Summer 2023 – MPH Epidemiology Practicums

K.C.
Public Health Ontario - Health Protection

Introduction: Respiratory syncytial virus (RSV) hospitalizations strain healthcare systems globally. Beyond known clinical risk factors, understanding the impact of social factors on susceptibility is vital. Our study aimed to provide population-based estimates of RSV hospitalization across age groups in Ontario, Canada, with a focus on understanding trends by socio-demographic characteristics.

Methods: We conducted a population-based study of RSV cases in the Canadian Institute of Health Information Discharge Abstract Database from Ontario, Canada admitted between September 1st, 2016 to August 31st, 2019. RSV hospitalizations were identified using validated ICD-10-CA codes. We examined individual-level demographics and neighbourhood-level measures for sociodemographic and housing characteristics by quintiles using the 2016 Ontario Marginalization Index (ON-Marg) and 2016 census. Crude and age-standardized annualized incidence rates were calculated using the 2016 census as denominators and the 2011 census as the standard population.

Results: We identified 11,039 RSV hospitalizations across the study period. Of these, 15.1% were admitted to ICU and 3.5% died in hospital. Overall, the annualized RSV hospitalization rate was 27.3 per 100,000, with the highest rates observed in children under 1 year (1049.3 per 100,000), 1 year (294.4 per 100,000), and adults 85 years of age and older (155.1 per 100,000). Rates also varied by socio-demographic characteristics at the neighbourhood level. Higher rates of RSV hospitalization were associated with increasing marginalization of material resources (Q5: 32.6 per 100,000 versus Q1: 24.1 per 100,000), and household stability (Q5: 31.4 per 100,000 versus Q1: 21.5 per 100,000).

Conclusion: A better understanding of relative burdens of RSV across a comprehensive range of social factors is important for prevention efforts, particularly with the current expansions of existing vaccination recommendations and development of new vaccines.

G.E.E.
The Centre for Vaccine Preventable Diseases, Dalla Lana School of Public Health

Introduction: Vaccine coverage surveys are used to estimate uptake for routine vaccinations, measure progress towards national vaccination coverage goals, monitor and evaluate immunization programs, explore determinants of vaccination and report vaccination coverage to the World Health Organization. In Canada, vaccine coverage surveys are conducted nationally, provincially and municipally. However, a comprehensive, routinely updated resources that compiles publicly available routine vaccine coverage data from both the Public Health Agency of Canada and provinces/territories is lacking. The Immunization Atlas aims to fill this gap by become an interactive visual tool summarizing vaccine coverage data, beginning with measles-containing vaccines. Its purpose is to identify coverage gaps, track progress towards national vaccination coverage goals and explain variations in estimates from different sources.

Methods: A scoping review of peer-reviewed and grey literature was conducted assessing current and retrospective measles vaccine coverage in children (12 months-18 years) and adults, within Canadian jurisdictions. Inclusion criteria necessitate primary data on the measles-containing vaccine antigen, population type, proportion or percent vaccinated, age/birth year, coverage assessment year, coverage definition and geographical source. Articles lacking sufficient coverage data, primary data, or written in non-English/French or pre-dating the measles vaccine are excluded. Citations searches and governmental contacts contribute to the search strategy.

Results: Results from the peer-reviewed search across databases (Embase, MEDLINE, Web of Science, CINAHL) yielded 2878 records post-duplicates. After screening, 46 eligible articles were chosen for data extraction. The grey literature search is ongoing, with 138 reports sought, 18 assessed for eligibility and 14 included for extraction.

Conclusion: The scoping review has achieved significant progress, with the next phase focusing on data extraction from peer-reviewed and grey literature. The progress thus far confirms the potential of the Immunization Atlas to be a dynamic tool that enhances vaccine coverage understanding in Canada.

K.S.E.
The Centre for Addiction and Mental Health

For my practicum, I worked at the Institute for Mental Health Policy Research at The Centre for Addiction and Mental Health (CAMH). The focus of our lab is understanding the impact of policy on population level influences of mental health and substance use. The lab uses longitudinal cohort studies to evaluate changes in behaviours over time and machine learning to identify predictors of change.

In my summer practicum, I contributed to several studies. First, I joined a mental health monitoring cohort study, where the primary objective was to develop an automated and sustainable infrastructure to identify trends in population mental health and substance use over time. Within this study, I investigated the association between having a diagnosis of COVID-19 and functional impairment, anxiety, and depression. I cleaned the data, planned the analysis, coded the linear regression in R, and interpreted the results. This study is still ongoing, and a manuscript is in preparation for submission to a peer-reviewed journal.

Second, I conducted adjusted logistic propensity weighting analysis to evaluate the representativeness of our study sample in comparison to the Canadian population (using census data), and to reweight the data in our sample. Third, I extracted data from the CCHS and Statistics Canada on population smoking trends for input in a simulation study, with the main objective of generating estimates of historic smoking prevalence by a number of interacting demographic strata (i.e. age, sex). Last, I conducted a literature search for incidence of specific diseases for input in a simulation study modelling the impact of a potential menthol ban in the United States. I also created an analysis plan and code to calculate the transition probabilities of various smoking states using longitudinal cohort data from the Population Assessment of Tobacco and Health (PATH) study.

K.A.K.
Princess Margaret Cancer Centre – UHN

During this first practicum experience, I was actively engaged in multiple projects, most notably in the realm of Geriatric Oncology, as part of the all-encompassing AIM2REDUCE program at the Princess Margaret Cancer Centre. A key accomplishment was creating a comprehensive team presentation that effectively conveyed project objectives and current results. Vital datasets were meticulously processed for accuracy, so that an eligible study population was prepared prior to analysis. As the summer student role concluded, a comprehensive knowledge transfer report was compiled, encompassing data cleaning, analytic methods, coding algorithms, and thorough results and findings. All these aspects of this project allowed me to leverage and learn new skills in statistical programming with R. This facilitated future project transitions, offering insights into potential quality improvements and subsequent steps for analysis. Additionally, I contributed to the Rare Molecular Alterations project, as part of the CARMA-BROS research program. This included initiating initial descriptive analysis (i.e., Table 1 Demographics) and data processing. This project aimed to scrutinize treatment patterns, survival outcomes, and patient-reported experiences following Osimertinib treatment for advanced EGFR-mutated NSCLC patients, a targeted therapy developed by AstraZeneca. dedication to documentation across was evident in meticulous codebook creation for both projects. Further, I participated in developing an eligibility protocol for a proposed lung cancer study, emphasizing the East-Asian female population in Toronto, ON.

S.B.K.
University Health Network

Introduction: Chronic obstructive pulmonary disease (COPD) is a prevalent chronic lung disease in olderadults. Older adults with COPD often do not seek medical attention until they experience an exacerbation. To address this issue, we developed a machine learning model which uses speech features to predict COPD symptoms. We aimed to understand important speech features for predicting different COPD symptoms before individuals experience exacerbations.

Methods: Voice recordings were collected using smartwatches from 7 patients over 6 months. Daily symptoms were recorded on a smartphone app and daily symptom scores were calculated to determine the occurrence of an exacerbation. We extracted speech features using the PulmoListener, an end-to-end speech processing pipeline using the openSMILE framework including loudness, pitch and formants. A Random Forest machine learning model was used to detect the occurrence of any COPD symptom and trained using K-fold cross-validation and feature selection (k=42). Given the imbalance in symptom outcomes, we employed different resampling techniques to improve performance. The average F1 score, accuracy and feature importance for each speech feature by symptom was calculated.

Results: The best-performing model using random oversampling achieved an F1 score of 0.488 and an accuracy of 0.474. The most important feature in that model involved loudness. Testing each symptom as a separate model, we saw that the F1 scores were much lower. Further, only 15 of the 42 selected speech features had some importance in classifying patients into the correct symptom.

Discussion/Conclusion: We suspect the lower F1 scores by individual symptoms may be due to the imbalance in the classes of each symptom. These identified speech features and our model's performance shows promise in developing further models to explore the utility of speech features as a biomarker to predict symptoms.

K.L.
Population Health Analytics Lab

Introduction: The disproportionate impact of diabetes on certain populations indicates a health equity issue in Canada. A special case of diabetes in Ontario is Peel Region, which has higher rates of diabetes than average and unique characteristics such as a high proportion of immigrants. Studying the association between health equity factors and future diabetes risk will help inform preventative intervention planning.

Methods: We applied the validated Diabetes Population Risk Tool (DPoRT) to Canadian Community Health Survey (CCHS) 2017/18 data to investigate the impact of health equity factors on future 10-year diabetes risk and cases. A synthesized framework for health equity factors was developed by combining the Wider Determinants of Health Model and Queensland Health's framework. Using our framework, we selected relevant variables from the CCHS under the two domains: socioeconomic and structural, and lifestyle. We created four risk groups based on if people were low- or high-risk for socioeconomic and lifestyle variables. DPoRT estimates were obtained for each risk group, for both Canada and Peel, stratified by sex and age. A hypothetical intervention scenario was also modeled.

Results: In line with other literature, males and older populations have higher diabetes risk. We found that both socioeconomic and lifestyle factors were associated with future diabetes risk and cases. The group with combined high-risk socioeconomic factors and high-risk lifestyle factors had both the highest diabetes risk and number of cases (12% risk and 1.5million cases compared to 3% and 58k cases for the low-risk socioeconomic and low-risk lifestyle group). This association was seen for both Canada and Peel, across all strata. Correspondingly, the groups with high-risk factors saw the largest impact in our intervention scenario.

Conclusions: Populations with both high-risk socioeconomic and lifestyle factors should be a priority target for preventative diabetes interventions. Furthermore, socioeconomic factors are essential to consider for diabetes prevention.

K.M.
Public Health Agency of Canada, Health Promotion and Chronic Disease Prevention Branch

My summer practicum role was a Research Data Analyst at the Public Health Agency of Canada in the Applied Research Division. My project at PHAC was to examine the effects of the COVID-19 pandemic on alcohol related hospitalizations and mortality using an Interrupted Time Series Analysis. The "interruption" was the beginning of the pandemic period, and using ARIMA modelling I was able to look at the trends of hospitalizations and mortality due to alcohol pre pandemic beginning in January 2016, and see how the pandemic affected these trends beginning in March 2020. Then I was able to forecast the rates of hospitalizations and mortality that could have occurred if the pandemic didn't happen, in order to see if the pandemic created significant changes in the amount of people who died or were hospitalized from alcohol. From May-August I worked remotely, and used the Discharge Abstract Database and CVSD mortality data to extract, interpret, and analyze the rates of both hospitalizations and mortality due to alcohol from 2016-2021. Using excel, I compiled and organized this data into charts, and using R software I created multiple ARIMA models and plots of the rates for hospitalizations and mortality, as well as for 3 sub age-groups being 15-44, 45-64 and 65+ and for males specifically and females specifically. I improved upon my independent work skills, my statistics and coding skills, and will have the chance to write a manuscript on this data in the fall, and submit an abstract to the Health Canada conference that is taking place next February.

X.M.
Centre for Global Health Research

Background: The opioid epidemic has become a rising public health concern and social crisis in the United States since the 1990s. Previous studies have revealed that opioid-related mortality differs by sex, race, and industry of usual occupation. However, the interplay of sex, race, and industry in the progression of the opioid crisis is less known.

Methods: We examined US residents aged 15 years or above using US mortality multiple cause-of-death data to retrieve opioid-related death counts from 1990 to 2021. We calculated age-standardized opioid-related mortality rates, by sex, race, and industry. We further investigated industries most affected by opioid-related mortality and their non-opioid-related mortality comparisons by race and sex.

Results: We identified 683,335 opioid-related deaths for US residents aged 15 years or over from 1990 to 2021. The majority were male (68.2%) and white (76.2%). 96.5% of the deaths were in the working-age population aged 15 to 64. Opioid-related mortality rates exhibited a gender difference, with higher rates and a more rapid increase in males. Whites showed the highest opioid-related mortality rates among all races after the first wave. Opioid-related mortality rates of Blacks rose sharply in the third wave, surpassing whites before 2020. Industries most affected by opioid mortality among males were predominantly labour-intensive (e.g., construction, mining), particularly among whites. For females, a broader spectrum of industrial patterns was noted. Industries most impacted by opioid-related mortality differ across racial groups.

Conclusions: Opioid-related mortality increased over time regardless of race, sex, or industry, with a significant surge in the ongoing third wave of the US opioid epidemic. Different gender and racial groups showed varying patterns of industries with higher opioid-related mortality rates. Future public health policy on this opioid crisis should target specific industries while addressing gender and racial disparities

M.P.
The Hospital for Sick Children, SickKids Research Institute

Background: There is limited research investigating the impact of learning models during the COVID-19 pandemic on child health behaviours in Canada. Objective: To determine the association between school learning models (virtual versus in-person) and child health behaviours (daily screen time, physical activity, outdoor time, sleep duration and sleep onset) during the COVID-19 pandemic, and whether these associations are modified by child age, sex and family income.

Methods: A repeated measures cross-sectional study was conducted through The Applied Research Group for Kids (TARGet Kids!) COVID-19 Study of Children and Families. Included children were 4 to 13 years of age living in Ontario, Canada, between November 2020 and October 2022. School learning models (virtual vs in-person) and outcome data (hours of daily screen time, physical activity time, outdoor time, sleep duration, and time of sleep onset were parent-reported on multiple questionnaires. Unadjusted and adjusted linear mixed-effects models were fitted using repeated measures. Models were adjusted for child age, child sex, child ethnicity, self-reported family income, employment status, maternal education, living arrangement, housing, siblings, number of screen devices at home and calendar date. Only models for physical activity and screen time included child's age as an interaction term.

Results: 395 observations from 249 children (52.9% male; mean age 7.9 years) were included. Adjusted results showed that compared to in-person school, virtual learning was associated with higher daily screen time (1.88; 95% CI 0.64, 3.11; p = 0.003), lower outdoor time (-0.72; 95% CI -0.99, -0.44; p < 0.001), higher physical activity (1.55; 95% CI 0.35, 2.75; p = 0.01) and higher sleep duration (0.29; 95% CI 0.11, 0.49; p = 0.003). Child age modified the association between virtual learning and physical activity and screen time.

Conclusion: Virtual learning during the COVID-19 pandemic was associated with daily higher screen time, lower outdoor time, higher physical activity and longer sleep duration among children.

A.P.R.
Public Health Agency of Canada, Outbreak Management Division

The Public Health Agency of Canada (PHAC) aims to prevent disease and injuries, respond to public health threats, promote good health, and provide information for decision-making. I worked as a Public Health Analyst in the Outbreak Management Division within PHAC, which assesses and detects enteric outbreaks, leads responses to multi-jurisdictional outbreaks, and builds technical capacity to detect and respond to outbreaks. OMD is also responsible for managing Outbreak Summaries (OS), a national surveillance tool which was created to make enteric outbreak data accessible for provincial/territorial (P/T) partners, to summarize information, monitor outbreak trends and occurrences, identify risk factors, and evaluate interventions. My main project with OMD was to describe and analyze trends of enteric outbreaks in Canada that were reported to OS for 2019-2022. After collecting data from the OS platform, I used STATA to search the dataset for any errors, to reformat variables for analysis, to create derived variables, and to remove submissions meeting exclusion criteria. I analyzed the data to describe proportions of enteric outbreaks in Canada and to describe links between outbreaks according to their characteristics. I communicated the results in the OS Annual Report that is disseminated to P/T partners and PHAC management. Through this project, I was able to understand how OMD contributes to the mandate of PHAC, to understand how public health data is gathered and shared between jurisdictions, and to manage, analyze, and interpret a large dataset. Other projects that I worked on were improving documents that describe OS project processes, such as analysis plans and data dictionaries, to develop the division's best practices. I also created plain language pathogen fact sheets to be published online. These projects allowed me to develop my communication skills for various audiences.

D.U.R.
Li Ka Shing Knowledge Institute, St. Michael's Hospital-Knowledge Translation Program

Artificial Intelligence Decision Support Tool to Assess the Quality of Systematic Reviews

Background: Informed decision-making in patient care hinges on the ability to critically evaluate study findings. Decision-makers rely on high-quality studies to decide which interventions and policies should be used, and systematic reviews (SRs) provide the most reliable answers. Assessing bias in SRs is often done using tools like the AMSTAR 2 checklist for quality and the ROBIS for bias risk assessment. Currently, no automated tool exists for this purpose. This project aims to build a labelled dataset of 2000 SRs that are quality/bias assessed and use crowdsourcing to recruit collaborators to build the dataset.

Methods: We posted a request for collaborators on TaskExchange on May 24th, 2023, asking for volunteer collaborators who have experience with screening studies against eligibility criteria, assessing the risk of bias of trials (Cochrane risk of bias tool) and reviews (using AMSTAR 2 or ROBIS), have done some data extraction, and have critical thinking and problem-solving skills. We began by sending training materials and study instructions as a first step to do remote self-training. As collaborators began to extract and assess SRs, feedback was given on each item that was not assessed correctly until the quality reached 100%.

Results: To date, we have recruited 56 collaborators, and 35 collaborators are working on assessments. In the total of 2000 SRs, 125 have been developed: 40 assessments are completed and checked, 58 are pending checking, and 27 assessments are in-progress.

Conclusion: Future plans include testing different models using evaluation metrics to perform predicted classification on the data features, and more data will continue to be manually extracted by collaborators. In conclusion, crowdsourcing is an effective strategy to build a large, complex, and balanced dataset.

M.V.C.S.
Centre for Addiction and Mental Health

Title: Alcohol exposure and related harms in the WHO Western Pacific region

Background: The WHO Western Pacific region (WPR) has been previously identified for concerning increases in alcohol exposure. This study examines the trends in alcohol exposure from 2000 to 2030 and concurrently investigates the alcohol-attributable disease burden in the WPR in 2019.

Methods: Data for adult alcohol per capita consumption was obtained from country-validated data in the Global Information System on Alcohol and Health. Alcohol consumption projections were acquired from the latest Global Status Report on Alcohol and Health. A comparative risk assessment framework was employed, combining alcohol exposure data and relative risks from meta-analyses to estimate population-attributable fractions. The WHO's Global Health Estimates were used to obtain mortality and morbidity data.

Findings: The total alcohol per capita consumption in the WPR was 5·5 L exceeding the global estimate of 5·3 L in 2019. Moreover, the highest alcohol consumers in the region were Lao People's Democratic Republic (PDR) (12·2 L [95 CI 8·3, 15·8]), Australia (10·1 L [7·4, 13·2]), and New Zealand (9·9 L [7·2, 12·9]). Between 2000 and 2019, significant increases in total alcohol per capita consumption were observed, led by Cambodia (419·8%), Viet Nam (194·3%), and Mongolia (186·0%). In 2019, 484,233 (95 UI 352,218, 672,166) deaths and 22·1 (18·3, 27·5) million disability-adjusted life-years (DALYs) were attributable to alcohol in the region. At the country level, age-standardized alcohol-attributable deaths and DALYs were highest in Mongolia (123·1 deaths and 5240·0 DALYs per 100,000), Cambodia (83.8 deaths and 3147·0 DALYs per 100,000), and Lao PDR (75·0 deaths and 2956·9 DALYs per 100,000).

Interpretation: The WPR faces a continued crisis against the use of alcohol, especially among countries with lower human development index. Thus, this warrants a commitment to make the WPR safer by implementing cost-effective policies to mitigate harmful alcohol consumption and its associated harms.

A.S.
Public Health Ontario

Background: The policy response to the COVID-19 pandemic substantially changed driving conditions in Ontario. This project aims to investigate the impact of the initial stay-at-home policy on trends in motor vehicle collision (MVC)-related emergency department (ED) visits and hospitalizations in Ontario, compared to the pre-pandemic period.

Methods: Data were collected for all individuals in Ontario who have either presented at an ED or been hospitalized for a MVC-related injury, from March 1st, 2016 to December 31st, 2022. An interrupted time series design was used by fitting a negative binomial regression model to the pre-pandemic data, including monthly indicator variables for seasonality and accounting for autocorrelation. The pre-pandemic data were used to simulate the distribution of expected outcomes during the pandemic, which could be compared to the actual observed outcome counts, using a median percent change.

Results: Compared to the expected numbers if pre-pandemic conditions remained unchanged, there was a significant decrease in observed ED visits (-31.5%; 95% CI: -35.4, -27.3) and no change in hospitalizations (-6.0%, 95% CI: -13.2, 1.6) among vehicle occupants during the pandemic. Results were similar for pedestrians. Among cyclists injured in an MVC, there was no change in ED visits (12.8%, 95% CI: -8.2, 39.4) and a significant increase in hospitalizations (46.0%, 95% CI: 11.6, 93.6). Among cyclists injured in a non-MVC, there was a significant increase in both ED visits (47.0%, 95% CI: 12.5, 86.8) and hospitalizations (50.1%, 95% CI: 8.2, 101.2).

Conclusions: Due to the decrease in vehicle volume during the pandemic, it is expected that rates of injuries decreased among occupants and pedestrians. An increase in cyclists early in the pandemic likely contributed to the increased rate of injuries. This work identifies vulnerable road-user populations most affected by pandemic-related policies and can inform policymakers and injury prevention practitioners to protect these populations in the future.

K.C.S.
Toronto Metropolitan University School of Occupational and Public Health

Municipalities are promoting cycling as a means of mobility within urban centers, with considerable investments made over the past decade. Despite advancements, challenges related to transportation safety and equitable access persist.

The COVID-19 pandemic has further highlighted these issues, requiring adaptive strategies to safely accommodate increasing ridership and promote accessibility.
This research aimed to evaluate cycling infrastructure trends in Vancouver, Calgary, and Toronto from 2009 to 2022 to better understand municipal responses to changing public health contexts and urban mobility patterns.

Information on current infrastructure was acquired in January 2023 from each municipality. Instances of installations and upgrades occurring between 2009 and 2022 were then assessed using a combination of grey literature, and historical street view imagery. A standardized criterion allowed for the comparability of results across municipalities.

From 2009 to 2022, there was a 64%, 1014% and 98% increase in dedicated on-street cycling infrastructure for Vancouver, Calgary, and Toronto, respectively. Among the key findings was the marked acceleration of permanent infrastructure development in Calgary and Toronto since the start of the COVID-19 pandemic, where the highest yearly rate of infrastructure installations for both cities occurred during this time (1.0 km and 4.7km of new infrastructure per 1000 centerline-km of roadway, respectively).

The COVID-19 pandemic has notably spurred an upward trend in infrastructure development, especially in Calgary and Toronto, in response to changing mobility patterns and evolving public health needs.

S.S.
Public Health Agency of Canada, Centre for Communicable Diseases and Infection Control

Evaluating the Canadian Tuberculosis Surveillance Systems

I completed my practicum as a Student Epidemiologist for the Tuberculosis (TB) Surveillance team at the Public Health Agency of Canada. The team monitors the burden of TB utilizing two surveillance systems. The Canadian Tuberculosis Reporting System (CTBRS) is a case-based surveillance system that collects new and re-treatment cases of active TB. The Canadian Tuberculosis Laboratory Surveillance System (CTBLSS) is an isolate-based laboratory surveillance system that monitors TB drug resistance. Both combined provides an enhanced understanding of the existing TB burden, however, its timeliness and data quality have been an ongoing concern.

My project aimed at evaluating the timeliness and data quality of both systems:

Timeliness: I assessed the timeliness of our TB reporting/publishing cycle, specifically focusing on the duration between data request and report publication. I produced process diagrams clearly identifying the steps (data request/receipt, validation and processing, report preparation) and time frames for each. I examined the timespans and proposed recommendation to alleviate avoidable delays within the reporting process. In addition, I compared Canada's TB reporting lag in relation to other low TB-incident western countries, aiming to establish a newly optimized timeline.

Data Quality: The Canadian Tuberculosis Standards recommends that all culture-positive TB cases undergo drug susceptibility testing. Therefore, ideally, all culture-positive cases recorded in the CTBRS should also be captured in the CTBLSS. I employed two sets of merges using deterministic linkage/matching methods to assess the level of overlap. The first merge linked the data by date of birth, sex and province. The remaining unmerged data was then linked by age, sex, and province. The results depict the overall percent linkage, indicating data relatedness.

The evaluation revealed that the data linkage yielded a substantial level of relatedness between the CTBRS and CTBLSS. Moreover, despite the systems having a strong foundation, there remains opportunities for refinement and enhancement.

A.T.
Occupational Cancer Research Centre, Ontario Health

Incidence of COVID-19 among workers compared to the general population of Ontario, Canada

Background and Rationale: The role of occupation in COVID-19 risk remains unclear, and current surveillance systems do not adequately capture both work information and COVID-19 diagnoses. This study uses the existing Occupational Disease Surveillance System (ODSS) to examine the association between occupation and COVID-19 incidence.

Methods: This study followed previously injured workers with accepted lost-time claims for COVID-19 diagnoses from February 1, 2020, to December 31, 2021. Workers were followed until age 65 years, death, or emigration out of Ontario. COVID-19 diagnoses were identified using ICD-10-CA diagnostic codes in the Discharge Abstract Database and National Ambulatory Care Reporting System. Standardized incidence ratios (SIRs) and corresponding 95% confidence intervals (CIs) adjusted for age, sex, and calendar month were calculated to compare COVID-19 risk among workers to the general Ontario population.

Results: The cohort consisted of approximately 1.2 million workers, predominantly male (67.13%), residing in Central East and Central West of Ontario (50.30%), and aged 55 to 65 years (42.90%). In total, 10,322 COVID-19 cases were identified through hospital records. Compared to the general population, workers had a higher risk of COVID-19 hospitalizations (SIR=1.21, CI95%=1.18-1.26) and emergency department visits (SIR=1.29, CI95%=1.27-1.31). Occupations with a higher risk of hospitalizations were healthcare (SIR=1.47, CI95%=1.30-1.67); materials handling (SIR=1,45, CI95%=1.45, 95% CI=1.28-1.64); and food, wood, and textile processing (SIR=1.38, CI95%=1.18-1.62). Industries with a higher risk of hospitalizations were community, business, and personal service (SIR=1.41, CI95%=1.33-1.50); manufacturing (SIR=1.33, CI95%=1.26-1.41); and transportation and communication (SIR=1.24, CI95%=1.11-1.37). Findings were similar for emergency department visits.

Implications: Findings support the hypothesis that occupation may play a role in COVID-19 risk. Elevated risks observed among ODSS workers suggests that prevention strategies should be targeted towards high-risk occupations. Understanding occupational COVID-19 incidence can inform public health policies and workplace safety measures to protect workers, businesses, and broader communities during infectious disease outbreaks.

Keywords: COVID-19, epidemiology, occupation, surveillance

T.K.T.
Public Health Ontario - Immunization and Vaccine Preventable Diseases

This project explores the relationship between HPV vaccination coverage and socio-demographic factors in Ontario. It investigates sex-specific trends and PHU-level variations in vaccine coverage for the school years 2016-17 to 2021-22. Further analysis examines socio-demographic characteristics at the Dissemination Area (DA) level among 12-year-old students who are up-to-date (UTD) with their HPV vaccine for the 2018-19 school year.

Moreover, HPV immunization data was extracted from the Digital Health Information Repository (DHIR). The Ontario Marginalization Index (ON-Marg) dimensions, such as households and dwellings, material resources, and racialized/newcomer populations, were used to delve into socio-demographic factors. HPV vaccine coverage data was merged with PHU-level factor scores from the 2016 ON-Marg Index, expanding the analysis to the Dissemination Area (DA) level using quintiles.

From the school years 2016-17 to 2021-22, males consistently had lower HPV vaccine coverage. This observation emphasizes the need for targeted interventions to enhance vaccine coverage among this demographic. The analysis extended to Public Health Units (PHUs), revealing a wide range of HPV vaccine coverage, varying from approximately 45.2% to 72.5%. This indicates potential vaccination gaps at the PHU level. Further exploration was conducted at the Dissemination Area (DA) level, as the scatter plot analysis between HPV coverage and ON-Marg factor scores at the PHU level did not indicate clear trends. Utilizing the 2016 ON-Marg quintiles showed that the most marginalized groups, particularly those in the highest quintile of the dimensions (e.g., households, dwellings, material resources, and racialized/newcomer populations), exhibited lower HPV vaccine coverage, highlighting the necessity for targeted interventions for vulnerable groups.

Future steps involve exploring factors impacting HPV vaccination initiation and completion, particularly sex-based disparities at the DA level. This project overall underscores the importance of addressing sex disparities and marginalization to achieve equitable vaccination coverage and reduce the burden of HPV-related diseases.

D.U.
Access Alliance Multicultural Health and Community Services

Neighbourhood Profile: Taylor-Massey Oakridge

Introduction: During my practicum placement at Access Alliance Multicultural Health and Community Services, Downtown College Site, I undertook the task of updating the Neighbourhood Profile for Taylor-Massey and Oakridge, two distinct Toronto neighbourhoods (nos. 61 and 121 as per City of Toronto). This recent profile serves as an update to the one previously published by Access Alliance in 2017. I received invaluable guidance and support from my supervisors, Courtney Kupka and Dr. Akm Alamgir.

Methods: The updated profile was chiefly sourced from secondary data from the City of Toronto, StatsCan, and Ontario Health Profile. I began by identifying the pivotal indicators from Access Alliance's earlier report on the same neighbourhoods. All the collected data were compiled in MS Excel. The final report was designed using Canva, a tool I familiarized myself with during the practicum.

Results: The outcome was a visually compelling and comprehensive neighbourhood profile, incorporating a range of indicators such as mental health, COVID-19 statistics, crime rates, and the Ontario Marginalization Index. The report was also enriched with the most recent data from the 2021 census.

Conclusion: My practicum experience at Access Alliance offered me the invaluable opportunity to leverage and enhance my skills in secondary data collection and data visualization. Through hands-on involvement, I acquired proficiency in using Canva software. Furthermore, immersion in the organization's operations shown their profound commitment to data security and cybersecurity, vital facets in the current digital landscape. This placement has significantly augmented my practical know-how, bridging academic concepts with real-world application, and has fortified my foundation in public health research and data management.

G.V.
St Michael's Hospital, Unity Health Toronto

Investigating the incidence and risk factors associated with anal HPV infection among gay, bisexual, and other men who have sex with men (GBM) in Canada.

Background: Human papillomavirus (HPV) is the most common sexually transmitted infection. High-risk HPV strains can potentially cause various types of cancers. The incidence of anal HPV displays a significant disparity, with higher rates observed among gay, bisexual, and other men who have sex with men (GBM) compared to the general population. The paper aims to determine the overall incidence of anal HPV infection among GBM and to identify risk factors associated with the incidence anal HPV infections.

Methods: GBM in Montreal, Toronto, and Vancouver, Canada, were recruited through respondent-driven sampling between February 2017 and August 2019. Participants completed a self-interview questionnaire at baseline and the 12-month follow-up. GBM also provided an anal specimen for HPV DNA testing during each visit. A Poisson regression was conducted to estimate the incidence rate for 36 individual genotypes and grouped HPV types (low-risk and high-risk). A modified Poisson regression was also conducted to estimate rate ratios for risk factors.

Results: 255 GBM (16-30 years) completed follow-up and provided anal specimens at baseline and follow-up. The 12-month incidence rate of any newly detected HPV was 74.01 per 100 person-years (CI, 63.60 - 86.16). Condomless receptive anal sex was statistically significant in both the univariate model (rate ratio = 1.74; 95% CI 1.20, 2.53) and the multivariable model (rate ratio = 1.25; 95% CI 1.03, 1.51). Regarding the number of male sex partners, categories for 6-10 partners and >10 partners were statistically significant in the univariate and the multivariable.

Conclusions: The incidence of anal HPV remains relatively high among sexually active GBM in Canada. Further, high-risk HPV genotypes had the highest incidence rates. Several sexual behaviour risk factors contribute to increased HPV detections among GBM. These findings enhance our understanding of changing anal HPV patterns and support the implementation of appropriate measures to address its impact among young GBM.

L.Y.
Durham Region Health Department Regional Municipality of Durham

I completed my practicum as a student epidemiologist at the Durham Region Health Department with the Health Analytics and Research Team (HART). HART is a team responsible for conducting population health assessment in Durham Region. As a member of HART, this summer I assisted with two projects pertaining to maternal and infant health. First, I assisted with updating the maternal and infant health data tracker in Durham Region. Specifically, I extracted data from the BORN information system and updated STATA codes by cleaning up data and calculating key health indicators. Besides, I worked closely with team members as well as other public health program staff to develop multiple infographics (e.g., gestational diabetes, maternal mental health concerns) with the goal of promoting maternal and infant health information among different communities in Durham Region. Through the process of developing infographics, I learned how to communicate health infomation in an efficient way. I also learned the importance of addressing diversity and inclusiveness in health communications. In addition to these projects, I had the opportunity to attend various public health workshops and group meetings where I was able to learn about a wide range of public health topics and to be more familiar with public health practice. In general, I had a great experience working at the local public health unit - the strong support received from the team and the various learning opportunities emerged from the work environment all helped me gain a better understanding of epidemiology.

M.Y.
Sunnybrook Research Institute

Background: Esophageal cancer is an aggressive disease with significant symptom burden and a 5-year survival rate of 16%. Current survival prediction tools at the time of surgery do not integrate information on patient-reported outcomes, including symptoms such as pain or nausea, which may provide prognostic value. Thus, this study aims to determine whether patient-reported symptoms can improve the ability to prognosticate among resected esophageal cancer patients.

Methods: This was a population-based cohort study using administrative datasets from ICES. Ontario patients who underwent esophageal cancer resection between December 31 2006 to June 30 2016 and reported first post-operative ESAS assessment within 3 months (January 1 2007 to September 30 2016) were eligible. Cox proportional hazard models were used to predict 3-year mortality risk following the first post-operative ESAS assessment. We compared the performance of an externally validated pathology model, which included details of the patient, disease, and pathology, with two models including individual-level Edmonton Symptom Assessment System (ESAS) data. One model included ESAS scores for each individual symptom while the other used total ESAS scores.

Result: Model performance was estimated with a c-statistic (discrimination) and by plotting calibration-in-the-large, with additional assessment of calibration across different patient subgroups. Among the ESAS models, 717 patients were included with a median age of 64, 81.7% males, and 88.8% with adenocarcinoma. We observed no major differences in the c-statistic (0.709 vs 0.716 vs 0.710) and overall calibration (0.551 vs 0.547 vs 0.546) across the pathology, individual-ESAS, and total-ESAS models, respectively. However, when comparing subgroups of high symptom burdens of anxiety, poor appetite, drowsiness, shortness of breath, nausea, pain, and wellbeing, both ESAS models overestimated the predicted 3-year mortality risk.

Conclusion: Overall, our findings demonstrate that the addition of ESAS data to a model containing demographic, clinical, and pathology data does not add benefit to the prediction of 3-year survival in esophageal cancer patients treated with resection. ESAS may have limited prognostic value for this early-stage, highly selected cancer population and/or for predicting long-term mortality.

Z.L.Z.
Public Health Agency of Canada, Canadian Nosocomial Infection Surveillance Program

For my practicum at PHAC, CNISP division, I described the status and variation of antimicrobial stewardship programs (ASP) in hospitals across Canada. The association between antimicrobial use (AMU) and the emergence of antimicrobial resistant organisms (AROs) is well-documented, thereby making antimicrobial stewardship a key strategy in combating AMR. ASPS involve appropriate selection, dosing, route and duration of antimicrobial therapy, which help preserve the future effectiveness of antimicrobials by reducing their misuse and overuse.

Descriptive analysis was the primary mode of analysis for my study. I merged datasets together based on similar variables, conducted data cleaning and descriptive analysis. From the findings of my analysis, the majority of hospitals sampled reported having an antimicrobial stewardship program implemented in 2021 (98%). Within ASP teams, physicians and pharmacists were present in all teams, followed by microbiologists (75%). Nurses, epidemiologists, and research coordinators on the other hand were not present in any of the ASP teams in 2020 and 2021. Across participating hospitals, the rate ratio comparing AMU rates one year after to one year before ASP implementation was 0.984 (0.981 0.987), indicating that on average, there were lower AMU rates one year post ASP implementation. This supports the effectiveness of ASP in reducing antimicrobial usage within hospitals. However, this study does not consider the long-term effects of ASP on AMU rates and could not consider other variables that could be impacting rates of antimicrobial use.

I faced unique challenges in selecting the most appropriate form of analysis given the hierarchical nature of my data and the limited sample size due to incomplete responses. Overall, this project was my first try at analysis using real world surveillance data, so it was an excellent learning experience. I have gained invaluable experience in protocol writing, data exploration, data analysis and report writing.