# Survival Disparities Between Border and Non-border Counties in Colorectal Cancer Patients Using The TCR

**Authors**
Michael Machiorlatti 1 & Michael LaPelusa 2
1 UTRGV - SOM, Department of Population Health and Biostatistics
2 Vanderbilt University Medical Center, Department of Internal Medicine; Graduate of UTRGV SOM – Class 2020

# Background

- Along the US Texas Mexico border constant migration, developing medical infrastructure and income disparity per capita often leads to poorer access to healthcare which translates to poorer health outcomes.
- 32 of the 254 counties in Texas are on the border; roughly 9.8% of the Texas population resides these counties (2.8 million people)
- This represents a significant portion of the population susceptible to potentially adverse health outcomes.
- Additionally, 88.4% of the population is Hispanic, and up to 47% of people lack health insurance with half of Texans living on the border having a HS or less (compare to 39% of US citizens overall).

# Critical Issue and Statement of Aims

In 2014, seven of the 20 US counties with the lowest colorectal cancer (CRC) screening rates were in Texas, six of which were Texas border counties. Screening directly influences long term outcomes such as recurrence and death.  Our goal is to then:

1) Investigate if disparities between border and non-border counties on survival in CRC exist

2a) If disparities exist between border and non-border counties on survival, investigate factors affecting disparities

2b) Quantify the survival disparities by border status and other sociodemographic factors

# Methods - Data

Cases were obtained from the Texas Department of State Health Service's Texas Cancer Registry (TCR).

**Inclusion Criteria:** patients 18 or older between 1995 and 2015.

**Exclusion Criteria:** incomplete information regarding age, sex, year of diagnosis, site of diagnosis, or poverty level.

# Methods - Statistical Analysis

- Simple descriptive statistics were calculated for all covariates.
- Chi-square tests of independence were created to examine the association between each categorical variable and border county status.  This was done to explore potential adjustment factors in our multi-variable model.
- Finally, Kaplan Meier and Cox Proportional Hazards Analysis was performed to quantify survival estimates for patients included in the analysis.  SAS v9.4 was used for all data analysis.

# Results – Descriptive Statistics

The majority of cases from 1995 to 2015 were non-border cases (91.4%), 60+ (69.2%), and white (67.3%). There was a 53.2% vs 46.8% split of all CRC cases between males and females.

Along border counties the population is 68.5% Hispanic for reported cases, with only 12.7% in non-border counties.

Among all cases 21.5% of cases occurred between 2010-15 in non-border counties, but 36.2% for border counties. This represents an absolute and relative increase in cases from prior years.

# Results – Survival Results

**Table 1 – Kaplan Meier Analysis of Median OS (months) of Colorectal Cancer Overall and By Border County Status by Site – Unadjusted**

| Cancer Type | Median OS (95% CI | | | |
|---|---|---|---|---|
| | Overall | Non-Border | Border | p-value |
| **Overall** | 59.0 (58.0, 59.0) | 59.0 (58.0, 60.0) | 53.0 (51.0, 55.0) | < 0.0001 |
| **Male** | ***56.0 (55.0, 57.0)*** | ***56.0 (54.0, 58.0)*** | ***49.0 (47.0, 52.0)*** | ***< 0.0001*** |
| **Female** | 62.0 (61.0, 63.0) | 62.0 (61.0, 64.0) | 59.0 (55.0, 62.0) | 0.5645 |

Unadjusted there was a difference in median OS months non-border to border counties (56.0 vs 49.0; $p < 0.0001$) with no difference in females.

# Results – Survival Results

After adjustment (age, race, sex, grade, stage dxyr) the hazard of death was lower for border counties (HR = 0.95 95% CI 0.92-0.99 p =0.0058) after stratification of counties by poverty level in counties with poverty between 20-100%.

This also included a finding of HR 0.96 (95%CI 0.93-0.99 p = 0.0049) for Hispanics vs Whites, but only in 20-100% poverty class.

Traditional findings of M > F across all poverty classes; Asians have lower HR across all poverty classes

# Conclusions

- This study found evidence that border males had lower survival times than their non-border counterparts.
- A counterintuitive result  was that poorer counties along the border had lower hazards of survival was found.  This is likely a consequence of the lower age demographic of border population and potentially differences in incidence.

# Conclusions

- Currently have an incidence paper under review → we found there were absolute differences in incidence of CRC with lower rates being reported in border counties.  What is troubling is that more recently border counties rates are exceeding their non-border counterparts with trends going in opposite directions (increase in border counties with marked drops in non-border counties.
- Exploration of this finding is consistent with other cancer and health types, but warrants further investigation and potential comparison to the national border experience.

# Limitations

1) Only considered complete cases; for final analysis will perform imputation to conduct a sensitivity analysis on our findings
2) There was no treatment variables included in our analysis; so there might be confounding due to treatment effects
3) We don’t have individual screening information
4) Modeling approach should consider age stratification due to known age effect of CRC

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