Pursue STEM: What Can You Do With Statistics?

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Outline

1. **Who** Am I?
2. **What** do I do?
3. **When** did I decide to study statistics?
4. **Where** was I in my life when I made this decision?
5. **Why** did I make this change?

Who Am I?

- My name is Nnenna Asidianya. I am a second year statistics PhD student in the Department of Statistical Sciences (DOSS)

What do I do?

Recently years has seen an increase in the use of statistical methods by scientists in various fields. I have been actively involved in the following areas:

- Clinical Research
- Statistical Education
- Methodology

What do I do?

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GASTRIC CANCER RISK IN FOREIGN-BORN POPULATIONS
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ICES

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 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

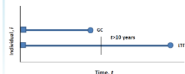$$\lambda(t) = \lambda_0(t)\exp(\beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 \mathbf{1}_{\{t_i > 10\}}) \quad (2)$$

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

REFERENCES

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

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.

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.

ACKNOWLEDGEMENTS

RESULTS: TRACKING MALE GASTRIC CANCER TRENDS
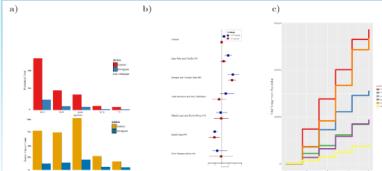
a) b) c)

Figure 3: a) Comparison of GC distributions among male immigrants and controls. The similar 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
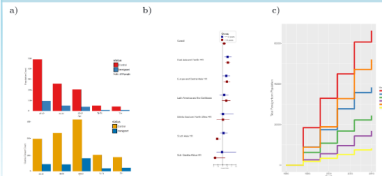
a) b) c)

Figure 4: a) Comparison of GC distributions among female immigrants and controls. Analogous to male populations, the distributions of immigrants and controls are similar. 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.

When did I decide to study statistics?

- First year courses: Biology I & II, Chemistry I& II, Physics I & II, Calculus I& II, *Electives: Statistics I*
- Second year courses: Organic chemistry I, Biochemistry I & II, *Electives: Linear Algebra I, Ordinary Differential Equations*
- Realization that I preferred my electives to my course courses.
- I began to take more mathematics courses in my second year of my undergraduate studies.

Where was I in my life when I made this decision?

- I am a second year student who began to take second year mathematics courses for self interest.
- Ontario Shores Mental Health Research: Began working with SPSS statistical software in order to manage the data pertaining to satisfaction with inpatient care.
- Realization that statistics was a driving force in clincal and medical research.
- *Officially took a major in statistics.*