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## Colorectal Cancer Screening: Prevalence Among Low-Income Groups With Health Insurance

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### Abstract

We examined the prevalence of colorectal cancer (CRC) screening in a low-income, racial/ethnic minority sample, among whom 97 percent had health insurance that covered CRC screening. This is a model for examining the impact of health insurance on racial/ethnic disparities in screening. Screening rates (67 percent self-reported; 52 percent adjusted based on a validation substudy) were higher than among similar population-based samples who have lower levels of insurance coverage. There were no differences by race/ethnicity. This study suggests that insurance coverage for CRC screening should be considered as part of a comprehensive approach to address CRC disparities.

### INTRODUCTION

Incidence of and mortality from colorectal cancer (CRC) is higher for blacks than for whites, and for lower-income populations than for higher-income groups.<sup>1</sup> Similar disparities are found in CRC screening.<sup>2</sup> Health insurance coverage has been found to be an important strategy for reducing disparities in cancer screening. For example, National Health Interview Survey (NHIS) data from 1993 and 2005 demonstrated that only 38 percent of women with no health insurance were current with mammography, compared with 57 percent of women who had public forms of insurance.<sup>3</sup> Similar patterns were found in the overall population, as well as in the subgroup of women who were most impoverished. There is similar evidence for CRC screening, with health insurance coverage and income accounting for differences in CRC screening rates among racial and ethnic groups.<sup>4</sup> The complexity of addressing disparities is underscored by other research that finds persistent racial and ethnic disparities after accounting for these factors. However, in most of these studies, disparities are reduced, although not eliminated, compared to national levels.<sup>5</sup> Additional research on the prevalence of CRC screening among lower-income, population-based samples, where health insurance is ubiquitous, may offer further insight into the complex relationship among income, insurance, race/ethnicity, and screening

This study documents the prevalence of CRC screening by endoscopic tests (flexible sigmoidoscopy or colonoscopy) or fecal occult blood testing (FOBT) in a large, sociodemographically diverse population that resides in low-income housing in Massachusetts. The endoscopic tests find both polyps and cancer through examining the colon directly; FOBT does not require an invasive procedure but has a lower accurate detection rate. Low-income housing residents represent an important population in which to examine CRC screening prevalence because, as a result of their income qualification for subsidized housing, they are largely qualified for the state Medicaid program or the state's free care pool, both of which cover CRC screening. Further, because many subsidized housing residents are elderly, they have Medicare, which also covers CRC screening.

In this paper, we address two key questions: (1) what is the prevalence of CRC screening among insured low-income adults; and (2) do racial/ethnic differences exist in a low-income population that is insured?

## Study Data And Methods

### Sample description and recruitment

These data are from the baseline survey of Open Doors to Health (ODH), a longitudinal, randomized study of the effect of a peer-led colon cancer prevention intervention delivered through low-income housing sites in 2004–2005. ODH uses a cluster randomized design, with twelve urban housing sites as the primary sampling units. Twelve of the thirteen housing sites approached (92 percent) agreed to participate. Secondary sampling units were individuals within the site. Unequal probability sampling across housing sites was employed because of the varying sizes of housing sites. In half of the sites (with fewer than 300 residents each), the full population was sampled; in the remaining sites, with more than 300 residents, sampling was conducted to obtain an approximate 35 percent sample with a minimum of 250 subjects per site.

Eligibility criteria for the larger study included (1) residence in the housing community; (2) at least eighteen years of age; (3) English or Spanish spoken; (4) not currently being treated for cancer; and (5) having the cognitive capacity needed for consent. This analysis included only participants age fifty and older. Participant recruitment began with housing site representatives sending letters announcing the study to eligible residents, with an opt-out option. Participants provided verbal informed consent, and the interviewer administered the survey in English or Spanish. The study protocol was approved by the Human Subjects Committee at the Harvard School of Public Health.

Enrollment and baseline surveys were obtained on 1,554 (of 2,941 invited) participants (53 percent response rate). Although we do not know the response rate among older residents across all sites, in the two housing sites whose residents were predominantly over age fifty, the response rate was 68.5 percent. The data reported here represent baseline data only, among respondents who were age fifty or older at the time of the survey ( $n = 836$ ).

A small random subset ( $n = 106$ ) of those who reported being current with CRC screening were asked for permission to gather their medical record data to validate self-reported screening by sigmoidoscopy or colonoscopy. We did not attempt to validate self-reported FOBT because of the lack of standardized documentation of FOBT in medical records. Consent was obtained from eighty-eight participants (response rate, 83 percent). Next, we requested information on all of their health care providers over the past twelve years. Medical record data were gathered from the screening facility for the most recent endoscopic test, to avoid underreporting of screening because test results were not recorded in the patient's primary care chart. After up to two written requests for screening information were sent, sixty-two (70 percent) were returned completed by the medical center as requested, eight (9 percent) were returned because of an incorrect address with no ability to trace, and twenty-four (27 percent) were unresolved.

### Measures

**Demographics**—Participants were asked to report their sex and age. Participants reported their race/ethnicity as black, white, Hispanic, Asian, American Indian, or other. Those choosing more than one of the other five race/ethnicity options were assigned to a “mixed race/ethnicity” category. Participants also reported their highest level of educational attainment, current employment status, annual household income, and native language. We also assessed health insurance status.

**Measures of screening**—CRC screening was assessed using questions developed and adopted by the National Cancer Institute (NCI) as standard self-reported measures of screening.<sup>6</sup> This measure provides a brief description of each of three screening tests (FOBT, flexible sigmoidoscopy, and colonoscopy) and then assesses receipt of the test and timing. Patients were considered current with CRC screening if they reported having FOBT within one year of the survey, flexible sigmoidoscopy within five years, or colonoscopy within ten years. The timing of these screening intervals is consistent with guidelines published by the American Cancer Society and the U.S. Preventive Services Task Force. If patients reported more than one screening test, they were credited with having the most efficacious screening method, with ranking of the screening methods as follows: (1) colonoscopy, (2) flexible sigmoidoscopy, and (3) FOBT.<sup>7</sup> Of note, participants were asked to indicate their receipt of CRC testing regardless of whether it was for screening or diagnostic purposes, as is common practice for studies using self-reported assessments of CRC screening.<sup>8</sup> We refer to testing as “screening” for simplicity of presentation, and to be consistent with the literature.

**Analysis**—Univariate analyses of variables of interest were examined to test for outliers, discrepancies, and distributional assumptions. Bivariate relationships between self-reported screening status and categorical variables were tested using Pearson chi-square tests. The bivariate relationship between age and screening status was evaluated using a t-test. Only three variables (education level, employment, and native language) were significantly related to screening status in the bivariate models at the liberal level of  $p = 0.15$ . Attempts at constructing a multivariable model of screening status using the three variables did not provide further insight into these relationships; thus, this is not presented.

For the primary analyses, based on the cluster design, data were weighted to the size of the population over age fifty within each housing site (with a total weighted size of 1,232). Analyses were conducted using SUDAAN 9.1 and SAS 9.1 statistical software for clustered data. The validation subsample was left unweighted and was compared to the unweighted self-reported screened population on key demographic variables. Bivariate analyses examined differences in demographics between those whose self-report agreed with physicians’ reports and those whose did not.

## Study Results

### Demographics

The over-age-fifty sample was largely female and nonwhite, had low education levels, and had low incomes (Exhibit 1). Half of the sample were native English speakers. Only 2.6 percent did not have health insurance; 76 percent were insured by some form of public insurance (Medicaid, Medicare, or free care), and 18 percent by private insurance. Among those insured by public insurance, approximately half were covered by the state Medicaid program and half by Medicare.

### Screening prevalence

The self-reported screening prevalence for the ODH sample (weighted  $n = 1,232$ ) was 67 percent (7 percent screened by FOBT, 60 percent by endoscopy, and 33 percent no screening). Of those who were screened, 10 percent were screened by FOBT, 9 percent by flexible sigmoidoscopy, and 81 percent by colonoscopy. We do not have data as to whether these colonoscopies were performed for screening or diagnostic purposes for the entire sample, but we do have these data for participants from seven of the twelve housing sites. Among those who reported having a CRC test in this group, 58 percent had a screening colonoscopy, 32 percent had a diagnostic colonoscopy, 8 percent had a screening sigmoidoscopy, and 2 percent had a sigmoidoscopy to follow up on symptoms.

Seventy-three percent of the patients in the validation subsample that self-reported endoscopic CRC screening were confirmed by medical record review as having been screened by the same test as reported. Four percent ( $n = 2$ ) were validated as having been screened by endoscopy but had confused which test they actually had. Twenty-seven percent reported screening but had no medical record of an endoscopic screening in the appropriate screening interval; four of these participants were screened after the self-reported data were collected. The only demographic difference between those whose self-report was confirmed versus those not confirmed was type of health insurance. When the self-reported rate for the overall sample was adjusted by the rate of validated screening in the subsample, the screening rate was 52 percent.

### Disparities in screening

There was no evidence of disparities in screening rate by race/ethnicity among this insured population (Exhibit 1). There were also no differences by income. The only demographic difference between the screened and unscreened participants was employment status. Significantly more screened than unscreened participants were retired or disabled, and more unscreened than screened participants were homemakers or unemployed. Not surprisingly, those with a history of polyps were more likely to be current with screening (96 percent). Screening prevalence was equivalent among those with Medicare and the state Medicaid program, both of which cover screening.

### Discussion

Colorectal cancer incidence and mortality has been on the decline, with recent analysis of Surveillance, Epidemiology, and End Results (SEER) data indicating a 4.7 percent drop in mortality between 2002 and 2004.<sup>9</sup> This victory is largely thought to be a function of increased screening participation. However, if screening rates are not equivalent across population groups, then we will likely see increased CRC disparities in the years to come. The interplay of multiple factors that influence screening behavior is not well understood, and there have been mixed findings regarding the role of health insurance in addressing disparities in screening. Our findings are similar to the few other studies in the literature, described below, that examine CRC screening rates among a population with similarly low income levels and health insurance coverage, rather than using estimates of insurance coverage or income from area-based measures.<sup>10</sup> Taken together, these results suggest that health insurance that covers screening may be an important lever for improving rates of cancer screening among low-income people, bringing their screening rates much closer to or even slightly higher than those found in the general population.

### Our study versus others

Our study evaluated self-reporting of CRC screening or diagnostic evaluation among a large sample of very-low-income insured adults. The self-reported testing rate was 67 percent. If we adjust this rate by the results of the validation subsample, the adjusted screening rate is 52 percent.

Using a similar measure of screening as ours, Su-Ying Liang found that 42 percent of respondents to the 2003 NHIS were current with screening.<sup>11</sup> Screening rates differed by poverty level, having a usual source of care, and insurance status, among other variables. Multivariable analyses in our study did not identify differences in screening rates by race/ethnicity. An analysis of the Centers for Disease Control and Prevention's (CDC's) 2006 Behavioral Risk Factor Surveillance System (BRFSS) data revealed that 63 percent of respondents with health insurance coverage were current with CRC screening, versus 37 percent of those without coverage.<sup>12</sup> Ya-Chen Tina Shih and colleagues found that inclusion

of Medicare coverage for CRC screening alleviated the screening disparity between black and non-Hispanic white enrollees.<sup>13</sup>

Ann Scheck McAlearney reported on the prevalence of CRC testing among a population of women who had high rates of health insurance and resided in subsidized housing.<sup>14</sup> Nearly half of participants reported being current with CRC screening. As in our study, there were no racial/ethnic differences in screening. Navkiran Shokar evaluated self-reported CRC screening among a sample of multi-ethnic, low-income primary care patients, 97 percent of whom had insurance.<sup>15</sup> Overall, 62.5 percent of patients were current when considering testing for screening or diagnostic purposes, as measured in our study. Among asymptomatic patients only, significant differences by race/ethnicity were found, but overall screening rates were still high (48.2–67.5 percent).

### Medicare, Medicaid, and mandates

In our study, screening rates were equivalent for those with Medicare and those with state Medicaid coverage, both of which cover screening. As many states consider mandatory health insurance coverage as a way of addressing health disparities, it is important to remember the complexity of this issue and that how such mandates are implemented will greatly influence their effectiveness.<sup>16</sup> That said, the present results highlight the importance of incorporating coverage for preventive services. Health insurance alone is unlikely to reduce or eliminate racial/ethnic disparities but should be considered as one component of comprehensive efforts targeting CRC disparities. Even with insurance, about a third of respondents had not been screened.

### Screening preferences

There has been speculation about the value of colonoscopy as a screening strategy in public health settings because of its invasiveness, associated barriers, and cost. Colonoscopy was widely used in our sample, and data from a subsample indicated that the majority of colonoscopies were for screening rather than for diagnostic purposes. One of the few available studies of screening preferences among diverse or lower-income groups found that slightly more lower-income African American participants preferred colonoscopy over FOBT.<sup>17</sup> Another study found that those with lower incomes showed a preference for FOBT over endoscopy.<sup>18</sup> However, data on insurance status were not presented, so these results may reflect insurance coverage and cost factors. Our findings here suggest that use of colonoscopy is significant in this population when insurance is not an issue.

Study limitations and strengths. Limitations of this study should be noted. First, the response rate for the full sample (53 percent) ideally could have been higher. The response rate by site ranged from 34 percent to 92 percent and was particularly low in the first two sites; study procedures were adjusted in subsequent sites, which greatly improved participation. Low-income housing can be a challenging environment in which to conduct research and does not accommodate comparisons of characteristics between responders and nonresponders, as would a sample taken from a closed cohort. However, exploratory analyses examining screening prevalence among sites with the lowest versus the higher response rates revealed the same pattern of results found overall. Response rates also appeared to be lowest among the younger residents, who would not have been eligible for the analyses included in this paper. Further, the response rate in the sites with predominantly older adults was 68 percent. Despite these factors, it is possible that nonresponders were more likely than responders to be unscreened. Although that would affect our overall prevalence estimates, it would only affect our findings related to disparities in screening by race/ethnicity if there were differences in screening rates among responders versus nonresponders by race/ethnicity, which is unlikely.

Another limitation is that although we collected screening data for the validation from the screening facilities themselves, some patients whose self-reported screening was not confirmed might have provided incorrect information about their screening facility. We do not have data to determine if this population had lower copayments than found among other insured populations, and whether this increased screening rates. Although we are not aware of specific CRC screening activities focusing on these participants that would have affected their screening rates in the time windows measured, we cannot rule out this possibility.

There are marked differences between conducting research in a socioeconomically diverse population and adjusting for socioeconomic status (SES) versus conducting a study in a socioeconomically homogenous group where SES is naturally controlled, as in this study. Jay Kaufman, among others, notes that adjustment for SES measures in studies of racial disparities can introduce residual confounding and thus spuriously inflate associations between an exposure and outcomes.<sup>19</sup> We have used the preferred approach, to study populations in which SES is naturally controlled, because this is less prone to measurement error.

Our findings present an interesting and important opportunity to examine the impact of screening access in a population that faces many barriers to health care. As states increasingly explore efforts to reform health insurance programs to cover all citizens, insurance coverage for CRC screening should be considered as one strategy to address CRC disparities.

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EXHIBIT 1  
 Characteristics Of Colorectal Cancer Screening Study Participants, Overall And By Screening Status, 2004–2005

Characteristics	Unweighted N	All Participants Weighted N (Column %)	Screened Weighted n=820 Column %/Row %	Not Screened Weighted n=412 Column % / Row %	p value*
Sex					
Male	258	363 (29)	30% / 68%	29% / 32%	.6791
Female	578	870 (71)	70% / 66%	71% / 34%	
Race/Ethnicity <sup>3</sup>					
Black	407	546 (45)	45% / 68%	43% / 32%	
White	48	86 (7)	7% / 63%	8% / 37%	.5617
Hispanic	343	543 (44)	44% / 65%	46% / 35%	
Other	30	46 (4)	4% / 76%	3% / 24%	
Education					
Less than HS	466	694 (56)	59% / 70%	51% / 30%	
HS or equivalent	187	268 (22)	20% / 62%	25% / 38%	.1116
Greater than HS	179	266 (22)	21% / 64%	24% / 36%	
Employment Status					
Working	161	236 (21)	20% / 66%	23% / 34%	
Retired	270	375 (34)	37% / 74%	27% / 26%	
Disabled	238	365 (33)	34% / 72%	29% / 28%	.0087
Homemaker	39	68 (6)	4% / 45%	11% / 55%	
Not working	34	51 (4)	4% / 55%	7% / 45%	
Other	12	18 (2)	1% / 40%	3% / 60%	
Annual Household Income					
≤ \$10,000	344	516 (52)	52% / 69%	51% / 31%	.6979
\$10,000–19,999	224	329 (33)	34% / 70%	32% / 30%	
≥ \$20,000	103	145 (15)	14% / 66%	16% / 34%	



Characteristics	All Participants		Screened Weighted n=820 Column %/Row %	Not Screened Weighted n=412 Column % / Row %	p value*
	Unweighted N	Weighted N (Column %)			
Native Language					
English	452	616 (50)	52% / 69%	47% / 31%	.1074
Spanish	327	524 (43)	42% / 66%	43% / 34%	
Other	57	92 (7)	6% / 54%	10% / 46%	
Health Insurance					
None	24	32 (3)	2% / 55%	4% / 45%	.3249
Public ins Only	625	935 (76)	77% / 67%	75% / 32%	
Private ins only	154	218 (18)	17% / 64%	19% / 36%	
Public+ Private	28	39 (3)	4% / 75%	2% / 25%	
Age: Mean (se)	64.8 (.34)	64.3 (.34)	65 (.58)	63 (.33)	.1983
History of Polyps					
Yes	143	208 (20)	27% / 96%	3% / 4%	<.0001
No	556	821 (80)	73% / 65%	97% / 35%	