An Explanatory Sequential Mixed-Methods Investigation of Colorectal Cancer Care Disparities in North Dakota

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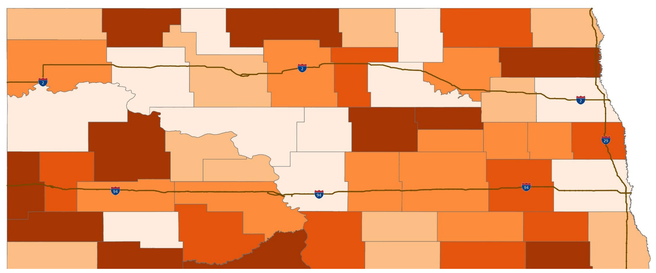
Abstract

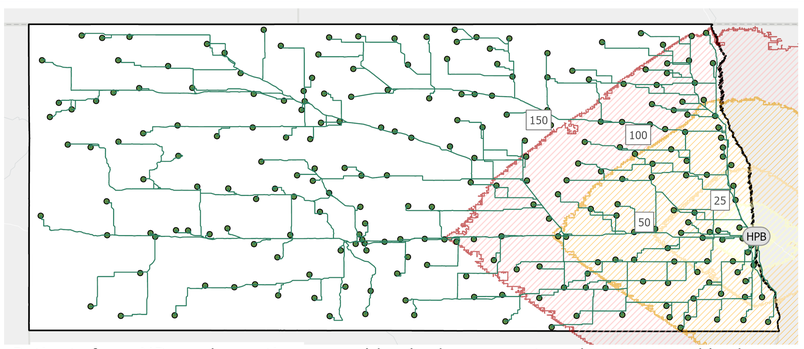
Rural populations experience disparities in access to care which can lead to inferior cancer outcomes. Colorectal cancer (CRC) is the second-leading cause of cancer mortality in the United States, despite being highly preventable, detectable, and treatable. Over the last decade, CRC incidence rates have decreased by 30% in the US, presumably secondary to screening as a public health measure. However, the pace of improvements from screening has not been equal within the United States, with North Dakota lower that the median of states for colorectal screening rates, while having a higher than average cancer incidence. **We present the hypothesis that spatial and aspatial barriers exist that influence CRC outcomes in North Dakota.** We propose an explanatory sequential mixed-methods study focusing on CRC mortality-incidence ratio hot-spot and low-spot counties in North Dakota that will elucidate attitudes, behaviors, beliefs, and barriers that may influence CRC incidence, screening rates, stage of presentation, and mortality. This study will specifically explore quantitative data analyzed using spatial techniques and use this data to inform qualitative analyses in a population-centered fashion.

Mortality-to Incidence Ratio



Choropleth maps depict Mortality to Incidence Ratio (MIR), quintiles, based on county of residence in ND. Darkest quintile MIR 0.65-0.84 ("hot spots"); lightest quintile MIR 0.45-0.54 ("low spots"). Data are from the ND Cancer registry, from age-adjusted incidence and mortality rates.

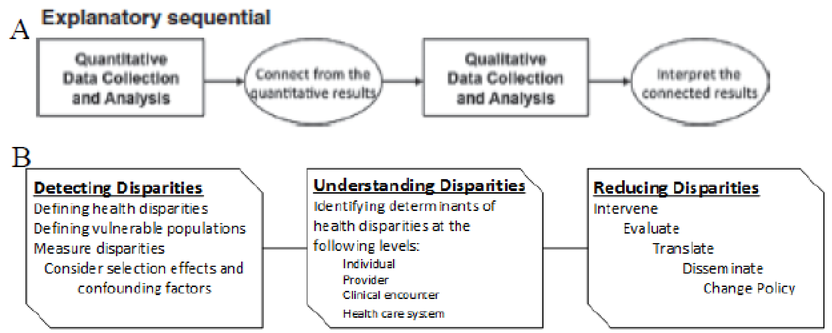
Rural Driving Distance to CRC Specialists



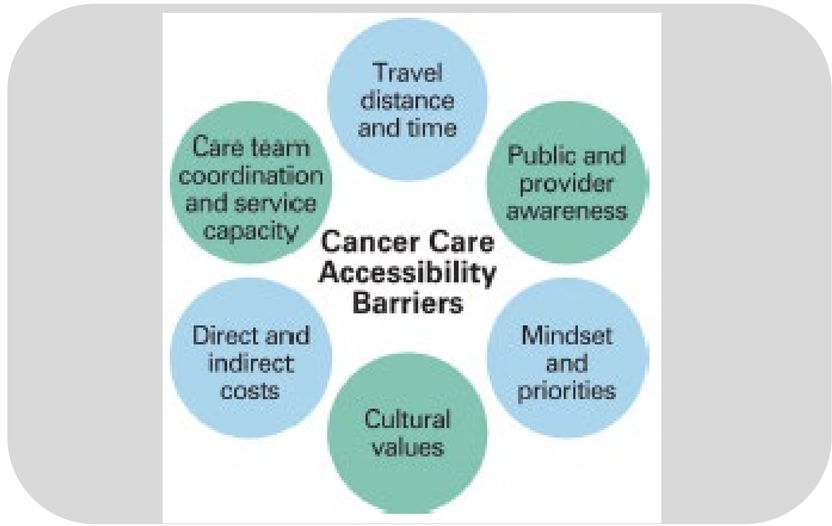
Patients from ND rural counties were older, had more unstaged cancers, and had a greater proportion of AIAN diagnosed with CRC compared to residents of urban counties. Rural patients travel further to endoscopic services (29 vs 8 miles; p<0.001), colorectal surgeons (312 vs 61 miles; p<0.001), and hepatobiliary specialists (551 vs 249 miles; p<0.001) compared to urban patients.

Spatial and Aspatial Accessibility Facilitators and Barriers may impact Colorectal Cancer outcomes in North Dakota

Study Design and Conceptual Framework

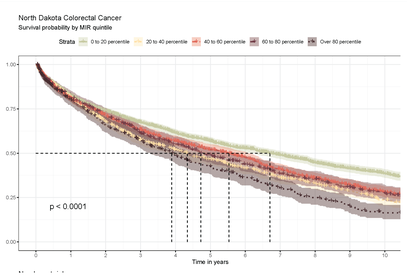


Six Dimensions of Cancer Accessibility

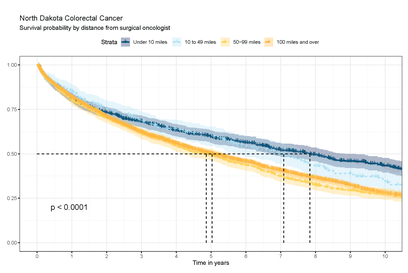


Barriers and Facilitators to Cancer Care Accessibility, Adapted from Dear 1977. Figure previously published in ASCO Daily News (Zahnd and Ganai, 2019).

Median Survival = 3.9y (hot spot counties) vs 6.7y (low spots)



MIR quintile (p<0.0001)



Distance from HPB SurgOnc p<0.0001)

Questionnaires

We submitted surveys by random purposeful sampling to ND residents in specific counties by MIR quintile and received responses from residents of low-spot counties (n=44), middle quintile counties (n=42), and hot-spot counties (n=35). There was no significant difference in age, gender, race, or ethnicity of respondents.

No differences were noted in EUROQOL 5L-5D Perceptions of current health state or validated questions examining Mistrust in health care.

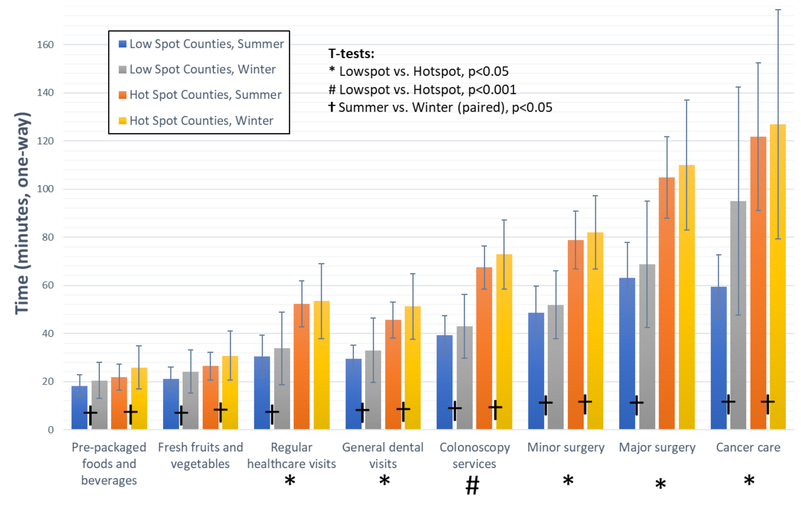
Respondents from hot-spot counties were

- more likely to live in a rural (RUCA 4-10) zip code (100% vs. 56%; p<0.001),
- less likely to be married or have a domestic partner (66% vs. 93%; p=0.003),
- less likely to have annual income over $50k (51% vs. 82%; p=0.007), and
- less likely to have a bachelors or higher college degree (17% vs. 64%).
- had higher estimated travel expenses for specialty care ($200 vs. $67).

In ranked order of preferred screening modality, residents preferred:

HOT SPOT COUNTIES	LOW SPOT COUNTIES	MIDDLE COUNTIES
1. Colonoscopy	**1. Cologuard**	**1. Cologuard**
2. Cologuard	2. FIT testing	2. Colonoscopy
3. Sigmoidoscopy	3. Colonoscopy	3. Sigmoidoscopy
4. FIT testing	4. Sigmoidoscopy	4. FIT
5. No Screen	5. No Screen	5. No Screen

Travel Time to Services



Next Steps

- Focus groups are underway in hot-spot and low-spot counties. These will be conducted in gender-specific community member cohorts to explain data and explore community attitudes, behaviors, values, and beliefs.
- We will later conduct provider interviews, comparing/contrasting provider attitudes, behaviors, values, and beliefs in hot-spot and low-spot counties.
- Following Kilbourne's conceptual framework for disparities research, we will work towards defining and developing an intervention to improve outcomes in North Dakota.

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