Gastric Cancer Risk in Foreign-born Populations

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Problem: Gastric Cancer risk high in foreign populations

Current evidence has shown that gastric cancer (GC) incidences have remained higher in some immigrant populations despite decreasing in North America. Studies examining migration patterns have shown an increase in foreign-born Canadians within the last 10 years, but few studies have sought to examine the implications of GC risk in the Canadian population. [1]

Contributions

We use traditional Cox regression in order to address the following questions within an Ontario wide population:

1. Is there an association between GC risk and immigrant status?
2. Is association is consistent across time?
3. How does it change across different World bank regions?

Method: Models

For each individual i the **main effects model** was a Cox regression model build from the exposure variable (i.e. immigrant status) and the age covariate.

$$\lambda(t) = \lambda_0(t)\exp(\beta_1 x_{i1} + \beta_2 x_{i2}) \quad (1)$$

We introduced a time-dependent interact term for time and the exposure covariate such that the **time-interaction model** was

$$\lambda(t) = \lambda_0(t)\exp(\beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 \mathbb{1}_{\{t_i>10\}}) \quad (2)$$

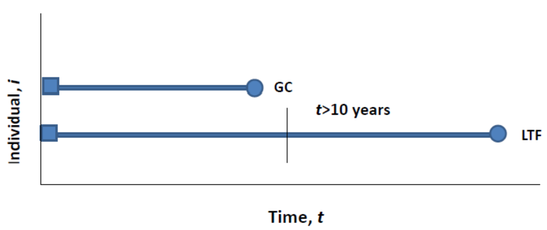

Figure 2: Schematic representation of follow-up time (FUT) decomposition in (2).

Method: Study Design

This is a retrospective matched cohort study that used **Ontario-wide** administrative databases.

OHIP eligible immigrants that were $\geq$ 40 years old were matched with five non-immigrants on the basis of age, gender and calender year.

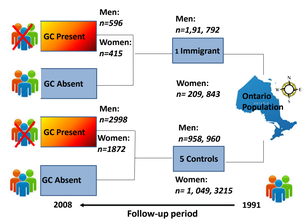

Figure 1: Depiction of 1:5 matching process.

Primary Findings

Table 1: Cox regression model.

	Females			Males		
Variable	Univariate HR (95C% CI)	Multivariate HR (95C% CI)	Multivariate HR (95C% CI) with interaction	Univariate HR (95C% CI)	Multivariate HR (95C% CI)	Multivariate HR (95C% CI) with interaction
Immigrants	1.23 (1.10, 1.36)	1.24 (1.12, 1.38)		1.09 (1.00, 1.20)	1.10 (1.00, 1.20)	
Non-immigrant controls	Reference	Reference		Reference	Reference	
Age at index						
40-49	Reference	Reference	Reference	Reference	Reference	Reference
50-59	2.05 (1.81, 2.31)	2.05 (1.81, 2.31)	2.05 (1.81, 2.31)	2.60 (2.37, 2.86)	2.60 (2.37, 2.86)	2.60 (2.37, 2.86)
60-69	3.99 (3.57, 4.47)	4.00 (3.57, 4.48)	4.00 (3.57, 4.48)	5.96 (5.10, 6.96)	5.97 (5.12, 6.98)	5.97 (5.12, 6.98)
70-74	5.96 (5.10, 6.96)	5.97 (5.12, 6.98)	5.97 (5.12, 6.98)	7.49 (6.61, 8.48)	7.49 (6.61, 8.49)	7.49 (6.61, 8.49)
>= 75	9.28 (7.90, 10.90)	9.28 (7.89, 10.90)	9.28 (7.90, 10.90)	9.66 (8.33, 11.20)	9.66 (8.33, 11.20)	9.66 (8.33, 11.21)
Years from index						
Immigrants<= 10 years	1.27 (1.10, 1.46)		1.29 (1.12, 1.48)	1.16 (1.03, 1.29)		1.17 (1.04, 1.31)
Controls<= 10 years	Reference		Reference	Reference		Reference
Immigrants> 10 years	1.17 (0.99, 1.38)		1.19 (1.01, 1.40)	1.01 (0.88, 1.16)		1.00 (0.87, 1.15)
Controls> 10 years	Reference		Reference	Reference		Reference

Note that 95% CI refers to 95% Confidence intervals.

1. Proportional increase in risk of GC with increasing age across all Ontarians.
2.East Asian and Pacific migrants showed an elevated risk after 10 years.
3. Further work would be required before adopting intervention programs for high-risk migrants.

References

[1] K. Yeerae, J. Park, et al. Stomach cancer incidence rates among Americans, Asian Americans and Native Asians from 1988 to 2011. In *Epidemiology and Health 2015*

Acknowledgements

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[2] Data was provided by ICES.

Results: Tracking male Gastric Cancer Trends

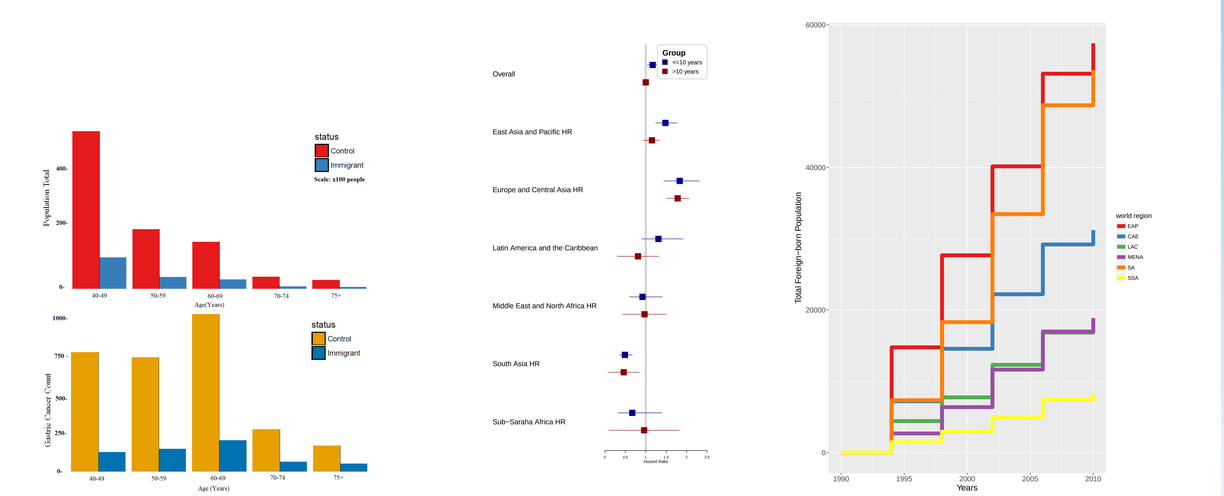

Figure 3: a) Comparison of GC distributions among **male** immigrants and controls. The similiar distributions indicate that there does not appear to be an interaction with age and immigrant status. b) Forest plot of the adjusted hazard ratio (HR) for each world bank region in comparison to the overall HR for males. c) Cumulative population growth in males across world bank regions.

Results: Tracking Female Gastric Cancer Trends

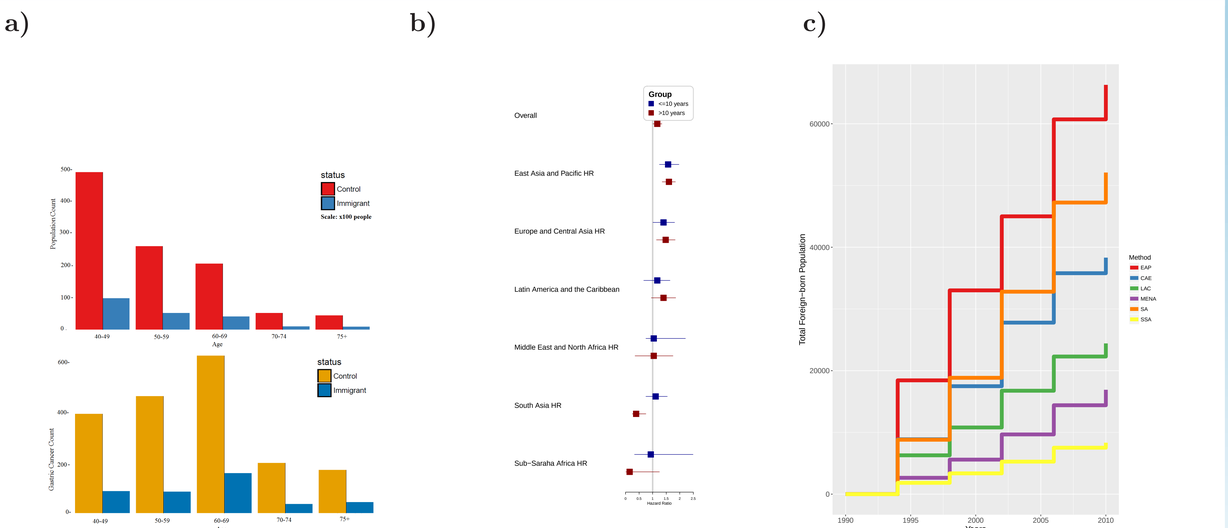

Figure 4: a) Comparison of GC distributions among **female** immigrants and controls. Analogous to male populations, the distributions of immigrants and controls are similiar. b) Forest plot of the adjusted hazard ratio (HR) for each world bank region in comparison to the overall HR for females. c) Cumulative population growth in females across world bank regions.