Questions

**Project Title: Use of joint point regression for temporal analysis of trends**

Supervisor: Victoria Landsman

Supervisor Email: victoria.landsman@utoronto.ca

Supervisor Phone: 4169272027 etx 2131

Co-Supervisor:

Co-Supervisor Contact Details:

Project Description: In this project we will learn about joinpoint regression

analysis which is a powerful regression approach to analyzing trends. This tool has

been used worldwide for the temporal analysis of cancer incidence. In this project

we will apply the method to the temporal analysis of injuries trends.

Statistical methods/analyses to be employed and level of familiarity needed for

these methods: Regression analysis, trends, administrative databases. I will

provide all the necessary guidance.

Site Location: 481 University Avenue, Suite 800, Toronto

Site Description: Institute for Work and Health is a non-profit research

organization with the focus on occupational health and safety.

Statistical software used at this site: R

Project available for MSc and/or PhD: MSc only

Expected availability: Flexible

Additional Onboarding Requirements: None

**The Statistics:**

Which R packages will be use?

No Joint point regression package.

“Segmented” R package.

Using the number of incidences per year, and the population size of Ontario or Canada, create the percent of incidences per year and using the “segmented” package

Things to consider: Are there injury trends that are seasonal.

What is the Statistical Model?

**Statistical Theory:**

To summarize the fitted piecewise linear relationship, Clegg et al. (2009) proposed the ’average annual

per cent change’ (AAPC) computed as the sum of the slopes (βj ) weighted by corresponding

covariate sub-interval width (wj ), namely µ =βjwj . Since the weights are the breakpoint differences,

the standard error of the AAPC should account for uncertainty in the breakpoint estimate,

as discussed in Muggeo (2010) and implemented by aapc().

**The Data:**

What is the target populations and the population we want to make an inference about?

Variable of interest?

Injuries trend. Are we looking at work place injuries or general injuries?

Where will we get the data from?

We have data from what year to what year?

How much data cleaning would be needed?

What have other similar studies on the subject shown?

**End Goal:**

What is the end goal of the study? Research paper / exploratory / other.

**Project Title: Practice Patterns in Renal Replacement Therapy (RRT or Dialysis) for the Elderly**

Supervisor: Gerald Lebovic

Supervisor Email: lebovicg@smh.ca

Supervisor Phone: 14168646060 ext. 7817

Co-Supervisor: Kevin Thorpe

Co-Supervisor Contact Details: kevin.thorpe@utoronto.ca 416.864.5776

Project Description: Elderly patients in the ICU have an increased risk of acute

kidney injury which can lead to a greater risk of death. However, utilization of RRT

in this population has not been well studied. It is believed that this population is

less likely to receive RRT as compared to a younger population. We will examine

practice patterns and patient demographics that may be associated with the use

of RRT in this population as well as associated outcomes such as mortality. Data

has been collected on several hundred elderly subjects at numerous centres

across Canada. There are several questions of interest and the student, in

conjunction with the supervisor, will choose the most suitable question(s) to work on.

Statistical methods/analyses to be employed and level of familiarity needed for

these methods: Multivariable regression models and generalized linear models

will be used in some of the analysis. Hierarchical models (i.e. linear mixed model

or generalized linear mixed model) will be used to examine practice patterns

where subjects are nested within units or hospitals. Time to event analysis will be

employed to examine mortality. Depending on the variables used, imputation

techniques such as multiple imputation may be used in the analysis.

Site Location: St. Michael's Hospital (250 Yonge Street site)

Site Description: Applied Health Research Centre (AHRC) where both the

Supervisor and Co-Supervisor work. The AHRC is an academic research

organization working on more than 100 studies.

Statistical software used at this site: Primarly R but SAS too

Project available for MSc and/or PhD: MSc only

Expected availability: Flexible to be determined by supervisor and student

Additional Onboarding Requirements: Brief orientation and some other

requirements (will find out)

**Project Title: The Burden of severe Group A Streptococcus in Ontario**

Supervisor: Lennon Li [Please note that I have provided two project descriptions,

but will be hiring only one student based on their particular interest and ability for

one of the two projects. Only one application is required to apply for both

projects]

Supervisor Email: lennon.li@oahpp.ca

Supervisor Phone: 6472607479

Co-Supervisor: Natasha Crowcroft

Co-Supervisor Contact Details: natasha.crowcroft@oahpp.ca

Project Description: Group A streptococci (GAS) are bacterial pathogens that

colonize and infect the upper respiratory tract and skin of humans. GAS can cause

non-invasive disease such as pharyngitis (‘strep throat’), scarlet fever and skin

infectious. Invasive GAS occurs when it invades normally sterile parts of the body

and can lead

to severe infections such meningitis and rarely, death. Incidence of iGAS has been

increasing in Ontario. Although most cases are sporadic, there have been several

recent community outbreaks in Thunder Bay, Toronto and Middlesex-London. One

report on a cluster finds a “striking overabundance of skin and soft

tissue infections that did not meet the definition of iGAS disease but which were

severe and, for the most part, required hospitalization.” This highlights that active

surveillance of severe cases of GAS occurs only after invasive infections have been

identified, which means that the full pattern of transmission and even some

outbreaks may not be captured by existing public health surveillance.

Understanding the epidemiology of severe GAS will help inform future GAS

interventions, including outbreak response and the potential of a new vaccine that

is under development. PHO is therefore

conducting a study with the specific objectives to:

1. Describe severe GAS cases in Ontario over time, age, sex and socioeconomic

factors

2. Identify geographic clusters (hot spots) of severe GAS to identify areas of

highest risk of iGAS

3. Compare severe GAS cases to reported (iPHIS) iGAS cases over time, age, sex,

geography and socioeconomic factors

The student will work on objective 2. The hypothesis to be explored is that there

are more clusters of GAS than identified by current surveillance, which is

important because it affects the likely design and impact of interventions. The

student is also expected to work with epidemiologists and content experts

to learn about the epidemiology of GAS and iGAS, and to gain more experience in

communication and presentation skills in real work settings.

Statistical methods/analyses to be employed and level of familiarity needed for

these methods: Some experience with Generalized Linear models, time series

models. Spatial models will be introduced during the project. Familiarity with R is

a must

Site Location: 480 University Ave

Site Description: Public Health Ontario (PHO) is a crown agency, we keep

Ontarians safe and healthy. With our partners in government, public health and

health care, we prevent illness and improve health. We provide the scientific

evidence and expert guidance that shapes policies and practices for a healthier

Ontario. PHO has locations across Ontario, including 11 laboratory sites. The

student will be assigned a cubical at PHO head office

Statistical software used at this site: R

Project available for MSc and/or PhD: MSc only

Expected availability: flexible

Additional Onboarding Requirements: Two weeks notice for computer and email

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