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"Intersecting Risks: Food Insecurity, Cigarette Smoking, Rurality and Colorectal Cancer Diagnosis in the U.S."

BACKGROUND: Colorectal cancer (CRC) remains a leading cause of death in the United States, with disparities influenced by behavioral, structural, and socioeconomic factors.[1] In 2023, food insecurity affected 13.5% of U.S. households and studies link it to lower CRC screening rates, delayed diagnoses, and poorer outcomes due to inadequate nutrition and limited preventive care.[2,3,4] Food-insecure individuals are more likely to smoke cigarettes, often as a coping mechanism for stress and hunger.[9] Approximately 25% of cancer patients experience food insecurity, and adults facing hunger are more likely to smoke cigarettes as a coping mechanism.[3,7,10] Cigarette smoking further elevates CRC risk and is more prevalent in rural, compared to urban, populations, who have limited access to healthcare, cessation programs, and nutritional support.[2,3,11] While food insecurity and cigarette smoking independently increase CRC risk, we know little about their combined effect, especially in underserved rural communities.[5,6,7] This study examined the intersection of food insecurity and cigarette smoking in relation to CRC diagnosis, with a focus on geographic disparities.

METHODS: We conducted a cross-sectional analysis using 2020–2023 National Health Interview Survey (NHIS) data (N=147,430). NHIS is a nationally representative health survey conducted annually on noninstitutionalized US adults by the National Center for Health Statistics of the Centers for Disease Control and Prevention.[8] NHIS collects self-reported data on various health topics to track health status and monitor progress in achieving national health objectives.[8] For this study, we included adult respondents ≥ 18 who reported current smoking status, answered all food security questions, and indicated whether they had ever received a CRC diagnosis. We performed descriptive analyses, a chi-square test to assess group differences, and a logistic regression model to evaluate the independent and interactive effects of smoking status, food insecurity, and rurality on CRC diagnosis.

RESULTS: We observed significant demographic, socioeconomic, and geographic differences across smoking and food security groups (all $p < 0.05$). Most participants (n=118,223) identified as straight (90.4%), female (52.6%), White (74.8%), and not Hispanic (85.3%). Nearly one-quarter (24.3%) had not completed high school, and 44.3% relied on Medicaid or CHIP. In adjusted models, food-insecure nonsmokers in rural areas had the highest odds of CRC diagnosis (OR=2.391; 95% CI: 2.328–2.456) compared to food-secure nonsmokers in urban areas. Food-insecure smokers in urban settings also showed increased odds (OR=2.063; 95% CI: 2.009–2.118) of CRC diagnosis.

CONCLUSION: These findings reveal the compounding impact of smoking, food insecurity, and rurality on CRC diagnosis. Individuals experiencing food insecurity, particularly those residing in rural areas, face significantly greater odds of CRC, regardless of smoking status, underscoring the role of structural inequities in shaping cancer risk. An urgent need exists for an integrated geographically tailored approach to increasing tobacco cessation and food assistance services to reduce inequities in CRC diagnosis in underserved populations.