Racial Clustering and Access to Colorectal Surgeons, Gastroenterologists, and Radiation Oncologists by African Americans and Asian Americans in the United States

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**Background:** Minority groups have poor access to quality health care services. This is true of colorectal cancer care and may be related to both geographical proximity and use of surgical, gastroenterology, and radiation oncology services. Without suitable access, many minority patients may present with advanced colorectal cancer and be less likely to receive appropriate adjuvant therapies. We sought to examine the variations in geographical access among minorities at a county level.

**Design:** A retrospective analysis was performed using data from the Area Resource File. Multivariate linear regression analysis was performed to identify the variations in access to colorectal surgeons, gastroenterologists, and radiation oncologists.

**Setting:** All counties in the United States.

**Participants:** Prevalence rate of African Americans and Asian Americans within a county.

**Main Outcome Measure:** Rate of colorectal surgeons, gastroenterologists, and radiation oncologists.

**Results:** Unadjusted analysis revealed that each percentage point increase in the African American population within a county was associated with a decrease in the number of specialists within that county. Multivariate analysis also revealed a statistically significant decrease in the number of gastroenterologists ($P < .001$) and radiation oncologists ($P < .001$) with each percentage point increase in the African American population and a trend toward a decrease in colorectal surgeons within that county ($P = .28$). Each percentage point increase in the Asian American population was associated with a significant increase in the number of gastroenterologists ($P < .001$) and radiation oncologists ($P < .001$) with a similar trend toward an increase in the number of colorectal surgeons within that county ($P = .13$).

**Conclusion:** Increasing numbers of minority patients in counties is accompanied by a differential access to specialists. This may affect the likelihood of a patient to receive appropriate care.

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**African Americans** with colorectal cancer have higher mortality than non-African Americans with colorectal cancer despite the overall declines in the incidence and mortality due to this disease among the entire US population. The explanation for this discrepancy is poorly understood. Previous attempts made to examine the interaction and contribution of characteristics of socioeconomic status, health insurance, and physician provider (hereafter referred to as “provider”) have largely been inconclusive. A wide racial disparity exists in early stage diagnosis of colorectal cancer. Residential factors have previously been implicated as affecting both access and outcome. Racial clustering and segregation have been shown to be significant predictors of infant mortality. The greater the extent of segregation, the higher the infant mortality. Less has been reported about the specific effects of residential segregation on colon cancer mortality, but the possibility of differential access, as determined by variations in geographic availability of subspecialty providers, has been implicated as a possible cause of delay in screening. Indeed, African Americans living in highly segregated areas have a higher incidence and mortality of gastrointestinal tract cancers.

Different counties in the United States have varying health care resources, the
availability and use of which may vary. A recent study has implicated increased distance to point of care in counties as contributing to decreased access by minority patients and, thus, having a potential role in the disparities observed among minority groups. Findings from previous studies have shown that endoscopic colon cancer screening is low among some minority groups and is lowest among African Americans. The increased distance traveled may serve as a deterrent to seek care farther away for what is deemed an asymptomatic condition. Therefore, this population as a whole may be less likely to undergo endoscopic screening or be diagnosed at an early stage of colorectal cancer. Because endoscopy is the mainstay of diagnosis, strategies to allow early diagnosis have been proposed to reduce these disparities. Geographic availability of endoscopists within a county may affect the willingness and feasibility of the patient to present for endoscopic screening. Without adequate availability, minority patients may continue to present with advanced colorectal disease. In addition to lower screening rates, minority patients (African Americans in particular) are also less likely to receive appropriate adjuvant therapies such as chemotherapy and radiotherapy. Zhang et al identified differences in 30-day mortality rates for colon cancer between African Americans and Asian Americans with African Americans having the higher rates. These differences may be exacerbated by limited access to providers such as radiation oncologists in the counties in which these minority patients live. In this vein, racial disparities in access may be affected by residential area and racial clustering within counties in the United States. We sought to examine the relationship between varying rates of ethnic minorities and the availability of colorectal surgeons, gastroenterologists, and radiation oncologists within counties in the United States.

METHODS

A retrospective analysis was performed on data from the 2004 version of the Area Resource File (US Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions, Rockville, Maryland), a nationwide database of health care, economic, and demographic sources including the American Medical Association, American Hospital Association, US Census Bureau, Centers for Medicare and Medicaid Services, Bureau of Labor Statistics, Veterans' Affairs, and the National Center for Health Statistics comprising aggregate data collected from all 3219 counties in the United States. This is the largest such composite health care data set bearing more than 6000 variables of socioeconomic, health, and demographic details including those from the last US census conducted in April 2000. Different geographical codes are included in the data set including Federal Processing Information Standard state codes, metropolitan-micropolitan statistical area codes, urban/rural continuum codes, typology codes, economic area codes, and region codes allowing these data to be easily aggregated to higher geographic levels. Sampling error was minimized as the data from all the counties in the United States were used.

Unadjusted and multivariate analyses were performed to examine the relationships between racial ethnicity and the various indices of access to colorectal screening as determined by opportunity and the geographic availability of gastroenterologists, colorectal surgeons, or radiation oncologists within a county. These variables included the rates of each of these providers within the county. The independent variables were prevalence rates of African Americans and Asian Americans in a county. County-level independent variables including socioeconomic characteristics (number of privately insured and median household income) and education status (rate of population with a high school diploma) were used in the adjustment. The extent of urbanization was estimated using the rural-urban continuum code.

We used commercially available software (STATA Intercooled version 10; StataCorp; College Station, Texas). Similar to Xirasagar et al, we used linear regression analysis rather than logistic regression to mimic past authors in the analysis of personal level data from national surveys. We sought to assess the net effect of the proportion of specific minority groups on the opportunity to use subspecialty resources in a county for which linear regression analysis of county-level data serves best. The ecological correlations described were computed without the extra refinement of weighting by the proportion of minority groups in each county. This decision has been reaffirmed in previous research in which ecological correlations have been described as being negligible. The US Department of Health and Human Services uses weighted, sequential, hot-deck imputation for missing values in the data set.

RESULTS

Unadjusted analysis revealed that each percentage point increase in African American population in a county was associated with a decrease in the number of colorectal surgeons, gastroenterologists, and radiation oncologists. Multivariate analysis revealed a statistically significant decrease in the number of gastroenterologists ($P < .001$) and radiation oncologists ($P < .001$) with each 1% increase in African American population and a trend toward a decrease in colorectal surgeons in a given county ($P = .28$). Each percentage point increase in the Asian American population, however, was associated with a significant increase in the number of gastroenterologists ($P < .001$) and radiation oncologists ($P < .001$) that persisted on adjusting for socioeconomic status and demographic differences within the county with a trend toward an increase in the number of colorectal surgeons ($P = .13$).

COMMENT

African Americans have the worst outcomes from colorectal cancer of all ethnic subgroups in the United States. The causes of this is multifactorial and the literature is rife with articles implicating the delay in diagnosis in African Americans as a potential cause of their lower survival. This is further complicated by the pathophysiology in African Americans who more commonly present with right-sided colon cancer and have a higher prevalence of more advanced adenomas. This has resulted in the acceptance of colonoscopy as a more appropriate diagnostic test than sigmoidoscopy, particularly for this population. Clinical gastroenterologists are better suited and skilled to perform full colonoscopy as opposed to primary care physicians whose skill set may be restricted to sigmoidoscopy. This underscores the leading
role that clinical gastroenterologists should have in facilitating the early diagnosis of colon cancer in African Americans. In this article we identified that an increasing percentage of African Americans within a county is associated with a decrease in the geographical availability of gastroenterologists, radiation oncologists, and colorectal surgeons. This association was not observed with increasing the percentage of Asian Americans in any given county. Indeed, articles estimate that African Americans are approximately 20% less likely to undergo colonoscopy compared with other races.20,21 Murff and colleagues10,22 established that even among African Americans who have multiple first-degree relatives diagnosed with colorectal cancer, a decreased likelihood to undergo the recommended screening tests despite an awareness of the family history still exists. The most common reason for not having the screening tests has been the lack of recommendation from health care providers.

Furthermore, we identified that an increasing percentage of African Americans in a given county was associated with a statistically significant decrease in the number of radiation oncologists. We, therefore, noted a decrease in the providers of both diagnostic and adjuvant therapies of colorectal cancer care. There have been demonstrable disparities reported in the literature pertaining to the geographic availability of adjuvant therapies such as radiotherapy and chemotherapy, particularly for patients presenting with stage II or III rectal cancer.12 Growing evidence suggests that increasing the receipt of appropriate adjuvant therapies may serve to reduce cancer mortality among African Americans.12 African American patients, however, are less likely to receive the appropriate surgery or adjuvant radiotherapy or chemotherapy even after receiving the initial referral.23-25 Morris et al12 postulated that in the absence of difference in insurance status, the disparity may be caused by transportation difficulties or complexities in navigating the medical system. Thus far, little has been offered in the literature to address the influence of residential geographic location on the racial disparities in access to colorectal cancer care.

Varying articles exist about the effect of segregation on health outcomes in general. Some reports suggest that African Americans and Hispanic Americans may perceive fewer barriers to care when they live in an area with a higher prevalence of people with similar ethnicity.5,20 In alignment with this concept, Geronimus27 postulates that a set of social networks within a segregated community may mitigate against the effects of segregation. Other articles in contradistinction lay out the negative outcomes associated with segregation including an increased all-cause mortality and differential access to subspecialty interventions.28,29 Zhang et al9 identified that increasing prevalence of minority groups was associated with higher adjusted mortality.

African Americans are the most racially segregated ethnic group in the United States.30,31 The highest rates of colorectal cancer mortality occur in inner-city communities despite the decline in overall mortality rates.11 Strategies that target the appropriate use of adjuvant therapies in the counties in which African Americans live may be impeded by the sheer lack of availability of the providers in these areas. Perhaps the nonuse of diagnostic and adjuvant therapies is related to the great distances that African Americans must travel to seek these services, plausibly outside their own residential counties. This may serve as an impediment to seeking these services despite the best intentions of referring physicians and surgeons. Access to diagnostic and adjuvant therapies is central to timely screening, diagnosis, follow-up therapy, and surveillance, without which long-term survival may never be improved and disparities never equalized.

This article is limited by its use of national administrative databases. Furthermore, the cross-sectional design does not allow a causal inference to be drawn, but in it we address the unspoken effect of racial clustering by examining the entire US population, and seek to define what role it may have in fueling disparities in colorectal cancer care in the United States.

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REFERENCES


