Using ‘Big Data’ To Explore and Identify Potential Risk Factors for Early-Onset Colorectal Cancer

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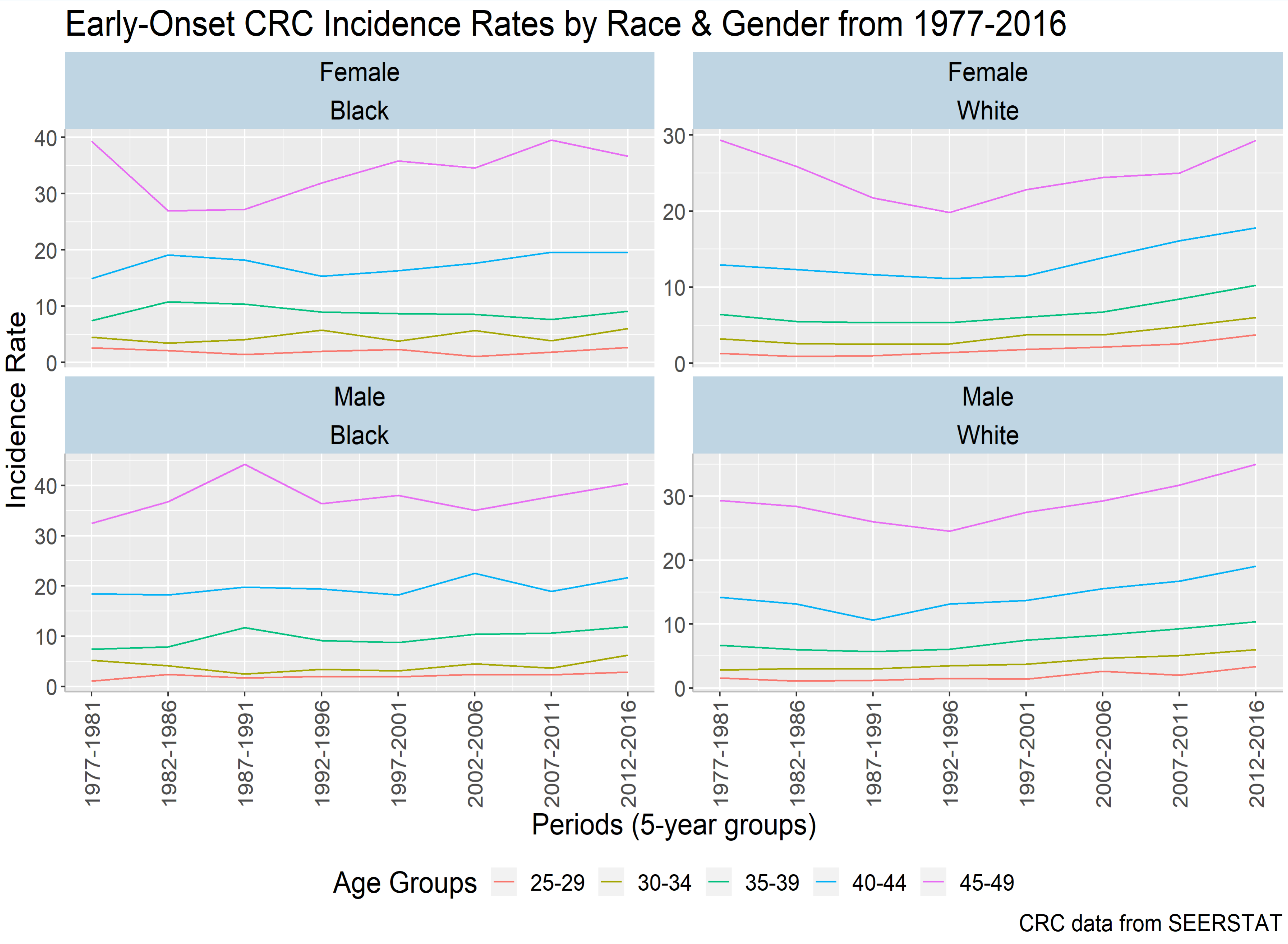
Background

- Incidence rates for colorectal cancer (CRC) have been increasing dramatically in younger adults in the past decade
- Established risk factors (RF) come from studies in older adults (50+), reasons for increase in younger cases remains unknown
- Traditional epidemiologic studies face challenges in identifying RF for early-onset cancer due to low absolute risk
- Accurately identifying modifiable RF is important for informing effective prevention in younger adults



Early-Onset CRC Incidence Rates by Race & Gender from 1977-2016

CRC data from SEERSTAT

Methodology

Data Sources

- Large scale survey data representative of the US population:
  - National Health and Nutrition Examination Surveys (NHANES) interviews about 5,000 individuals each year[1]
  - National Health Interview Surveys (NHIS) interviews almost 100,000 individuals each year[2]
  - Cancer incidence data from NCI’s Surveillance, Epidemiology, and End Results (SEER) Program (~34% of US population) [3]

Risk Factoring Coding

- Obtained RF data for White and Black males and females aged 25-49, from 1977 to 2016
- Grouped data into eight 5-year periods and five 5-year age groups
- Combined data from NHIS, NHANES II, NHANES III, and continuous NHANES 1999 to 2016 and revised the weights to increase sample size
- Categorized mean exposure values using quintiles from overall population for each gender[4]

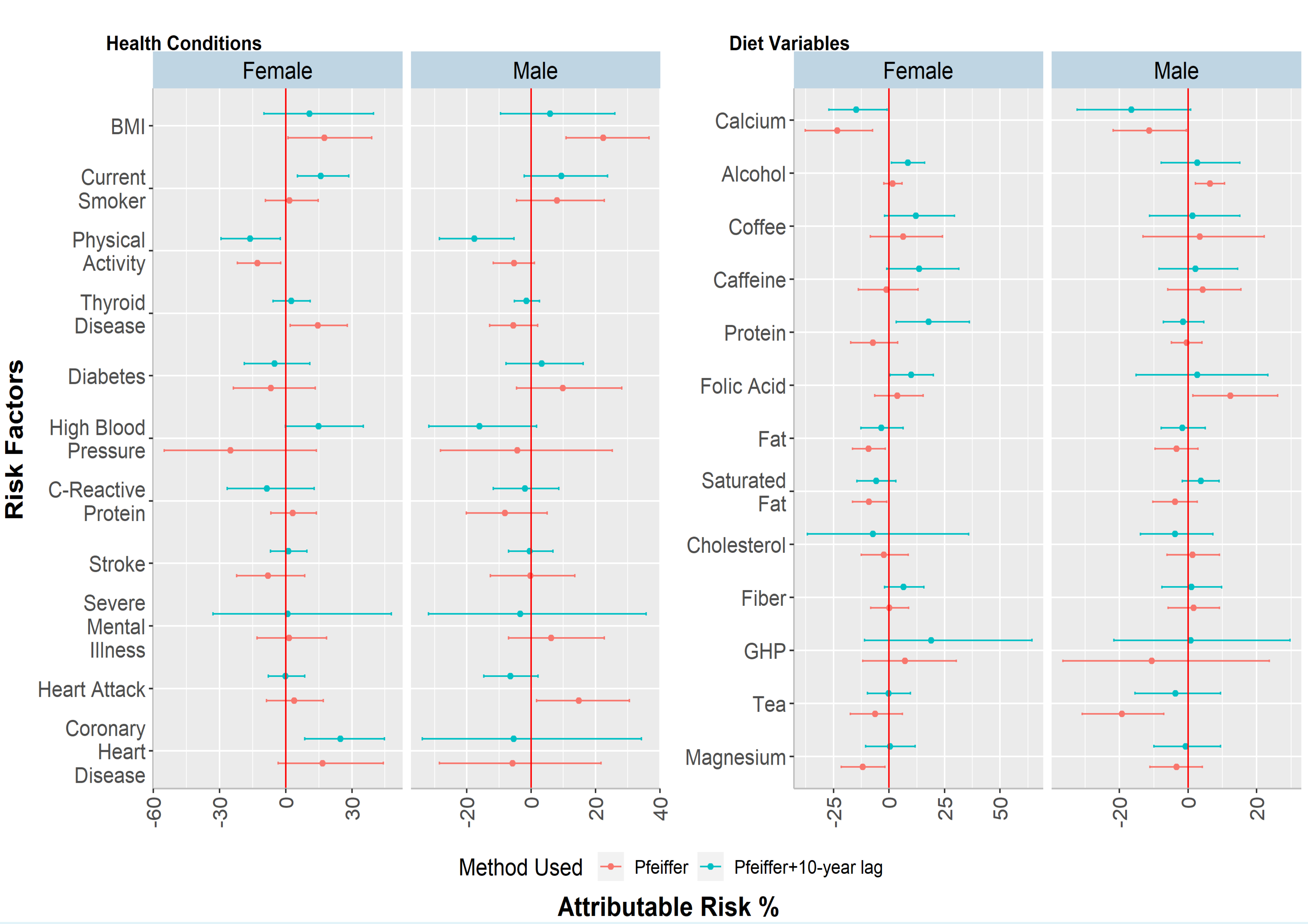
Statistical Analyses

- Ran quasi-Poisson regression for current intake, 10-year lagged intake
- RF lagged by 10 years to match current CRC incidence

Results

- Examined several diet variables and health conditions, both established and unestablished as CRC risk factors (e.g., BMI, cholesterol)
- Final methods selected were current intake and 10-year lagged intake (both quintiles)
- Other methods explored: age-period-race-mean centered current, 10-year lag, 10-year cumulative intake, and non-centered 10-year lag, non-centered current intake (RF modeled as continuous)
- Mixed results: some consistent with literature, others differed
  - E.g., calcium consistent, fat inconsistent
- Attributable risk, 95% CIs, standard errors were obtained for all RF for final methods
- Problems with limited data points (~80 observations per gender) despite use of ‘big data’
- Harmonizing risk factors from different surveys and across years due to changes and differences in design proved a challenge

Attributable Risk and 95% Confidence Intervals for EOCRC Risk Factors, ages 25-49



Future Directions

First stage was hypothesis generating; next steps will be to investigate the underlying mechanism of risk factors that stood out and how it ties in to early-onset CRC to identify risk factors via mechanistic models.

Acknowledgements

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References

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