# Food Insecurity is Associated with Lack of Up-to-Date Colorectal Cancer Screening in a Large, National Survey in the United States

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**Introduction**: Food insecurity (FI) has been associated with low access to healthcare services, poor health outcomes, and health disparities. However, little is known about the relationship between FI and colorectal cancer (CRC) screening and outcomes. Thus, we aimed to examine the association between FI and utilization of CRC screening in the United States.

**Methods**: We used data from the 2021 National Health Interview Survey (NHIS), an annual cross-sectional survey that provides nationally representative estimates on several health and health utilization measures. We included individuals aged 50-74 without a prior diagnosis of CRC and excluded individuals with missing responses to the FI questions. We used the USDA Adult Food Security Survey Module to determine FI status where FI is defined as low food security or very low food security. Respondents aged 50-74 with colonoscopy within 10 years, sigmoidoscopy within 5 years, sigmoidoscopy within 10 years with FIT within 1 year, FIT/FOBT within 1 year, or Cologuard within 3 years were considered screened. We calculated descriptive characteristics and screening rates by FI status. Finally, we performed a logistic regression to assess the association between FI and odds of up-to-date CRC screening, adjusting for patient sociodemographic factors.

**Results**: Our study included 12,019 individuals eligible for CRC screening, representing an estimated weighted population of over 90 million. Mean age was 61.4 (s.e.=0.08); 30.6% were non-White, 62.5% had some college education or more, 5.9% were uninsured, and 83.1% had a wellness visit within a year. The prevalence of FI was 5.7%. The prevalence of CRC screening was 71.6%; modalities were 76.4% colonoscopy, 3.8% sigmoidoscopy (± FIT), 13.7% FIT/FOBT, and 6.1% Cologuard (**Table**). FI was associated with significantly lower odds (aOR 0.76; 95%CI 0.60-0.96) of up-to-date CRC screening. In addition, odds of screening were significantly lower among uninsured respondents, respondents with Medicare/Medicaid, Hispanic/Latine respondents, and Asian respondents (**Figure**). Odds of screening were significantly higher with increasing age, metropolitan living status, and when there was a wellness visit within the past year (largest effect) (**Figure**).

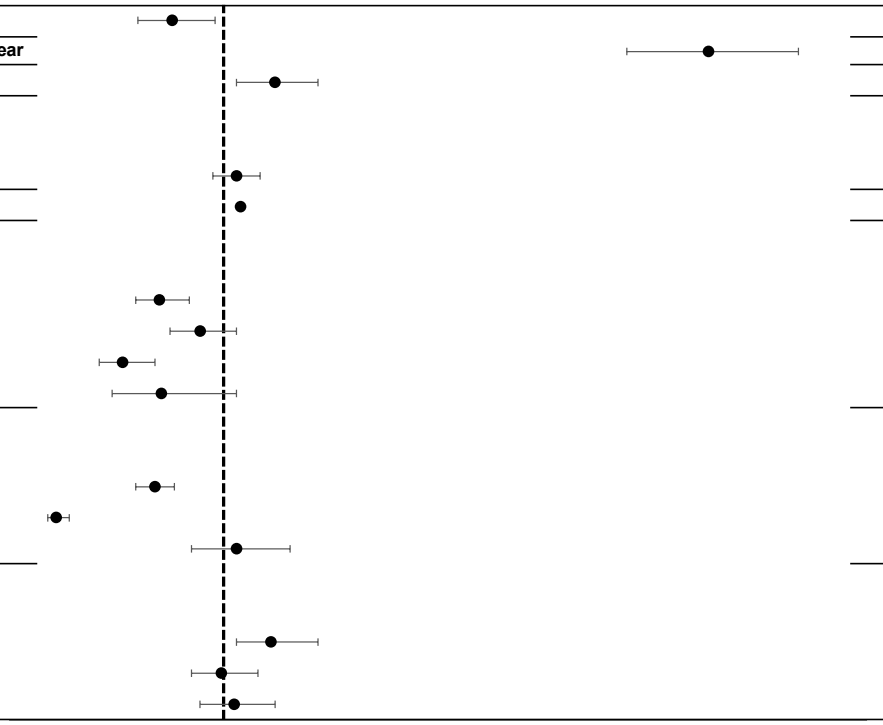
**Discussion**: Food insecurity is an important social determinant of health that has not been well-studied in the context of CRC prevention and control. In this nationally representative study, FI was associated with lower odds of up-to-date CRC screening. Other sociodemographic factors significantly associated with CRC screening status included age, race/ethnicity, insurance type, living environment, and healthcare utilization. Our findings highlight the need to better understand how FI impacts access to and use of CRC screening as well as the need for policies and targeted interventions to address FI.

**Table.** Respondent sociodemographic characteristics and CRC screening status in a nationally representative sample of adults ages 50-74 in the United States; 2021 National Health Interview Survey

| | **All Respondents** (n=12,019) Est Wtd Pop: 90,921,629 | **Up-to-date CRC Screening** (n=8,603) Est Wtd Pop: 64,115,805 | **Not up-to-date CRC Screening** (n=3,416) Est Wtd Pop: 26,805,824 | **p-value** |
|---|---|---|---|---|
| Age (years), mean (SE) | 61.4 (0.08) | 62.5 (0.09) | 58.8 (0.13) | <0.0001 |
| Male Sex, % | 47.9 | 47.2 | 49.6 | 0.05 |
| Race/Ethnicity, % | | | | <0.0001 |
| Non-Hispanic Black | 11.3 | 11.1 | 11.7 | |
| Hispanic/Latine | 12.0 | 10.3 | 16.0 | |
| Non-Hispanic Asian | 5.3 | 4.5 | 7.3 | |
| Non-Hispanic Other | 2.0 | 1.8 | 2.5 | |
| Non-Hispanic White | 69.4 | 72.3 | 62.5 | |
| Highest education, % | | | | <0.0001 |
| < High school | 9.6 | 7.9 | 13.7 | |
| High school | 27.9 | 26.0 | 32.4 | |
| College | 48.6 | 50.1 | 44.9 | |
| Graduate | 13.9 | 16.0 | 9.0 | |
| Income, % | | | | <0.0001 |
| <100% FPL | 8.5 | 6.5 | 13.5 | |
| 100%-199% FPL | 15.0 | 13.1 | 19.3 | |
| 200%-400% FPL | 27.8 | 27.2 | 29.2 | |
| >400% FPL | 48.7 | 53.2 | 38.0 | |
| Employed, % | 53.6 | 50.7 | 60.6 | <0.0001 |
| Health insurance status, % | | | | <0.0001 |
| Uninsured, % | 5.9 | 2.3 | 14.5 | |
| Medicaid/Medicare % | 39.9 | 43.4 | 31.7 | |
| Private, % | 47.1 | 464 | 48.7 | |
| All other coverage, % | 7.1 | 7.9 | 5.2 | |
| Wellness visit in last year, % | 83.1 | 89.4 | 68.0 | <0.0001 |
| Region, % | | | | 0.51 |
| Northeast | 18.3 | 18.4 | 18.0 | |
| Midwest | 21.5 | 21.8 | 20.6 | |
| South | 37.6 | 37.2 | 38.6 | |
| West | 22.7 | 22.6 | 22.9 | |
| Metropolitan Living Area, % | 84.8 | 85.4 | 83.5 | 0.04 |
| Food Insecure, % | 5.7 | 4.7 | 8.1 | <0.0001 |
| CRC screening modality, % | | | | n/a |
| Colonoscopy | 76.4 | 76.4 | n/a | |
| Sigmoidoscopy (± FIT) | 3.8 | 3.8 | n/a | |
| FIT/FOBT | 13.7 | 13.7 | n/a | |
| Cologuard | 6.1 | 6.1 | n/a | |

Abbreviations: WTD, weighted. SE, standard error. FPL, federal poverty level. FIT, fecal immunochemical test. FOBT, fecal occult blood test.

**Figure.** Predictors of up-to-date CRC screening status among adults aged 50-74 in the United States; 2021 National Health Interview Survey




| | Adjusted Odds Ratio | 95% Confidence Interval | p-value |
|---|---|---|---|
| **Food Insecure** | 0.76 | 0.60-0.96 | **0.02** |
| **Wellness Visit in past year** | 3.26 | 2.88-3.68 | **<0.0001** |
| **Metropolitan Area** | 1.24 | 1.06-1.44 | **0.009** |
| **Gender** | | | |
| Male | Referent | -- | -- |
| Female | 1.06 | 0.95-1.17 | 0.30 |
| **Age** | 1.08 | 1.07-1.09 | **<0.0001** |
| **Race/Ethnicity** | | | |
| Non-Hispanic White | Referent | -- | -- |
| Hispanic | 0.70 | 0.59-0.84 | **<0.0001** |
| Non-Hispanic Black | 0.89 | 0.75-1.06 | 0.20 |
| Non-Hispanic Asian | 0.53 | 0.42-0.68 | **<0.0001** |
| Non-Hispanic Other | 0.71 | 0.48-1.06 | 0.09 |
| **Insurance** | | | |
| Private | Referent | -- | -- |
| Medicare/Medicaid | 0.68 | 0.59-0.77 | **<0.0001** |
| Uninsured | 0.22 | 0.18-0.28 | **<0.0001** |
| Other Type | 1.06 | 0.85-1.31 | 0.63 |
| **Region** | | | |
| Northeast | Referent | -- | -- |
| West | 1.22 | 1.03-1.44 | **0.02** |
| South | 0.99 | 0.85-1.16 | 0.94 |
| Midwest | 1.05 | 0.89-1.24 | 0.56 |