

Social Disadvantage and Colorectal Cancer Outcomes in Minnesota

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Minnesota Cancer Reporting System

2024 NAACCR Annual Meeting

- My MCRS work group provides our state cancer prevention programs with cancer data intended to inform priorities and programming.
- Our data now include Area-Based Social Measures (ABSM), which are census-tract level measures of social disadvantage.
 - Cancer cases are linked to census tract at diagnosis, and the tracts are linked to the ABSM.
- **This work explores the potential usefulness of ABSM in identifying geographic areas in which to focus cancer control efforts.**

Colorectal Cancer As a Major Public Health Issue

- High burden: 2nd leading cause of cancer death in U.S., 3rd most common cancer diagnosed in men/women.
- Previous studies have found a disproportionate CRC burden among socially disadvantaged populations, based on both individual and area-level measures.
- Methods to reduce this burden are available – screening reduces CRC incidence and mortality.

Questions For This Study

Minnesota compares favorably with other U.S. states on measures of health and social welfare (America's Health Rankings).

1. Will we see similar disparities in CRC outcomes in Minnesota as found elsewhere, given the state's relatively low levels of concentrated disadvantage and income inequality?
2. If so, can our results help prioritize groups for cancer control efforts in Minnesota?

METHODS

Social Disadvantage and Colorectal Cancer Outcomes in Minnesota

Methods (1): Population, Design, Outcomes

- **Data Source:** Minnesota cancer registry data, analyzed using SEER*Stat.
- **CRC incidence**
 - Minnesota residents diagnosed with malignant CRC from 2016 to 2020.
- **CRC 5-year relative survival**
 - Minnesota residents 15+ years of age, diagnosed with CRC from 2014 to 2020 and followed for vital status through 2021.
 - Complete analysis method, all cancers meeting selection criteria, age-standardized.

Methods (2): Incidence According to Yost Index Quartile

Yost Index

- A multidimensional area (census tract) measure of socioeconomic status.
- Composite score based on median household income, median house value, median rent, percent living below 150% of poverty line, education index, percent working class, and percent unemployed.
- Analysis by population quartile: each quartile represents $\frac{1}{4}$ of MN population.
 - Q4 == Highest SES, most advantaged (reference group).
 - Q1 == Lowest SES, most **dis**advantaged

Methods (3): 5-Year Relative Survival According to Krieger Index

Percent poverty (Krieger Index)

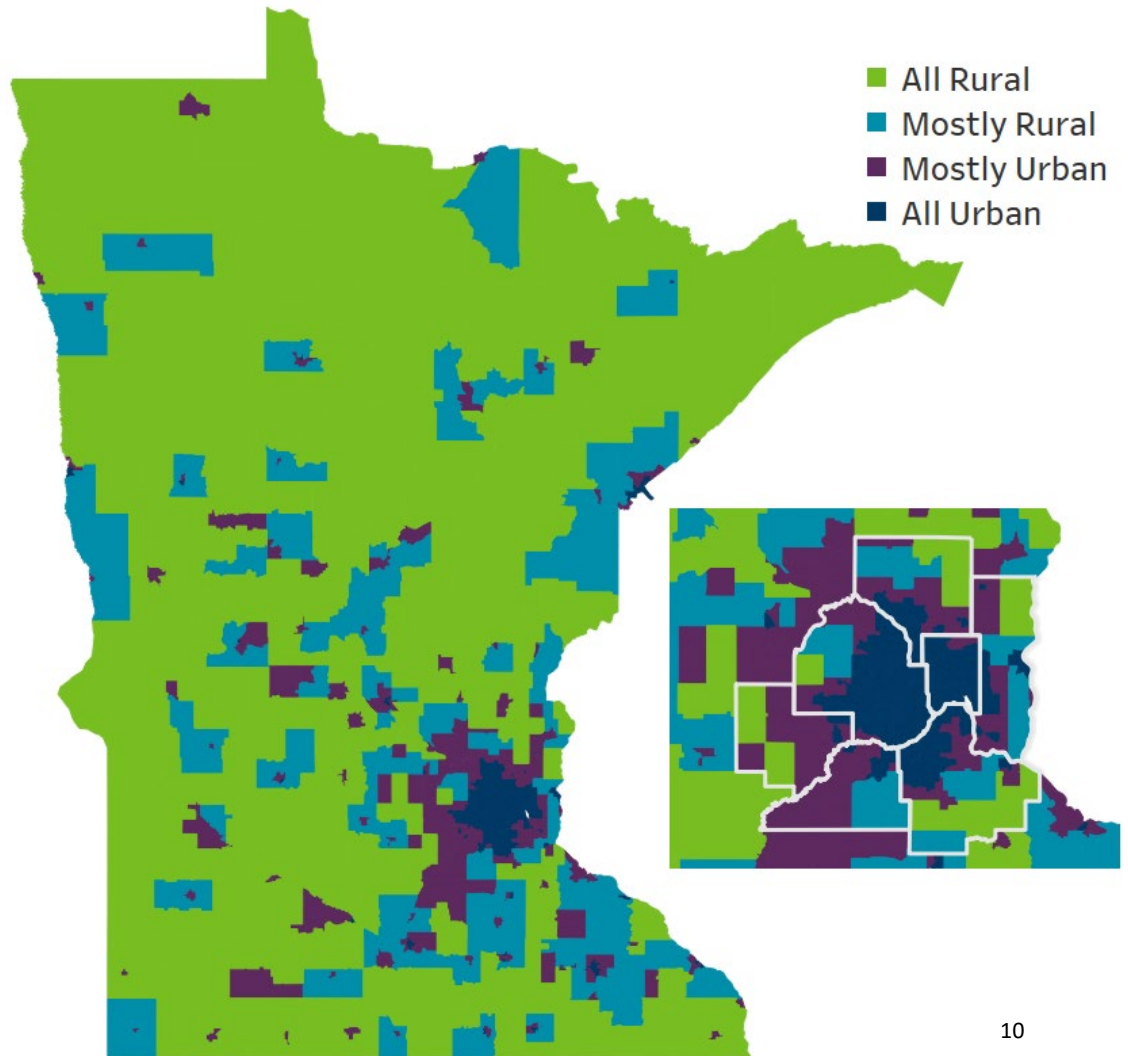
- Percent of households in a census tract living below the Federal Poverty Level.
- Categorized in SEERStat as -
 - <5% households below FPL == most advantaged (reference category).
 - 5 to <10%
 - 10 to <20%
 - 20% or more households below FPL == most **dis**advantaged category.

MAPS

Social Disadvantage and Colorectal Cancer Outcomes in Minnesota

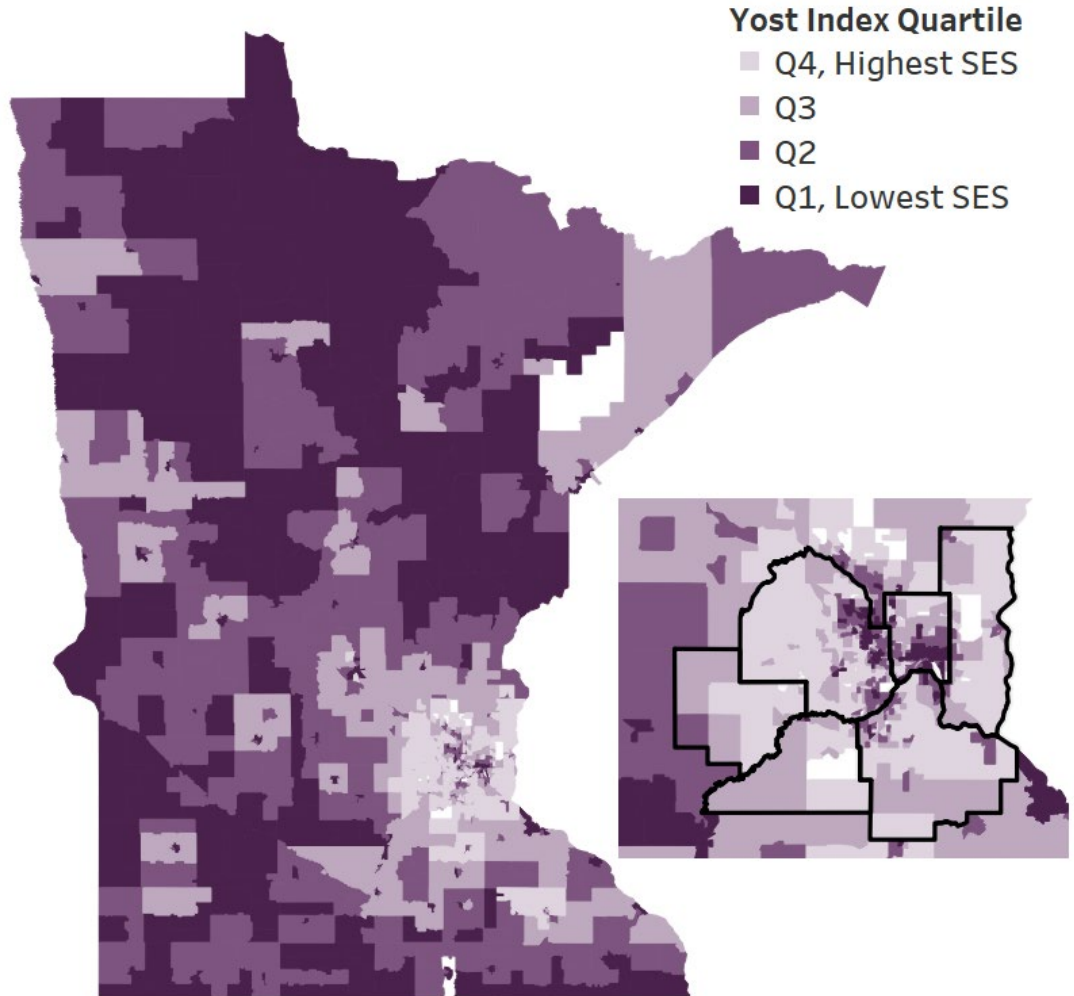
A Quick Look at Minnesota Geography (URIC-4)

- 55% of the state population lives in the urbanized Twin Cities metropolitan area (inset)
- Urban clusters elsewhere (Duluth, Rochester)
- Much of land mass is rural or mostly rural



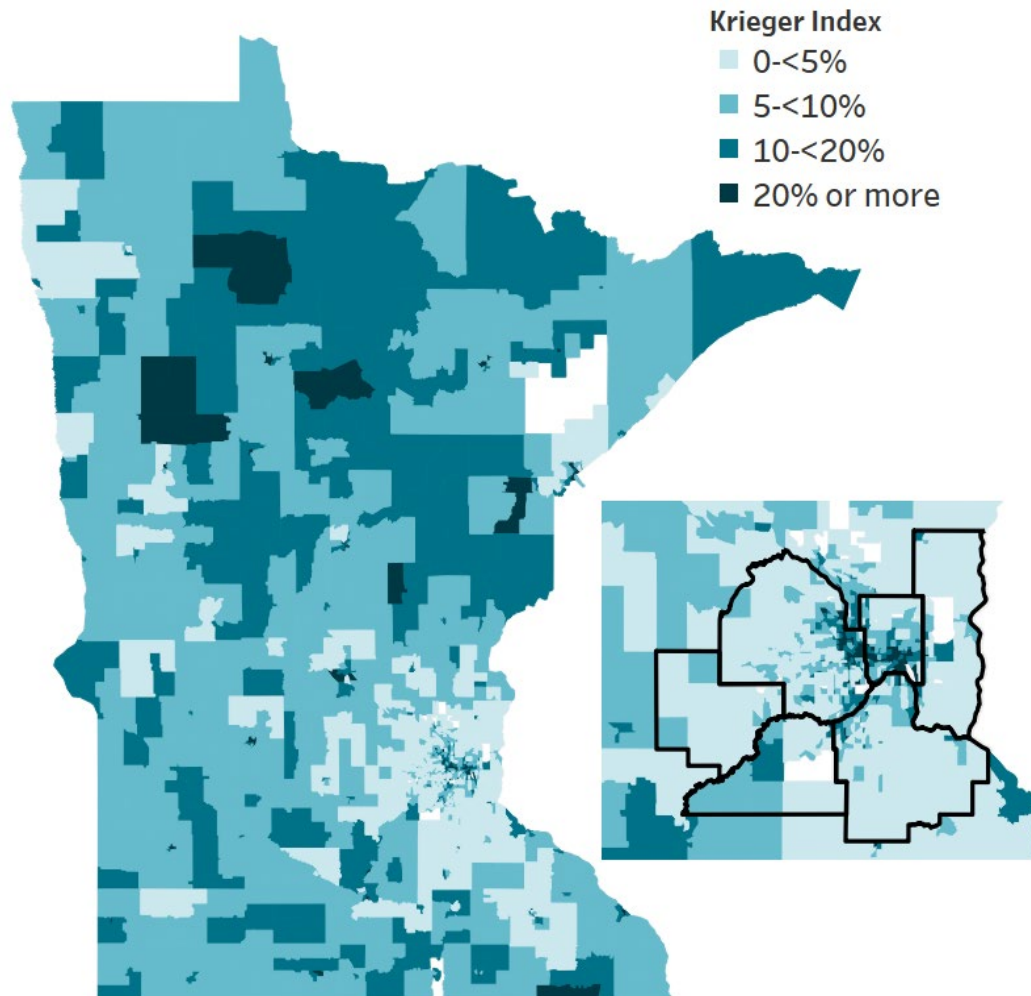
Yost Index (SES) Geographic Distribution

- Darkest purple represents lowest SES tracts (Yost-Q1).
- Lowest SES tracts tend to be located either in more rural areas or within Minneapolis, Saint Paul or the TC northwest suburbs.



Krieger Index (Poverty) Distribution

- Darkest turquoise represents highest poverty tracts (20% or more).
- High poverty tracts tend to be located in north central MN or within Minneapolis – Saint Paul.

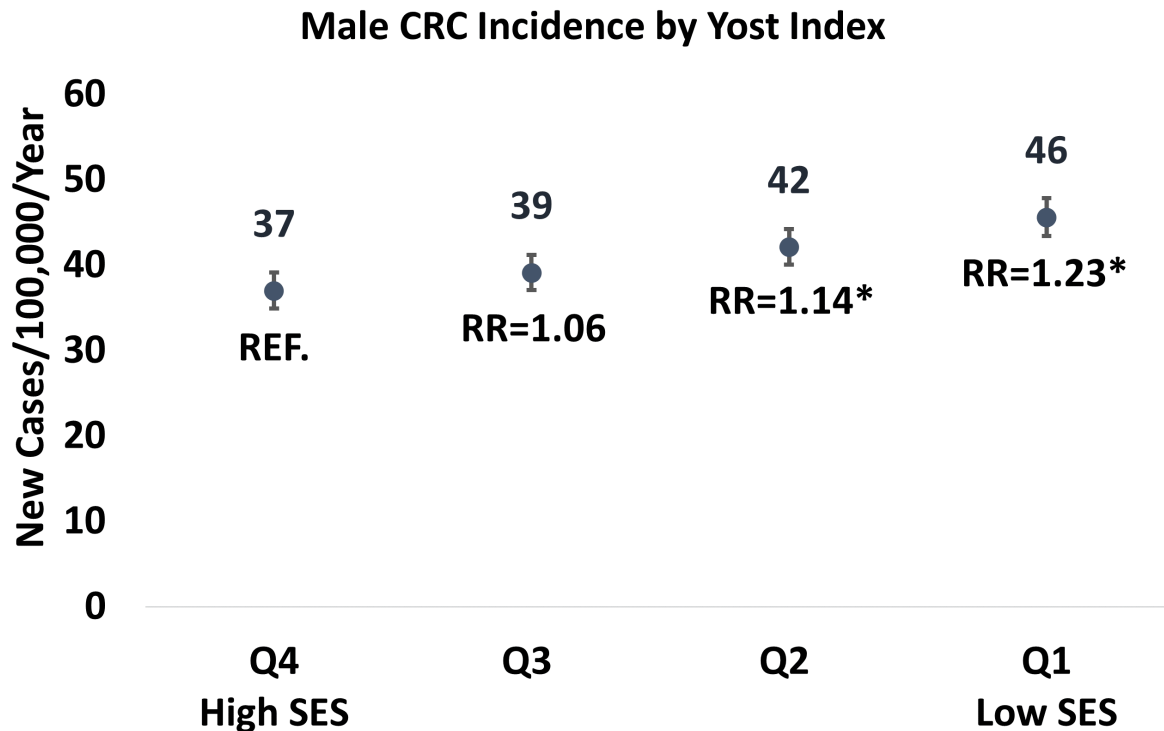


RESULTS – CRC Incidence in Minnesota

Social Disadvantage and Colorectal Cancer Outcomes in Minnesota

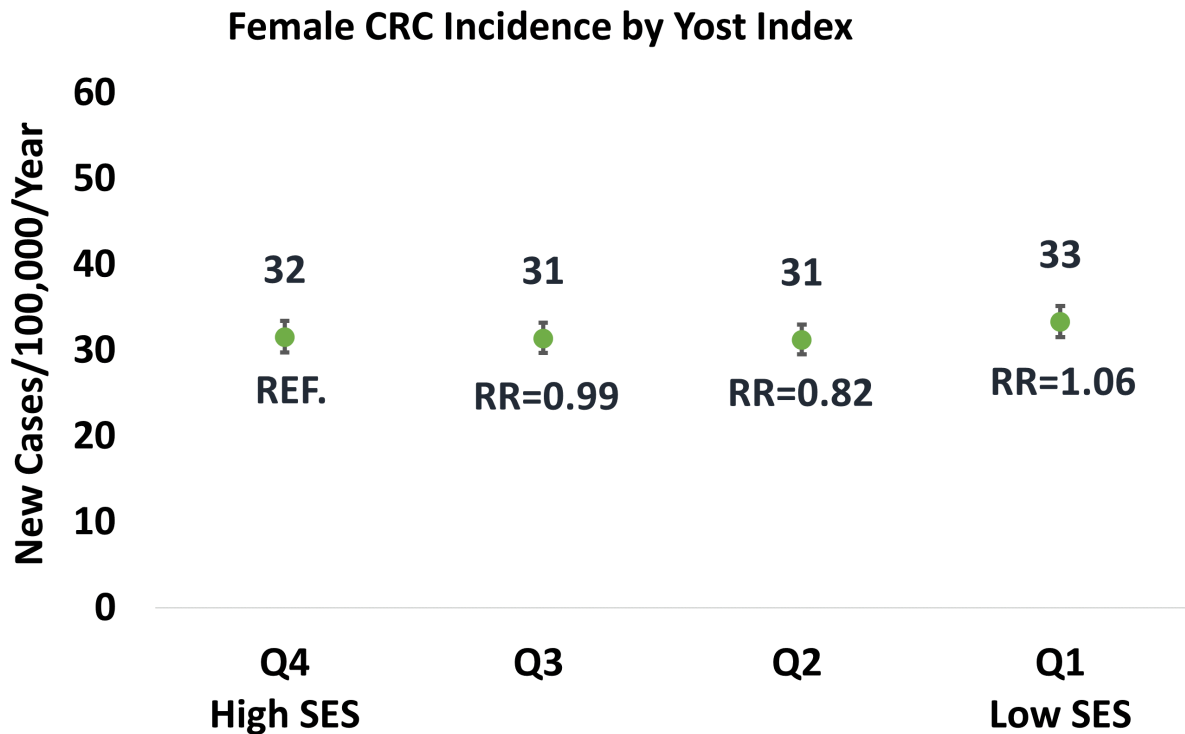
MN Males: CRC Incidence by Yost Index (SES) Quartile; All Malignant Cancers

- Male CRC incidence increased with progressively lower SES quartiles.
- Incidence in the lowest SES quartile was 23% higher than in the highest SES quartile.



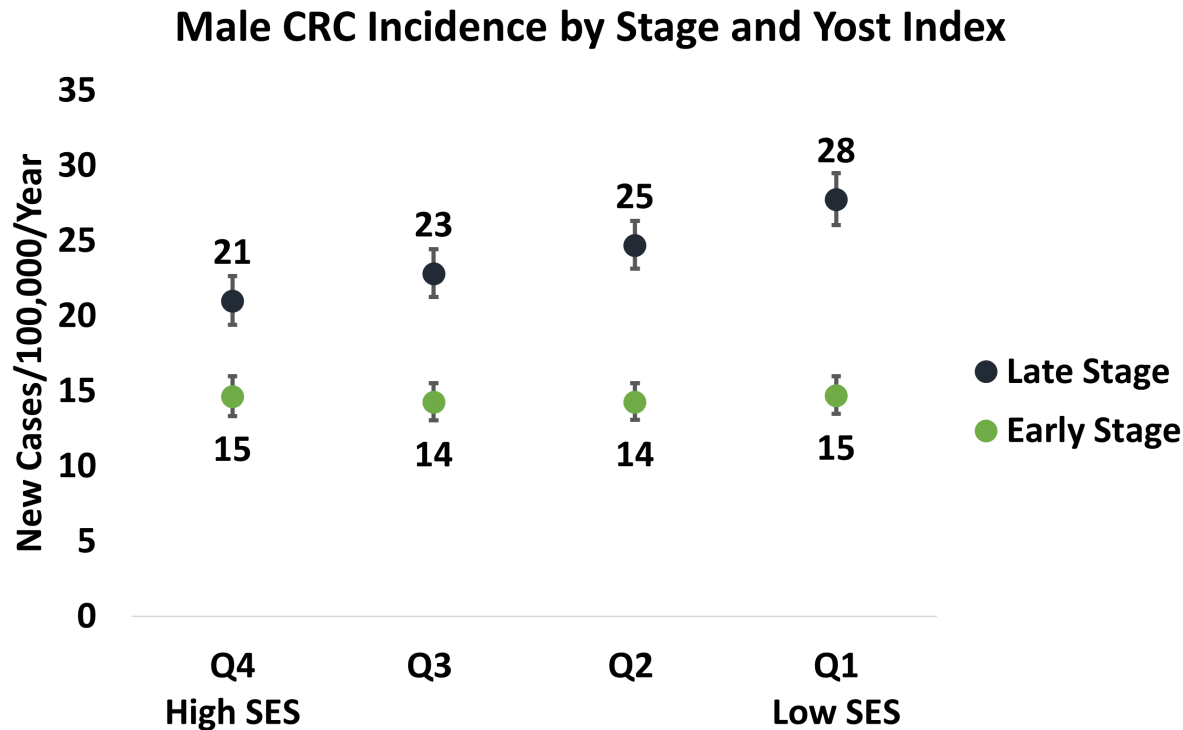
MN Females: CRC Incidence by Yost Index (SES) Quartile, All Malignant Cancers

- No association between SES quartile and CRC incidence in females.



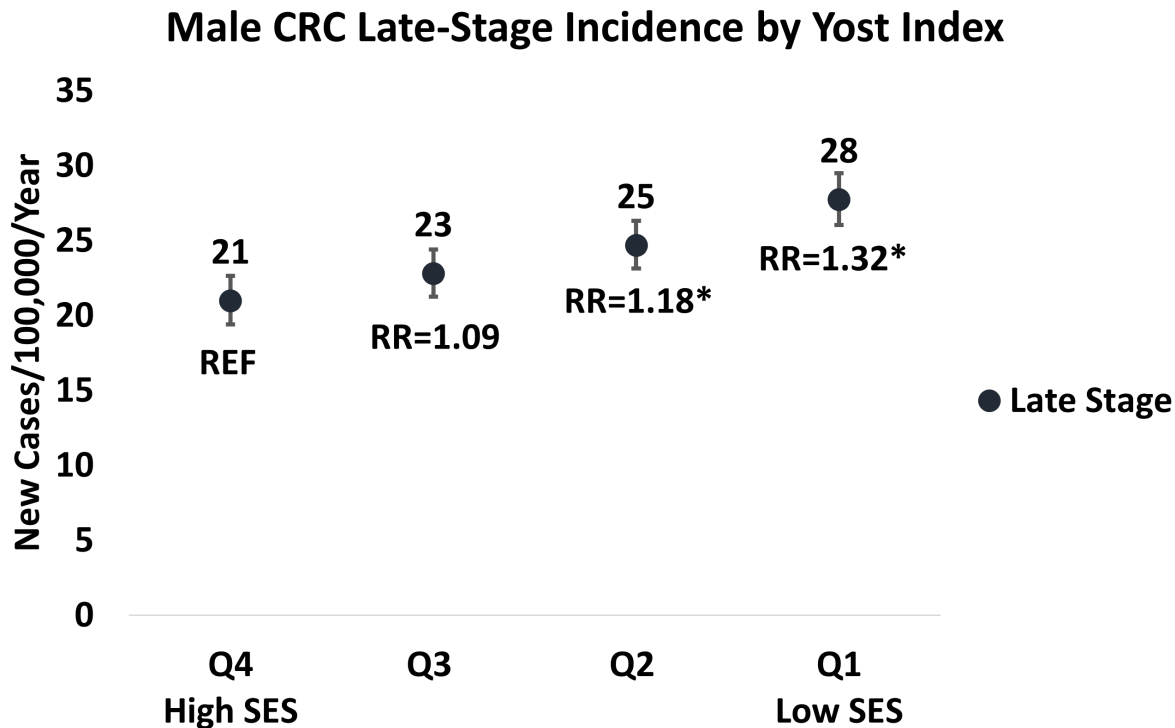
MN Males: CRC Incidence by Stage (Early, Late) and Yost Index (SES) Quartile

- **Late-stage** (regional + distant) incidence increased with lower SES quartile.
- But **early-stage** incidence was unrelated to SES quartile.



Late-Stage CRC Incidence by Yost Index (SES) Quartile

- Males: Restricting to late-stage disease, the association between SES quartile and CRC became stronger.
- Females: No association between SES and early- or late-stage CRC (data not shown).

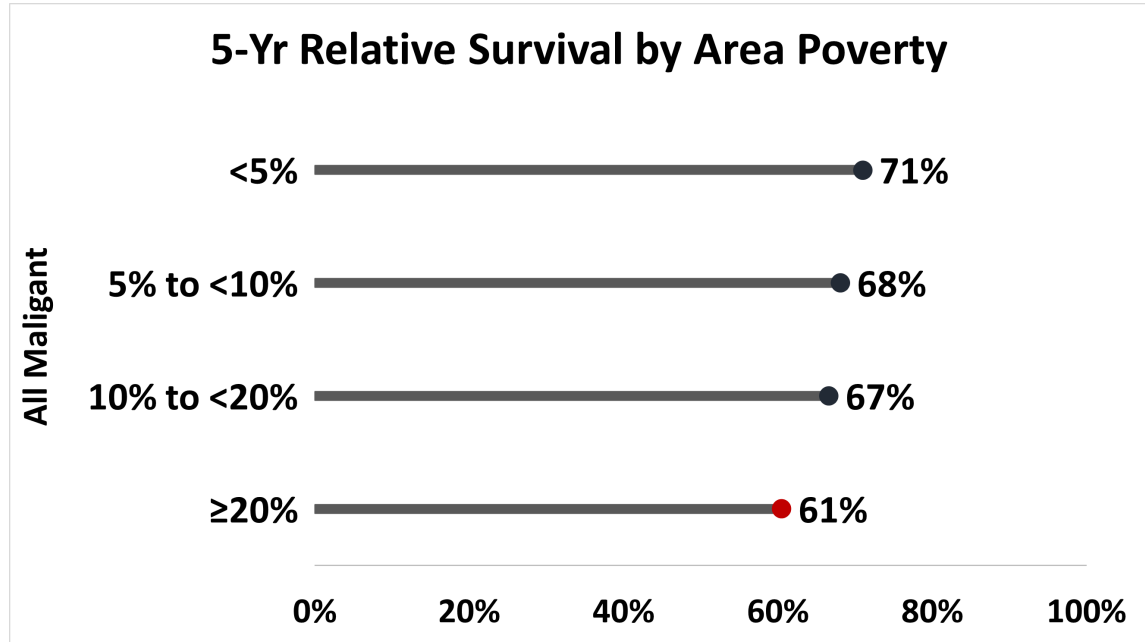


RESULTS – CRC 5-Year Relative Survival in Minnesota

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5-Year Relative Survival by Krieger Index (Pct Poverty)

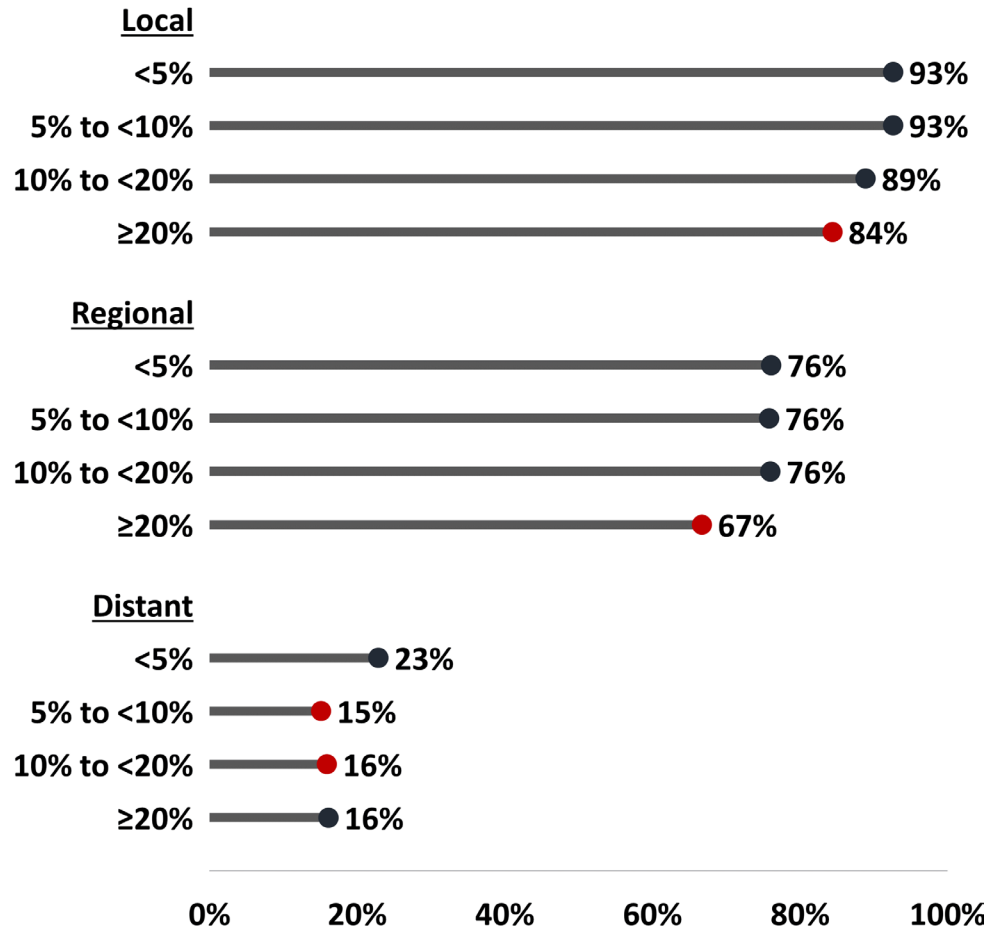
- Combined male and female results.
- 5-yr relative survival was 10 percentage points lower in patients living in tracts having 20% or more in poverty.



Stage-Specific 5-Year Relative Survival by Krieger Index

- Large survival differences based on stage at diagnosis.
- Within stage: Relative survival is lower in intermediate- or high poverty tracts.
- Indicates late stage at dx in Pts living in high poverty tracts does not explain their lower survival.

5-Yr Relative Survival by Stage and Krieger Index



CONCLUSIONS

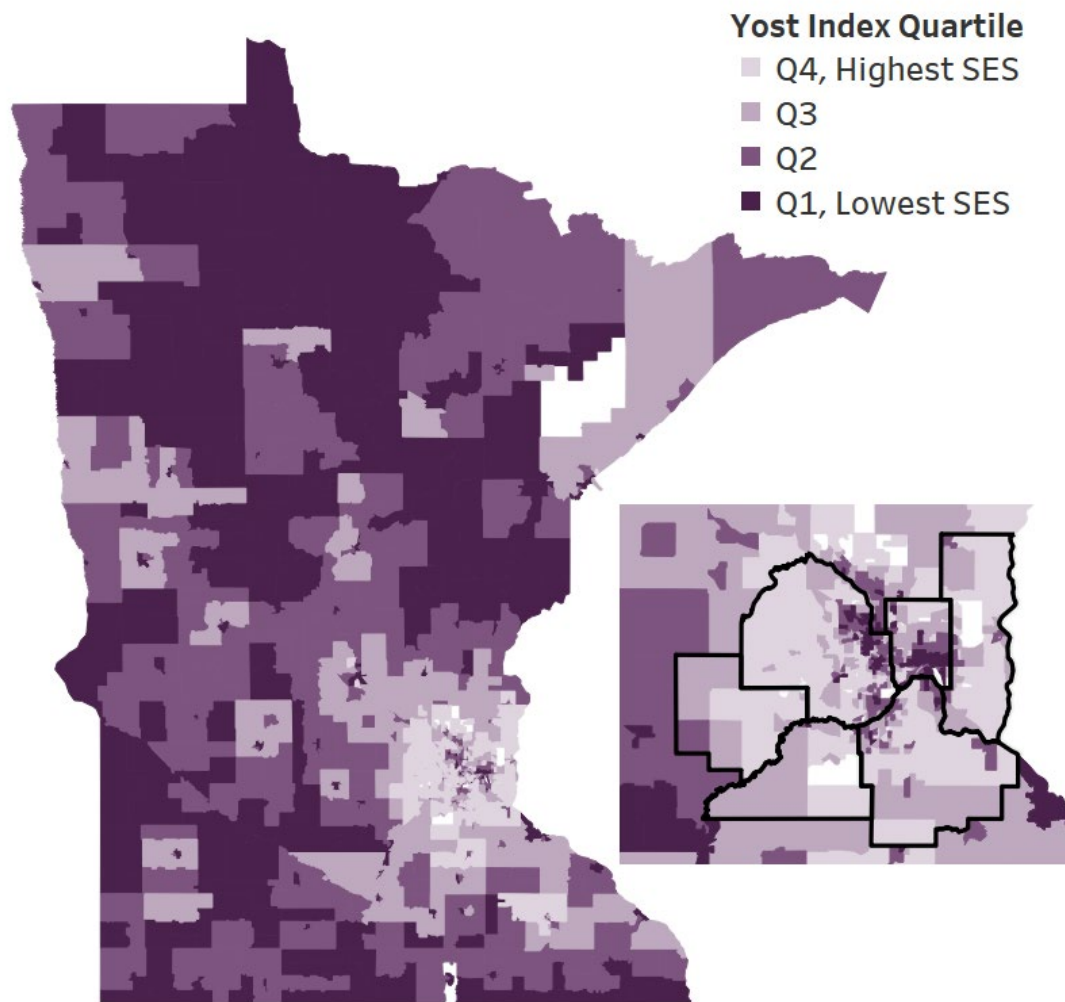
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Can these results help prioritize groups for cancer prevention in Minnesota?

- **Incidence:** Males living in the lower two SES tract quartiles (Yost Index) have higher rates of late-stage CRC and may benefit from programs to increase screening.
- **Survival:** Male and female CRC patients living in high poverty census tracts (Krieger Index) have poorer 5-year relative survival and may benefit from increased support in accessing timely, quality care.

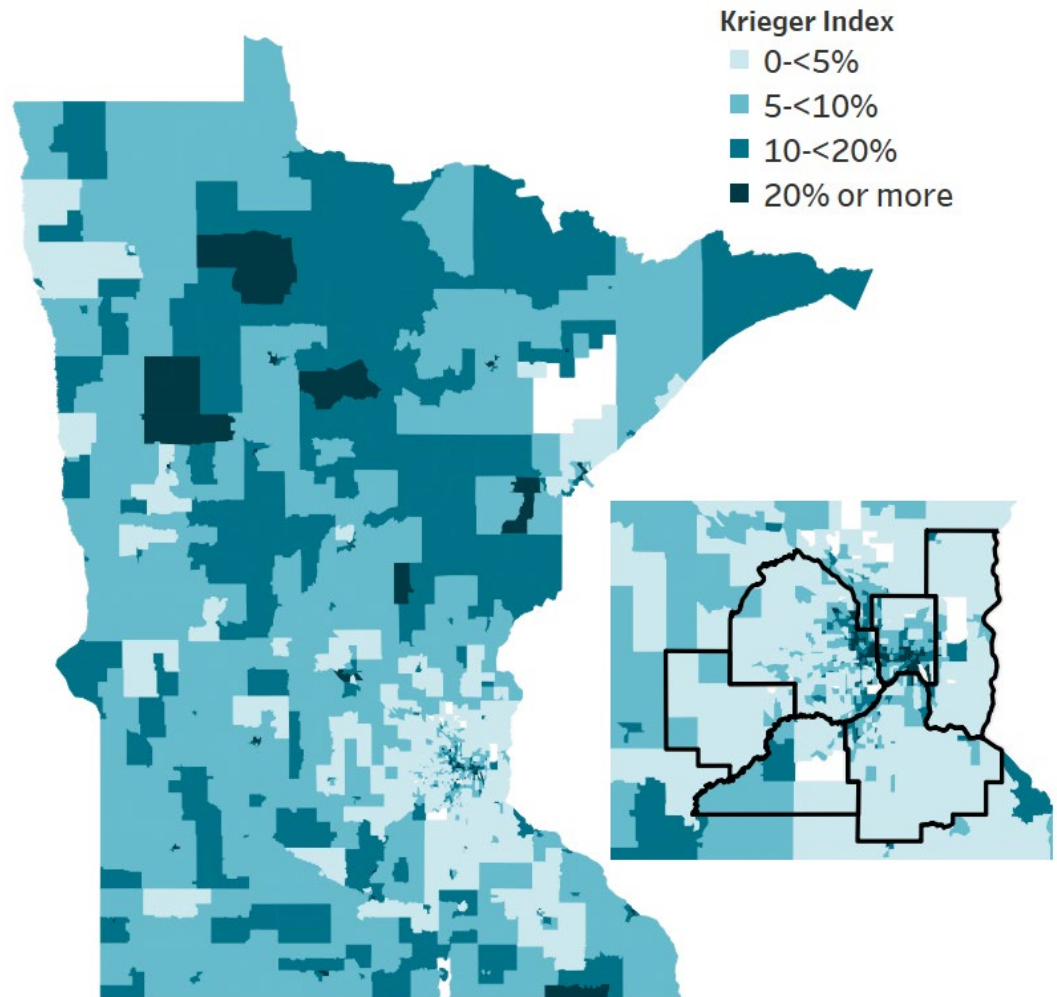
Yost Index Geographic Distribution

- Darkest purple represents lowest SES tracts (Yost-Q1).
- The male populations of these tracts have elevated incidence of late-stage CRC.
- These populations may benefit from increased promotion of CRC screening.



Krieger Index (Pct Poverty) Geographic Distribution

- Darkest turquoise represents highest poverty tracts (20% or more).
- CRC patients living in these tracts have lower CRC survival.
- These patients may benefit from increased support in accessing timely, quality care.



- Coauthors

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- Paula Lindgren, M.S.
- Tina Nelson, M.P.H.
- Michelle Brasure, Ph.D.

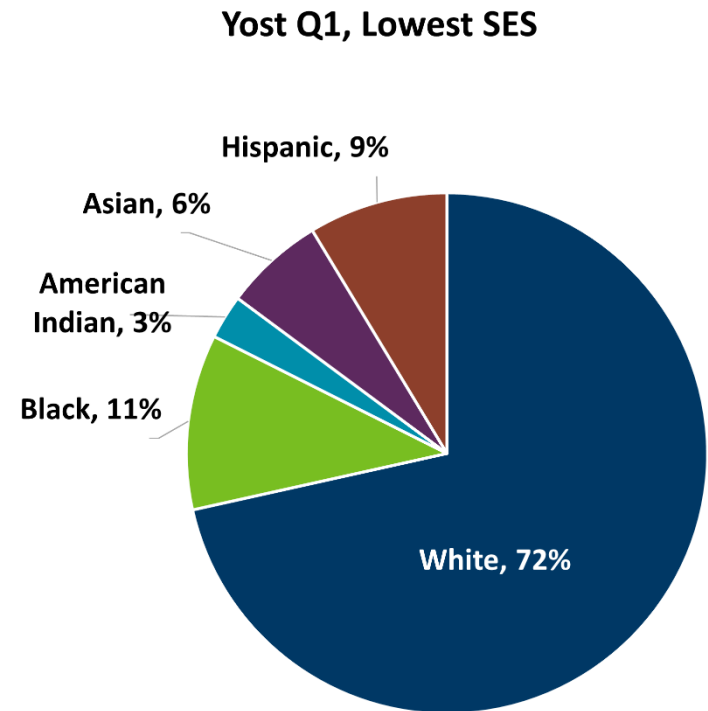
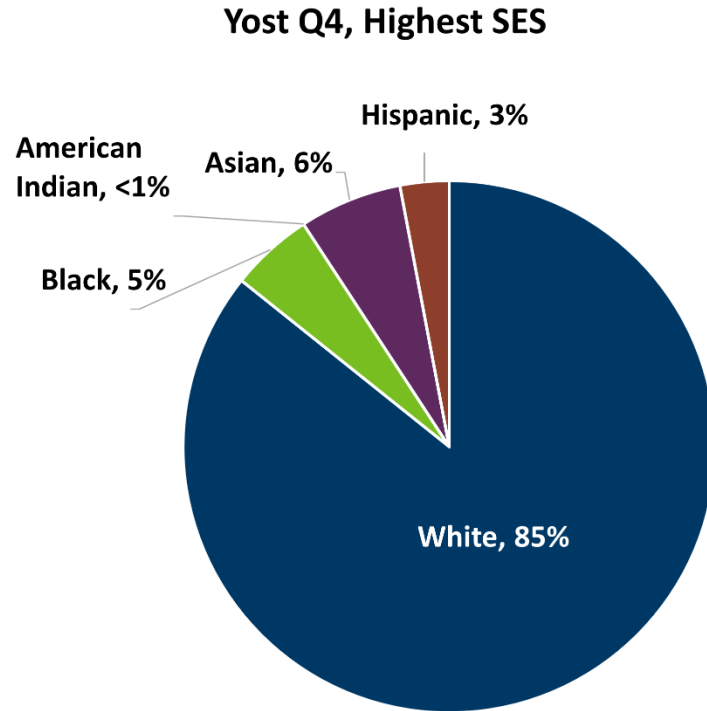
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Question and Answer Slides (Optional)

Social Disadvantage and Colorectal Cancer Outcomes in Minnesota

Race Composition of High and Low Yost Quartiles (MN)

- All quartiles are predominantly White race.
- Lowest SES quartile (Q1) has highest % Black, Hispanic, or American Indian residents (15% vs. 28%)



CRC Incidence: ABSM Rate Ratio Comparisons

- Males: Higher CRC incidence in more disadvantaged census tract categories (according to all 3 measures).
- Females: No relationship found between CRC incidence and social disadvantage.

Males	Yost Index Q4	Household Income Q4	Percent Poverty (Krieger Index)
Most Advantaged	REFERENCE	REFERENCE	REFERENCE
More	1.06	1.06	1.03
Less	1.14*	1.16*	1.08*
Least Advantaged	1.23*	1.19*	1.13*

Females	Yost Index Q4	Household Income Q4	Percent Poverty (Krieger Index)
Most Advantaged	REFERENCE	REFERENCE	REFERENCE
More	1.00	0.94	1.00
Less	0.99	0.95	0.98
Least Advantaged	1.06	0.98	0.96

Late-Stage CRC Incidence: ABSM Rate Ratio Comparisons

- Males: Yost Index, Income, and Krieger Index all found higher male late-stage CRC incidence in less disadvantaged areas.
- Females: No relationship between late-stage CRC incidence and social disadvantage.

Males	Yost Index Q4	Household Income Q4	Percent Poverty (Krieger Index)
Most Advantaged	REFERENCE	REFERENCE	REFERENCE
More	1.09	1.10	1.04
Less	1.18*	1.22*	1.08
Least Advantaged	1.32*	1.26*	1.19*

Females	Yost Index Q4	Household Income Q4	Percent Poverty (Krieger Index)
Most Advantaged	REFERENCE	REFERENCE	REFERENCE
More	1.01	0.95	1.07
Less	1.05	1.00	1.04
Least Advantaged	1.08	1.03	1.01

5-Year Relative Survival by Sex and Krieger Index (Pct Poverty)

- Males: 5-Year relative survival is lower in men living in high poverty tracts.
- Females: Apparent progressive decrease in higher poverty tracts. But no stat. sig. differences by overlapping CI method.
- Both sexes combined: Progressively lower survival with higher levels of poverty.

