

Disparities Between Blacks and Whites in Stage at Diagnosis, Incidence, and Anatomic Subsite of Colorectal Cancer

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Keywords

Disparity, colorectal cancer, morbidity, mortality

Abstract:

Background A disparity in colorectal cancer (CRC) incidence and mortality has been reported for black men and women in the United States.

Objective To determine the magnitude and direction of temporal change in black/white disparity, by anatomic subsites of the colon and rectum.

Design Population-based, epidemiologic study.

Setting Pennsylvania, 1997–2002.

Measurements Black/white ratios of the percentage of cases diagnosed at late stage and of age-adjusted incidence rates, by anatomic subsite, for four 3-year time periods.

Results In 2000–2002, 54.6% of CRC cases among blacks were diagnosed at late stage, compared with 51.3% among whites. The percentage of cases in the cecum, transverse colon, splenic flexure, descending colon, sigmoid colon, rectum, and recto-sigmoid diagnosed at a late stage was larger among blacks than among whites. The disparity in the percentage of cases diagnosed at a late stage in the colon and rectum, transverse colon, and descending colon increased during the study period ($P < .05$). In 2000–2002, incidence was greater among blacks (64.1/100,000) than among whites (59.8/100,000). Incidence for segments of the proximal colon tended to be higher among blacks than among whites. The disparity in the incidence in the transverse colon increased during the study period ($P = .021$), while the increase in the disparity in the appendix approached statistical significance ($P = .051$).

Limitations The effect of race may have been confounded by unavailable data, including socioeconomic position.

Conclusions The black/white disparity in the percentage of cases diagnosed at late stage increased during the study period. The disparity in the percentage of cases diagnosed at a late stage and incidence for the transverse colon also increased. Efforts to increase screening for CRC, especially among blacks, should be enhanced.

Cancer is the second leading cause of death in the United States, with cancer of the colon and rectum the third most common site for fatal cancer in both men and women.¹ The expenditure for treatment of colorectal cancer (CRC) in the United States is approximately \$5 billion per year.² Rates of CRC incidence and mortality for black men and women are higher than rates for men and women of other racial or ethnic groups,¹ constituting a health disparity for blacks.³

Randomized and observational studies have demonstrated that early detection and treatment of early-stage cancer or precancerous lesions in the colon and rectum can reduce CRC morbidity and mortality.⁴ According to the American Cancer Society, CRC screening in average-risk individuals should begin at 50 years of age with one of the five following procedures and frequency: fecal occult blood test (FOBT) or fecal immunochemical test (FIT) every year; flexible sigmoidoscopy every 5 years; FOBT or FIT test every year in addition to flexible sigmoidoscopy every 5 years; double contrast barium enema every 5 years; colonoscopy every 10 years.⁴ A positive test result for any of the first four procedures may be followed with a colonoscopy to remove precancerous polyps or to diagnose early stage cancer.

Unfortunately, screening is not utilized as frequently as recommended. In Pennsylvania, during 2004, 74% of adults 50 years of age and older reported not having a home FOBT in the past 2 years and 46% reported never having had a sigmoidoscopy or colonoscopy.⁵ No statistically significant differences by race or gender were observed for either screening procedure. Interestingly, Pennsylvania respondents with less education and lower household income were more likely to report a home FOBT in the past 2 years than those with more education and higher household income, respectively. A review of colorectal cancer epidemiology also reported no difference in CRC screening by race,⁶ but a study of Medicare beneficiaries found that colonoscopy, sigmoidoscopy, and barium enema were used less frequently among blacks than among whites.⁷

Previous studies have reported differences in the epidemiology of CRC by anatomic subsite. Recent studies have reported an increase since the mid-1980s in the rate and proportion of CRC that occurs in the right, or proximal, side of the large intestine. In addition, blacks have had more right-sided CRC than whites, who have had more right-sided CRC than Asian/Pacific Islanders.⁸⁻¹¹ These epidemiologic patterns, coupled with molecular differences¹² and treatment observations,^{13,14} have led investigators to posit that there are substantial differences in the etiology of right-sided and left-sided CRC.¹⁵

Recognizing that a cancer disparity in CRC incidence has been reported for blacks and that previous studies have suggested epidemiologic differences by anatomic subsite within the colon and rectum, the objectives of

this study were to: (1) confirm whether there was a disparity for blacks, relative to whites, in the incidence and stage at diagnosis of CRC in Pennsylvania; (2) determine whether disparities have been changing over time, and (3) if disparities have been changing over time, determine the direction and magnitude of change. Difference in rates and percentages for anatomic subsites of the colon and rectum were of particular interest.

Methods

We used 1997–2002 Pennsylvania Cancer Registry data for blacks and whites to calculate (1) the percentage of CRC that was diagnosed at late stage, and (2) the age-adjusted rate of CRC incidence. To increase the stability of the estimates, we calculated percentages and rates for the four 3-year time periods of 1997–1999, 1998–2000, 1999–2001, and 2000–2002. Percentages and rates were calculated for blacks and for whites for the following anatomic subsites: the colon and rectum (International Classification of Diseases for Oncology, second edition [ICD-O-2], C180-209; C260); colon excluding the rectum (C180-189; C260); rectum and rectosigmoid (C199; C 209); the large intestine not otherwise specified (NOS) (C188-189; C260); and each of the eight anatomic subsites of the colon (cecum, C180; appendix C181; ascending colon, C182; hepatic flexure, C183; transverse colon, C184; splenic flexure, C185; descending colon, C186; sigmoid colon, C187). Late stage at diagnosis was regional- and distant-stage disease, as defined by the SEER summary staging system. Rates were age-adjusted by the direct method to the Year 2000 US population. We calculated black/white ratios of percentages and rates to examine disparities between blacks and whites. To examine the temporal trend, we used least squares regression to regress time period on black/white ratios. Statistical tests were two-sided.

Results

From 2000 through 2002, 26,046 cases of invasive CRC were diagnosed among black and white Pennsylvania residents (Table 1). Among blacks, 54.6% of colorectal cancer cases were diagnosed at late stage, compared with 51.3% among whites. The percentage of cases in the cecum, transverse colon, splenic flexure, descending colon, sigmoid colon, rectum, and rectosigmoid diagnosed at a late stage was larger among blacks than among whites. In most anatomic subsites of the colon and rectum, the percentage of cancers diagnosed at late stage tended to be greater among blacks than among whites.

From 2000 through 2002, the age-adjusted rate of CRC in Pennsylvania was greater among blacks (64.1/100,000) than among whites (59.8/100,000)

Table 1. Number, Rate,* and Percentage Diagnosed at Late Stage for Colorectal Cancer, by Anatomic Subsite for Blacks and Whites, Pennsylvania 2000–2002

	Black			White		
	Number	Rate	Late Stage, %	Number	Rate	Late Stage, %
Colon and rectum	1,916	64.1	54.6	24,130	59.8	51.3
Colon excluding rectum	163	49.9	55.8	1,658	43.3	53.4
Appendix	20	0.6	46.1	227	0.6	48.8
Cecum	338	11.4	62.0	3,869	9.4	59.5
Ascending colon	261	8.8	53.9	3,269	7.9	56.1
Hepatic flexure	64	2.2	55.6	931	2.3	56.5
Transverse colon	133	3.8	59.6	1,562	4.4	57.1
Splenic flexure	60	2.0	66.2	592	1.5	58.6
Descending colon	117	2.4	60.5	956	3.9	50.9
Sigmoid colon	371	12.3	51.5	5,241	13.1	47.9
Rectum and rectosigmoid	430	14.2	50.2	6,513	16.5	45.9
Large intestine, NOS	122	4.2	38.8	970	2.3	41.1

* Rates (per 100,000) are age-adjusted using the direct method and the Year 2000 US population.

NOS = not otherwise specified.

Table 2. Black/White Ratio of Age-adjusted Rates* of Colorectal Cancer, by Anatomic Subsite and Time Period, Pennsylvania, 1997–2002

	1997–1999	1998–2000	1999–2001	2000–2002	Trend	P
Colon and rectum	1.07	1.07	1.06	1.07	0.00	.923
Colon excluding rectum	1.16	1.18	1.16	1.15	-0.01	.368
Appendix	0.67	0.83	0.83	1.00	0.10	.051
Cecum	1.32	1.31	1.21	1.21	-0.04	.090
Ascending colon	1.01	1.16	1.13	1.11	0.03	.430
Hepatic flexure	0.95	0.96	0.91	0.96	0.00	.774
Transverse colon	1.03	1.05	1.13	1.16	0.05	.021
Splenic flexure	1.80	1.40	1.43	1.33	-0.14	.158
Descending colon	1.54	1.58	1.68	1.63	0.04	.235
Sigmoid colon	1.01	1.01	0.94	0.94	-0.03	.081
Rectum and rectosigmoid	0.83	0.81	0.82	0.86	0.01	.358
Large intestine, NOS	1.68	1.68	1.95	1.83	0.07	.306

* Rates are age-adjusted using the direct method and the Year 2000 US population.

NOS = not otherwise specified.

(Table 1). Within the colon and rectum, the rate for colon excluding rectum, cecum, ascending colon, splenic flexure and large intestine, not otherwise specified (NOS), was greater among blacks than among whites. In general, incidence rates in segments of the proximal colon and rectum tended to be higher among blacks than among whites.

For each of the 3-year time periods, the age-adjusted incidence rate for the cecum, ascending colon, transverse

colon, splenic flexure, descending colon, and large intestine, NOS, among blacks was greater than the comparable rate among whites (Table 2). Age-adjusted incidence rates among blacks were lower than rates among whites for each of the time periods for the hepatic flexure and the rectum and recto-sigmoid; however, none of these trends was statistically significant. The trend for the black/white ratio in CRC incidence rate was positive and approached

Table 3. Black/White Ratio of the Percentage of Colorectal Cancer Diagnosed at Late Stage, by Anatomic Subsite and Time Period, Pennsylvania, 1997–2002

	1997–1999	1998–2000	1999–2001	2000–2002	Trend	P
Colon and rectum	1.02	1.04	1.04	1.06	0.01	.025
Colon excluding rectum	1.02	1.04	1.04	1.04	0.01	.073
Appendix	ND	1.23	1.23	1.46	0.12	.220
Cecum	1.06	1.09	1.09	1.04	-0.01	.693
Ascending colon	1.06	1.09	1.09	1.04	-0.01	.693
Hepatic flexure	1.01	1.00	0.98	0.98	-0.01	.069
Transverse colon	0.89	0.91	1.01	1.04	0.05	.029
Splenic flexure	1.11	1.00	1.13	1.13	0.02	.595
Descending colon	0.87	1.04	1.07	1.19	0.10	.031
Sigmoid colon	0.97	1.02	1.07	1.08	0.04	.051
Rectum and rectosigmoid	0.96	0.98	0.99	1.09	0.04	.120
Large intestine, NOS	1.25	1.16	0.93	0.94	-0.12	.071

NOS = not otherwise specified.

statistical significance for the appendix; however, the stability of the rates was limited because the number of cases for the appendix was only 945 during the entire 6-year study period. The trend for the black/white rate ratio was positive and statistically significant for the transverse colon. In general, the temporal trend for black/white ratio of incident rates did not exhibit a consistent pattern throughout the colon and rectum, although subsite-specific trends varied.

From 1997 through 2002, the percentage of cases diagnosed at late stage in the colon and rectum, colon, appendix, cecum, and ascending colon was greater among blacks than among whites (Table 3). The trend in percentage ratios was positive and statistically significant for colon and rectum, transverse colon and descending colon. In general, the temporal trend in the black/white ratio of the percentage diagnosed at late stage tended to increase in segments of the distal portion of the colon and rectum.

Discussion

In Pennsylvania, we found that blacks, when compared to whites, tend to have higher CRC incidence rates, overall. This is especially evident for anatomic subsites proximal to the sigmoid colon, a finding similar to data from the National Cancer Institute.¹⁶ However, this disparity in CRC incidence rates changed relatively little during the study period, with the only statistically significant change being an increase in the black/white incidence ratio for the transverse colon. Interestingly, Nelson and associates¹⁷ also reported an increase in the rate of CRC at the transverse colon. The cause of the disparity is unknown but potential factors include reduced access to healthcare and

screening services, especially screening with colonoscopy, and increased behavioral risks and comorbidities, such as obesity and diabetes. A recent meta-analysis found that the point estimate of risk from diabetes for proximal CRC was greater than the point estimate of risk for distal CRC; however, the interaction was not statistically significant and the authors concluded that there was no difference in risk across the colon and rectum.¹⁸

As noted previously, there was no difference between blacks and whites in the likelihood of undergoing FOBT within the past 2 years or of ever having had a screening colonoscopy or sigmoidoscopy.⁵ However, differences between blacks and whites in the rate of polypectomy may have contributed to observed disparities in incidence rates, despite the lack of difference in observed prevalence of colonoscopy. Unfortunately, race-specific rates of polypectomy are not available for Pennsylvania.

Similar to the National Cancer Institute,¹⁶ we observed that a greater percentage of blacks, when compared to whites, were diagnosed at late stage. These findings indicate an ongoing disparity in CRC for blacks relative to whites and point to the need for increased endoscopic screening among blacks. We observed that the relative overall percentage of CRC cases diagnosed at late stage for the transverse colon has been increasing over the study time period. Similarly, the disparity of CRC in the transverse colon between blacks and whites has also increased over the same time period. These data again suggest the need for additional studies to examine the epidemiology and etiology of CRC, particularly in blacks.

We also found a temporal increase in the relative black/white percentage of CRC in the descending colon diagnosed at late stage. This finding is particularly dis-

turbing in that asymptomatic CRC in the descending colon can be detected with any of the five recommended screening strategies. Again, the need for increased screening among blacks is evident.

There are at least four limitations to this study. First, we were able to analyze data for only 6 years; data from more years would enable us to examine a longer temporal period. Second, we did not have data on the socioeconomic position (SEP), which has been related to CRC incidence. Appalachian Pennsylvania, Kentucky, and West Virginia, a geographic area that has a high proportion (95%) of whites and a relatively low SEP level, were found to have an increased rate of CRC incidence and an increased percentage of cases diagnosed at late stage.¹⁹ Previous investigators have posited that the colorectal cancer incidence in the San Francisco Bay area was related to both race/ethnicity and socioeconomic position.²⁰ During 2000 in Pennsylvania, the median household income for blacks (\$27,415) was reported lower than that for whites (\$41,642).²¹ These factors suggest that SEP, in addition to race, may be important in the increased CRC rate.

Third, this study is possibly limited by our use of specific anatomic subsites. The validity of the anatomic subsite of CRC in cancer registry data is unknown. However, for 5 of the 6 years of data included in this study, the Pennsylvania Cancer Registry was recognized as being of the highest quality by the North American Association of Central Cancer Registries.²² Also, our use of specific anatomic subsites may have caused us to miss findings for segments of the colon composed of several specific subsites. Despite our use of specific subsites, we were able to observe an important temporal trend in the transverse colon. In addition, a single method for grouping anatomic subsites into segments of the colon has not been universally adopted by both epidemiologists and clinicians. Finally, we did not examine gender and race-specific rates because the number of cases among blacks was relatively small and would have obscured important differences. For example, incidence of proximal colon cancer has been observed to be increasing among black men but not black women.

Despite these limitations, the current study is significant for several reasons. First, we report evidence for an ongoing disparity in CRC incidence and stage at diagnosis for blacks, relative to whites, in Pennsylvania. Second, we found evidence that a disparity in CRC incidence may be more pronounced in anatomic subsites of the colon. These findings support continued examination of the epidemiology, screening and treatment of CRC by anatomic subsite, particularly in the context of disparities by race and SEP. Finally, these data support efforts to increase CRC screening among blacks in Pennsylvania, which is one of 30 states that has not enacted a law that addresses third-party coverage for colorectal cancer screening.²³

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