

**Title:** Identifying clinical and lifestyle factors which mediate the association between socioeconomic status and colorectal cancer mortality

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**Scientific Abstract:**

**Background:** Higher socioeconomic status (SES) is associated with lower mortality risk for people with colorectal cancer (CRC) and contributes to geographic and racial disparities for CRC. However, the factors that mediate the association between SES and CRC mortality have not been comprehensively investigated. We performed a mediation analysis to identify clinical and lifestyle-factors that may mediate the association between household income as a proxy for SES with overall, and CRC-specific mortality in a longitudinal cohort where most participants are non-Hispanic Black with lower SES.

**Methods:** Data arise from 1,038 participants of the Southern Community Cohort Study (SCCS) who developed incident CRC after enrollment. Participants were aged 40-79 years at enrollment between 2002-2009; 73% self-identify as having Black racial identity. Annual household income was assessed via questionnaire at enrollment and 59% of the cohort had household income < \$15,000/year. Overall and CRC-specific mortality were determined via linkages to the National Death Index through December 31, 2020. Proportional hazards models were used to estimate hazard ratios (HRs) with 95% confidence intervals (CIs) for mortality outcomes by income level, adjusted for age, sex, and marital status. Mediation analysis was used to estimate the indirect effect of stage, healthcare-related factors (CRC screening, insurance, and surgical resection) and lifestyle-related factors (smoking status, pack years smoked, alcohol consumption, diabetes duration, diet, and physical activity) on mortality, expressed as a percentage of the association between income and mortality attributable to the mediator.

**Results:** Income  $\geq$  \$15,000/year was associated with lower risk for mortality, however associations were more apparent in White participants (all-cause: mortality HR 0.44, CI: 0.29-0.67; CRC-specific HR: 0.43, CI: 0.24-0.76) than Black participants (all-cause: HR 0.76, CI: 0.62-0.94; CRC-specific: HR: 0.81, CI: 0.62-1.05). Stage at diagnosis and completing surgical resection were the largest mediation factors accounting for 35% of the association between income and CRC-specific mortality among white participants and 20% of the association among Black participants. Results were similar for overall mortality. For participants identifying as Black, history of and pack-years of smoking mediated an additional 28% of the association. For White participants, smoking and the other lifestyle-related factors did not mediate the association between income and mortality outcomes.

**Conclusions:** Higher income is associated with lower risk for mortality after CRC diagnosis. However, the factors that mediate the association may differ by self-reported race. Interventions to

promote early detection of CRC and equitable access to curative surgery may help to mitigate CRC disparities related to SES.

**Written Lay Abstract:**

Studies show that people with higher socioeconomic status (SES) tend to live longer after a colorectal cancer (CRC) diagnosis than people with lower SES. SES is a measure of social standing or position in society, and involves factors such as a person's income, education, and occupation. Researchers want to know why higher SES makes a difference in cancer survival.

For this study, the researchers looked at over 1,000 people with CRC enrolled in the Southern Community Cohort Study. Most of the people in this study were Black and had lower incomes.

The researchers found that people with household incomes above \$15,000 per year were less likely to die from colorectal cancer. This was more likely for White than Black people in this study. The people in this study with higher incomes were also more likely to have been diagnosed with CRC at an earlier stage, and more likely to have the cancer removed by surgery.

These findings tell us that people with CRC and higher incomes may be more likely to survive longer because they are able to screen for and diagnose the cancer sooner, and able to have cancer surgery. This was especially true for White participants in this study. Black participants who smoked were also less likely to live longer with CRC.

Having a higher income may lead to better access to screening and treatment for colorectal cancer, and this may help people live longer after being diagnosed. However, higher income does not affect Black and White people the same way, and there are other factors that affect cancer survivorship. Future studies and interventions could aim to increase access to cancer screening and treatment, especially for low-income and Black communities.

Visual Lay Abstract:

# Colorectal cancer and survival: why income helps, but not equally

We studied > 1,000 people with colorectal cancer  
to see what impacts survival. We found that...

## Income Matters



People with incomes over  
\$15,000 / year lived  
longer when diagnosed  
with colorectal cancer  
compared to those with  
lower incomes

## Race Matters



The link between income  
and survival was smaller  
for Black participants

Factors related to race  
likely affect survival

Black participants who  
smoked were also less  
likely to survive compared  
to White participants

## Access Matters



Earlier cancer screening,  
diagnosis, and treatment  
linked to survival

Higher income may  
mean earlier and better  
access to care

We need better access to screening and treatment  
for colorectal cancer - especially for low-income  
and Black communities



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