men and women are diagnosed with colorectal cancer and 1,511 die as a result of colorectal cancer. Between 2002 and 2006, there were 20,843 new colorectal cases diagnosed in North Carolina. The age-adjusted incidence rate for this five-year period was 48.4 cases per 100,000² (using the 2000 U.S. standard population). During the same time period, there were 7,518 deaths as a result of colorectal cancer in North Carolina. The age-adjusted mortality rate for this five-year period was 17.8 per 100,000.³ It is estimated that there will be 4,425 new colorectal cancer cases and 1,645 deaths in 2007.⁴

Racial differences in colorectal cancer incidence rates, survival rates, and mortality rates have been well-documented. Irby et al. found that colorectal cancer rates were higher among African-American men and women than white men and women.⁵ Mayberry et al. showed that African-American men and women have lower survival rates and higher mortality rates than whites among patients with early stage colorectal cancer. The authors of this study found that this disparity was primarily due to stage at diagnosis as African-American patients were more likely to be diagnosed with advanced stage disease than white patients.⁶

Further, available data suggest that colorectal cancer treatment guidelines have had limited impact on the management of colorectal cancer in community practice and on racial disparities in standard treatment modalities. Baldwin et al., for instance, found that African-American patients were less likely to receive chemotherapy than white patients.⁷ Morris et al. showed that treatment patterns vary across racial lines. Specifically, they found that African Americans were more likely to receive sphincter-ablating procedures, which are thought to

result in a lower quality of life compared with sphincter-sparing procedures. They also found that African Americans are less likely to receive radiation treatment when controlling for stage and other variables.⁸

This study describes colorectal cancer incidence and mortality trends (1990–2006), stage at diagnosis, and colorectal cancer treatment patterns among whites and African Americans in North Carolina.

Specific Objectives of the Study

- 1) To examine colorectal cancer incidence, stage at diagnosis and mortality differences between whites and African Americans in North Carolina.
- 2) To assess racial differences in colorectal cancer treatment patterns in terms of the National Comprehensive Cancer Network's (NCCN) guidelines for colorectal cancer care.
- 3) To examine racial disparities in screening, smoking, diet, exercise, and obesity, which are known risk factors associated with colorectal cancer.

Methods

Data on North Carolina colorectal cancer cases were obtained from the North Carolina Central Cancer Registry (CCR). The CCR operates under the authority granted in the North Carolina General Statute 130A-208. All health care providers are required by law to report cases to the CCR. Hospitals are the primary source of data. The CCR supplements hospital data with reports from physicians who diagnose cases in a non-hospital setting. The CCR also collects data from pathology laboratories and freestanding treatment centers. Data on colorectal cancer deaths were obtained from the vital statistics unit of the State Center for Health Statistics (SCHS). Population data from the National Center for Health statistics (NCHS) were used in the denominators of the rates, which are expressed per 100,000 population. Five-year (2002–2006) incidence and mortality rates for whites and African Americans were calculated to assess racial differences in colorectal cancer. Rates for the 17 year period 1990–2006 were used to examine trends in colorectal cancer incidence and mortality among whites and African Americans. Three-year overlapping rates were used to improve stability over time. Rates were age-adjusted to the 2000 United States population. Percentages for stage at diagnosis were calculated for

the 2002–2006 period. Stage at diagnosis was defined according to SEER Summary Stage guidelines as in-situ, localized, regional, distant, and unknown/unstaged. Data on colorectal cancer treatment was categorized into surgery, chemotherapy, and radiation therapy.

The analysis for treatment was performed for the five year period 2002–2006 because national standards required more complete treatment data starting in 2001. Information about colorectal cancer treatment is categorized into surgery, chemotherapy, and radiation therapy. The National Comprehensive Cancer Network’s (NCCN) guidelines for treatment of cancers of the colon and rectum are as follows:

Treatment of Colon Cancer

In situ and localized tumors of the colon may be treated with surgery. Regionally extended tumors (direct extension, regional lymph node involvement, or both) may be treated with both surgery and adjuvant chemotherapy. Treatment for distant disease varies according to location and magnitude of the metastases. Treatment may include additional surgery of the metastatic site, radiation therapy, and/or multi-agent chemotherapy.⁹

Treatment of Rectal Cancer

If surgery of an *in situ* carcinoma of the rectum completely removes the entire tumor the patient may be followed with close observation alone. Combined-modality therapy consisting of surgery, radiation therapy, and chemotherapy is recommended for the majority of patients with localized or regional disease. Adjuvant therapy regimens include both concurrent chemotherapy/radiation therapy and adjuvant chemotherapy. Resection is the standard of care for local treatment of metastatic

disease. Patients with distant disease may receive pre-operative chemoradiation in order to convert an unresectable tumor to one that is resectable. Single or multi-agent chemotherapy may be administered.⁹

Since treatment guidelines vary by stage and cancer site, treatment patterns were reported by stage for colon and rectum separately.

Data on screening and behavioral variables were obtained from the North Carolina Behavioral Risk Factor Surveillance System.¹¹

Results

Incidence and Mortality Trends

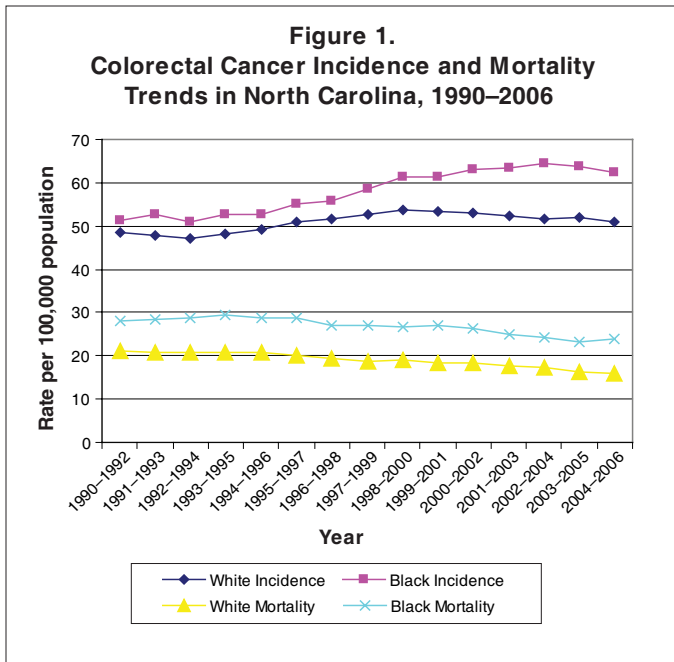
Between 2002 and 2006, there were 16,231 new colorectal cancer cases reported for whites and 4,274 reported for African Americans. Incidence and death rates by race (2002–2006) are presented in Table 1. The five year age-adjusted incidence rate for whites is 46.5. The five-year age-adjusted colorectal cancer incidence rate for African Americans is 57.3 per 100,000 population, which is 1.23 times as high as the rate for whites.

As can be seen in Figure 1, between 1990 and 2006, African-American rates have been consistently higher than white rates, with the gap widening since 2000. The colorectal cancer incidence rates for African-American males and white males were similar until 1998, when the rates for African-American males began to increase and the difference between African-American males and white males began to grow (Figure 2). A difference in rates between African-American females and white females has been apparent since 1990 (Figure 3). Regardless of race, men showed a consistently higher colorectal cancer incidence rate than women. The

Table 1. Colorectal Cancer Incidence and Death Rates for African Americans and Whites in North Carolina, 2002–2006

Race	Incidence		Mortality	
	Number of Cases	Rate*	Number of Deaths	Rate*
African American	4,274	57.3	1,717	23.9
White	16,231	46.5	5,714	16.5

* Rates are age-adjusted and expressed per 100,000 population.



2002–2006 colorectal cancer incidence rate for North Carolinians as a whole (48.4) is slightly lower than the rate for the 17 SEER geographic regions (49.1).¹⁰

Between 2002 and 2006, 7,518 North Carolinians died of colorectal cancer, including 5,714 whites and 1,717 African Americans (Table 1). The rate at which African Americans died of colorectal cancer (23.9) was 1.45 times as high as the rate at which whites died (16.5). As can be seen in Figure 1, the colorectal cancer mortality rates for both whites and African Americans have been steadily decreasing since 1995. While this is encouraging, it is discouraging to see that the difference between African-American and white rates has remained consistent, with African Americans having substantially higher death rates across the period. The 2002–2006 colorectal cancer mortality rate for North Carolinians as a whole (17.7) is slightly lower than the rate for the 17 SEER geographic regions (18.2).¹⁰

Stage at Diagnosis

The stage distribution for colorectal cancer cases diagnosed between 2002 and 2006 is presented in Figure 4. Percentages for five stage categories were reported: in-situ, localized, regional, distant, and unknown/unstaged. Tracking the rates of late stage (distant) cancers is a good method to assess the impact of cancer screening. If individuals are being screened as recommended, then more cancers should be detected

in early stages, and fewer cancers should be detected in late stages. Whites were diagnosed with localized tumors 37 percent of the time, while African Americans were diagnosed with localized tumors 33 percent of the time. Conversely, whites were diagnosed with distant tumors 16 percent of the time, while African Americans were diagnosed with distant tumors 19 percent of the time.

Treatment

Treatment patterns by cancer type, race, and stage at diagnosis are presented in Table 2. The observed patterns reveal a smaller than expected percentage of patients with regional disease receiving chemotherapy and/or radiation therapy. This is true of both African American and white patients. This is likely due to treatment data being unavailable to the hospital-based cancer registrar at the time the case was abstracted. Because the majority of patients receive chemotherapy in a private physician practice (instead of the hospital), it can be very challenging to obtain treatment information after the patient leaves the hospital.

Discussion

This paper presents descriptive results for colorectal cancer incidence, mortality, stage at diagnosis, and treatment patterns among whites and African Americans. These results indicate that African Americans are diagnosed with colorectal cancer and die from colorectal

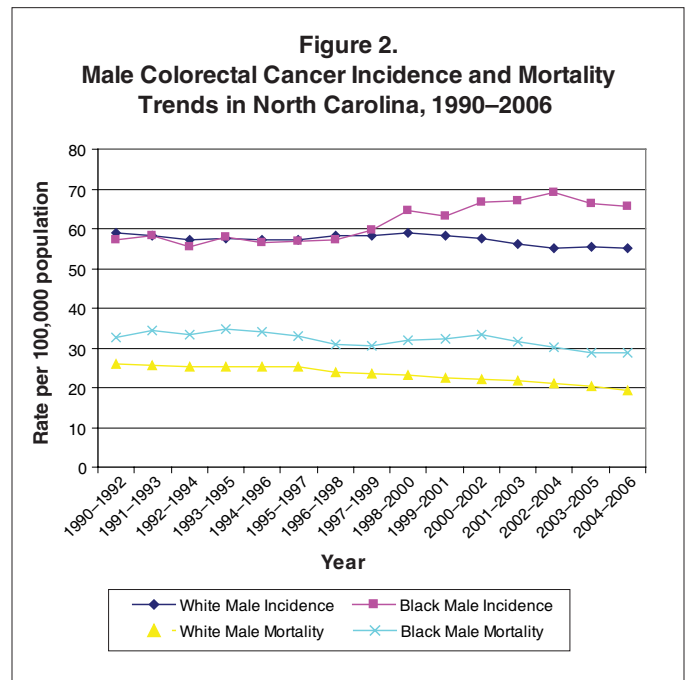
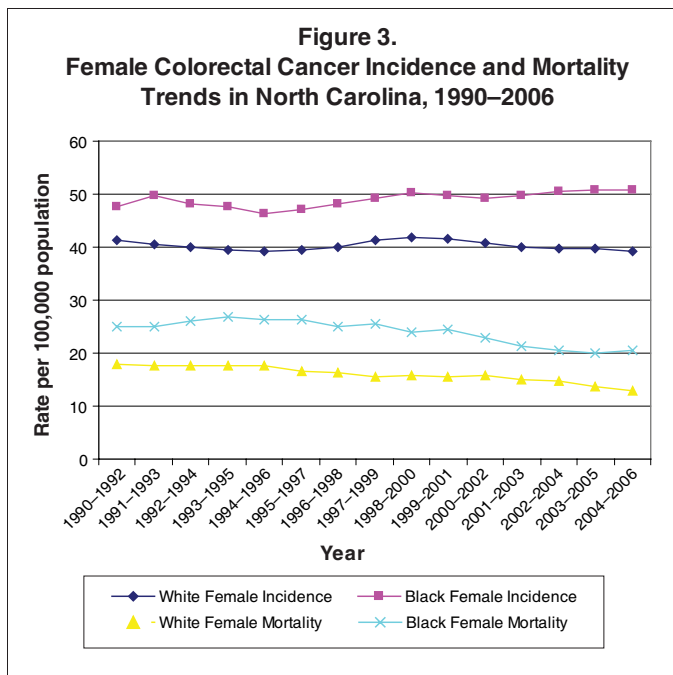


Figure 3.
Female Colorectal Cancer Incidence and Mortality Trends in North Carolina, 1990–2006



cancer at higher rates than whites. Furthermore, African Americans are less likely to be diagnosed with localized cancer and more likely to be diagnosed with distant cancer. Thus, the higher colorectal cancer mortality rates observed in African Americans appear to be due to both a higher incidence rate and more advanced stage of disease at time of diagnosis.

Although the incidence of colorectal cancer has slightly declined in recent years, it remains a major cause of illness and death in North Carolina.

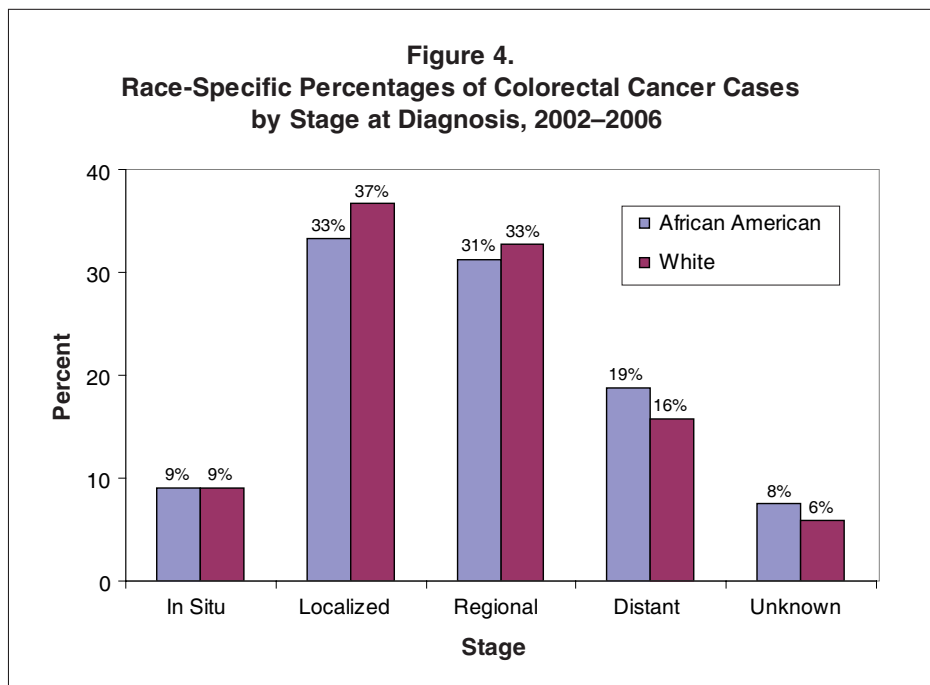
Early detection and proper treatment are important factors in reducing colorectal cancer mortality. Increased attention to improving screening rates for colorectal cancer can lead to earlier diagnosis and more effective treatment. In 2008, the North Carolina Behavioral Risk Factor Surveillance System (BRFSS) results indicated that sigmoidoscopy/colonoscopy rates are higher among whites (68.9%) compared to African Americans (61.9%).¹¹ These higher colorectal cancer screening rates may be the primary reason for earlier diagnosis of colorectal cancer among whites. These results suggest the need for increased preventive colorectal cancer

screenings for African Americans, so that more cancer cases can be diagnosed at an earlier stage. This may reduce racial disparities in colorectal cancer mortality.

BRFSS data also reveal racial disparities for several lifestyle-related factors that have been linked to colorectal cancer. The links between weight, exercise and diet and colorectal cancer risk are very strong. According to the 2008 BRFSS survey, whites are more likely than African Americans to engage in physical activity (77.4% vs. 71.3%) and more likely to maintain a BMI less than 25 (36.7% vs. 24.6%). The 2005 survey indicated that whites are more likely than African Americans to consume the recommended daily amount of fruits and vegetables (24.2% vs. 17.2%).¹¹

Factors such as socioeconomic status may partially account for the reported racial differences, but were not accounted for in this study. An additional limitation of this study is the completeness of the treatment data. The reporting of treatment has only recently become required, and the amount of unknown data on chemotherapy and radiation therapy is still too high. Much of this has to do with underreporting by non-hospital sources, and thus, it is important that reporting by non-hospital sources improves before disparities in treatment can be adequately addressed. However, these findings suggest that screening among African Americans needs to improve so as to detect colorectal cancer earlier, when it can still be treated effectively.

Figure 4.
Race-Specific Percentages of Colorectal Cancer Cases by Stage at Diagnosis, 2002–2006



**Table 2. Percentage of Colorectal Cancer Treatments
by Type, by Race, and Stage at Diagnosis, North Carolina 2002–2006**

			In Situ	Localized	Regional	Distant	Unknown/ Unstaged
Colon	White	% Surgery	94.0	96.5	98.7	73.2	18.8
		% Radiation	0.1	0.8	2.7	5.5	0.7
		% Chemo	0.2	7.2	43.2	53.4	6.3
	African American	% Surgery	91.9	94.1	98.4	67.4	17.5
		% Radiation	0.0	0.7	2.3	5.4	0.9
		% Chemo	0.3	6.6	43.1	49.8	4.2
Rectum	White	% Surgery	91.6	88.3	92.9	51.8	29.4
		% Radiation	1.2	27.4	56.1	38.2	24.4
		% Chemo	1.2	28.1	68.9	66.1	24.1
	African American	% Surgery	91.4	84.9	91.3	49.2	31.5
		% Radiation	2.5	21.2	60.5	29.4	12.6
		% Chemo	2.5	22.5	73.3	58.8	12.6

Note: The data here pertain to treatments rather than cases; a case is counted more than once within a column if more than one type of treatment was received. Cases with unknown treatment type were omitted from this table.

References

1. American Cancer Society. Cancer Facts and Figures, 2007.
2. North Carolina State Center for Health Statistics. Cancer Incidence in North Carolina, 2007. Accessed October 12, 2007. Available at: www.schs.state.nc.us/SCHS/data/cancer.cfm.
3. North Carolina State Center for Health Statistics. Cancer Mortality in North Carolina, 2007. Accessed October 12, 2007. Available at: www.schs.state.nc.us/SCHS/data/cancer.cfm.
4. North Carolina State Center for Health Statistics. Cancer Projections for North Carolina, 2007. Accessed October 12th, 2007. Available at: www.schs.state.nc.us/SCHS/data/cancer.cfm.
5. Irby K, Anderson WF, Henson DE, Devesa SS. Emerging and widening colorectal carcinoma disparities between Blacks and Whites in the United States (1975–2002). *Cancer Epidemiol Biomarkers Prev* 2006 Apr; 15(4):792–7.
6. Mayberry RM, Coates RJ, Hill HA, Click LA, Chen VW, Austin DF, Redmond CK, Fenoglio-Preiser CM, Hunter CP, Haynes MA, et al. Determinants of black/white differences in colon cancer survival. *J Natl Cancer Inst* 1995 Nov 15; 87(22):1686–93.
7. Baldwin LM, Dobie SA, Billingsley K, Cai Y, Wright GE, Dominitz JA, Barlow W, Warren JL, Taplin SH. Explaining black-white differences in receipt of recommended colon cancer treatment. *J Natl Cancer Inst* 2005 Aug 17; 97(16): 1211–20.

8. Morris AM, Billingsley KG, Baxter NN, Baldwin LM. Racial disparities in rectal cancer treatment: a population-based analysis. *Arch Surg* 2004 Feb; 139(2); 151–5.
9. The NCCN Clinical Practice Guidelines in Oncology™ Colon Cancer and Rectal Cancer (v.3.2009). © 2009 National Comprehensive Cancer Network, Inc. Available at: www.nccn.org.
10. Horner MJ, Ries LAG, Krapcho M, Neyman N, Aminou R, Howlander N, Altekruse SF, Feuer EF, Huang L, Mariotto A, Miller BA, Lewis DR, Eisner MP, Stinchcomb DG, Edwards BW (eds.). SEER Statistics Review, 1975–2006, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2006, based on November 2008 SEER data submission, posted to the SEER Web site, 2009.
11. North Carolina Department of Health and Human Services, Division of Public Health, State Center for Health Statistics, Behavioral Risk Factor Surveillance System (BRFSS). Available at: www.schs.state.nc.us/SCHS/data/cancer.cfm.

For more information about this publication, contact:

Sohrab Ali at (919) 715-8036
Email: Sohrab.Ali@dhhs.nc.gov

Seth Tyree at (919) 715-7474
Email: Seth.Tyree@dhhs.nc.gov

For a list of other publications by the
State Center for Health Statistics call:
(919) 733-4728

Or check the Web site at:
www.schs.state.nc.us/SCHS

Acknowledgements

The authors would like to thank

Karen Knight, Director of the North Carolina Central Cancer Registry,
Chandrika Rao, Statistical Supervisor/Assistant Director of the North Carolina Central Cancer Registry,
Sandra Overton, QC/FS Manager of the North Carolina Central Cancer Registry, and
Paul Buescher, Former Director of the State Center for Health Statistics
for their valuable contributions to this study.

The incidence data used in this publication were collected by the North Carolina Central Cancer Registry,
which participates in the National Program of Cancer Registries (NPCR) of
the Centers for Disease Control and Prevention (CDC).

The Central Cancer Registry acknowledges the CDC for its financial support of this project
under cooperative agreement 5U58DP000832-03.

The contents of this report are the responsibility of the authors
and do not necessarily represent the views of the CDC.

State of North Carolina
Beverly Eaves Perdue, Governor

Department of Health and Human Services
Lanier M. Cansler, Secretary
www.ncdhhs.gov

Division of Public Health
Jeffrey P. Engel, M.D., State Health Director
www.ncpublichealth.com

Chronic Disease and Injury Section
Ruth Petersen, M.D., M.P.H., Chief



State Center for Health Statistics
Karen L. Knight, Director
www.schs.state.nc.us/SCHS

The North Carolina Department of Health and Human Services does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. 02/10

Department of Health and Human Services
State Center for Health Statistics
1908 Mail Service Center
Raleigh, NC 27699-1908
919-733-4728