Technical Notes: Shared Health Equity Dashboard - 2023

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List of Acronyms

APHEO – Association of Public Health Epidemiologists of Ontario
BORN – Better Outcomes Registry & Network
DA – Dissemination Area
DAD – Canadian Institute of Health Information Hospital Discharge Abstract Database
DI – Deprivation Index
CA – Census agglomeration
CCHS – Canadian Community Health Survey
CIHI – Canadian Institute for Health Information
CMA – Census metropolitan area
COPD – Chronic obstructive pulmonary disease
ED – Emergency department
HPEPH – Hastings Prince Edward County Public Health
ICD-10-CA – International Classification of Disease version 10 Canadian codes
INSPQ - Institut national de santé publique du Québec
iPHIS -Integration Public Health Information System
ISPA – Immunization of School Pupils Act
KFL&A – KFL&A Public Health
LGLDHU – Leeds, Grenville & Lanark District Health Unit
MIZ – Metropolitan influenced zone
NACRS – National Ambulatory Care Reporting System
PCCF – Postal Code Conversion File
PHO – Public Health Ontario
PHU – Public Health Unit
RD – Rate difference
RR – Rate ratio
SAC – Statistical area classification
SD – Standard deviation
SHED – Shared Health Equity Dashboard
VAR – Variance
VS – Vital Statistics

Geographies of Interest

Five geographies are of interest in SHED: the PHU boundaries for HPEPH, KFL&A, and LGLDHU; the three PHU catchment areas combined (SE region); and the entire province of Ontario (when available).

Software

Data management: SQL Server

Analysis: R

Data visualization: Power BI with custom visualizations built using D3

Health Administrative Data Sources

Equity-stratifiers

Neighbourhood-level: these are derived based on postal code - see later pages for more detail.

Sex: Recorded as female or male by health administrators

Health-related outcome definitions

100% Alcohol-related Emergency Department Visits

Data source: National Ambulatory Reporting System (NACRS), 2013-2020, Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: June 2022
Universe: Ontario residents aged 10 years or more
Years: 2013-2014, 2015-2016, 2017-2018, 2019-2020
Age standardization: approximately 15-year age groups >>> 10-29, 30-44, 45-59, 60 -74, 75+
Numerator: Count of all emergency department (ED) visits (Ambulatory Case Type Code = 'EMG') of Ontario residents (Province Code = 'ON) with a most probable diagnosis (MPDx) or other diagnosis (All_Dx) of F10, K70, T51, X45, X65, Y15, E244, G312, G621, G721, I426, K292, K852, K860, O354, Q860, R780 (ICD-10 CA codes) in the region being examined.
Denominator: Aggregated 2016 dissemination area (DA) census population by age and sex x 2 for each combined time point for the region being examined
Notes: Comparable prevalence data on harmful alcohol use is not timely. This indicator measures ED visits entirely attributed to alcohol use and can act as a proxy for measuring alcohol harm in the community as well as the burden it places on the healthcare system. This definition is based on Canadian Institute for Health Information (CIHI) [1] and Public Health Ontario (PHO) [2] definitions.

Cannabis-related Emergency Department Visits

Data source: NACRS, 2013-2020, Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: June 2022
Universe: Ontario residents aged 10 years or more

Years: 2013-2014, 2015-2016, 2017-2018, 2019-2020
Age standardization: approximately 10-year age groups >>> 10-19, 20-29, 30-39-40-49, 50+
Numerator: Count of all ED visits (Ambulatory Case Type Code = 'EMG') of Ontario residents (Province Code = 'ON) with a most probable or other diagnosis (All_Dx) of T407 or F12 (ICD-10 CA codes) in the region being examined.
Denominator: Aggregated 2016 DA census population by age and sex x 2 for each combined time point for the region being examined
Notes: Comparable prevalence data on harmful cannabis use is not timely. This indicator measures ED visits related to cannabis use and can act as a proxy for measuring cannabis harm in the community as well as the burden it places on the healthcare system. This definition is based on that used by CIHI [1].

Cardiovascular Disease Hospitalizations

Data source: Discharge Abstract Database (DAD), 2013-2020, Ontario Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: March 2022
Universe: Ontario adult residents aged 45 years of age or older
Years: 2013-2014, 2015-2016, 2017-2018, 2019-2020
Age standardization: approximately 15-year age groups >>> 45-59, 60 -74, 75+
Numerator: Count of all acute care hospital visits (Hospital Type Code = 'AT' or 'AP') of Ontario residents (Province Code = 'ON') with a most responsible diagnosis (MRDx) of ICD-10-CA: I00 – I99 in the region being examined
Denominator: Aggregated 2016 DA census population by age and sex x 2 for each combined time point for the region being examined
Notes: The ICD-10-CA definitions are those recommended by APHEO [3]

Chronic Obstructive Pulmonary Disease (COPD) Hospitalizations

Data source: Discharge Abstract Database (DAD), 2013-2020, Ontario Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: March 2022
Universe: Ontario adult residents aged 45 years of age or older
Years: 2013-2014, 2015-2016, 2017-2018, 2019-2020
Age standardization: approximately 15-year age groups >>> 45-59, 60 -74, 75+
Numerator: Count of all acute care hospital visits (Hospital Type Code = 'AT' or 'AP') of Ontario residents (Province Code = 'ON') with a most responsible diagnosis (MRDx) of ICD-10-CA: J40 – J44 in the region being examined
Denominator: Aggregated 2016 DA census population by age and sex x 2 for each combined time point for the region being examined
Notes: COPD is a chronic disease with shortness of breath, cough, and sputum production; also referred to as chronic bronchitis and emphysema. The ICD-10-CA definitions are those recommended by APHEO [3]

COVID-19 Infections

Data source: Ontario. Ministry of Health, CCM. Extracted: January 2023.
Universe: All residents of HPEPH, KFL&A, and LGLDHU
Years: 2020-2021 (Mar 17, 2020 – Nov 30, 2021)

Age standardization: approximately 15-year age groups >>> 0-14, 15-29, 30-44, 45-59, 60 -74, 75+

Numerator: Count of lab-confirmed COVID-19 infections

Denominator: Aggregated 2016 DA census population by age and sex x 2 for the region being examined

Gonorrhoea Infections

Data source: Ontario. Ministry of Health, integrated Public Health Information System (iPHIS) database. Extracted: January 2023.

Universe: 15+ living in HPEPH, KFL&A, or LGLDHU

Years: 2013-2016, 2017-2020

Age standardization: 15-34 and 35+

Numerator: Count of lab-confirmed gonorrhoea infections for the region being examined

Denominator: Aggregated 2016 DA census population by age and sex x 4 for each combined time point for the region being examined

Notes: Cases were removed if the responsible health unit was not one of HPEPH, KFL&A, or LGLDHU. Cases that were either incarcerated or from a Canadian Forces Base were also removed.

Lyme Disease infections

Data source: Ontario. Ministry of Health, integrated Public Health Information System (iPHIS) database. Extracted: January 2023.

Universe: All residents of HPEPH, KFL&A, and LGLDHU

Years: 2013-2016, 2017-2020

Age standardization: approximately 30-year age groups >>> 0 - 29, 30-59, 60+

Numerator: Count of lab-confirmed Lyme disease cases for the region being examined

Denominator: Aggregated 2016 DA census population by age and sex x 4 for each combined time point for the region being examined

Notes: Cases were removed if the responsible health unit was not one of HPEPH, KFL&A, or LGLDHU.

Mental Health and Addictions-related Emergency Department Visits

Data source: NACRS, 2013-2020, Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: June 2022

Universe: All Ontario residents

Years: 2013-2014, 2015-2016, 2017-2018, 2019-2020

Age standardization: approximately 15-year age groups >>> 0-14, 15-29, 30-44, 45-59, 60 -74, 75+

Numerator: Count of all ED visits (Ambulatory Case Type Code = 'EMG') of Ontario residents (Province Code = 'ON) in the region being examined with a most probable diagnosis (MPDx) F06-F99, or other diagnosis (AllDx, Chapter 20) X60-X84, Y10-Y19, Y28 when MPDx is not F06-F99

Denominator: Aggregated 2016 DA census population by age and sex x 2 for each combined time point for the region being examined

Notes: Includes ED visits for substance-related and addictive disorders, schizophrenia spectrum and other psychotic disorders, mood disorders, anxiety disorders, trauma-and stressor-related disorders, obsessive compulsive disorder and related disorders, and personality disorders. Intentional self-injury may be present as a secondary ('other') diagnosis for any of these disorders. It is counted in addition to other disorders when the main reason for visiting is not mental health- or addictions-related. The mental health- and addictions-related ED visits definition here is that used by the IC/ES [4].

Non-traumatic Oral Health-related Emergency Department Visits

Data source: NACRS, 2013-2020, Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: June 2022

Universe: All Ontario residents

Years: 2013-2014, 2015-2016, 2017-2018, 2019-2020

Age standardization: approximately 15-year age groups >>> 0-14, 15-29, 30-44, 45-59, 60 -74, 75+

Numerator: Count of all ED visits (Ambulatory Case Type Code = 'EMG') of Ontario residents (Province Code = 'ON) with a most probable (MPDx) or other diagnosis (All_Dx) of K00-K14 in the region being examined.

Denominator: Aggregated 2016 DA census population by age and sex x 2 for each combined time point for the region being examined

Notes: This indicator is the same as that used by PHO [5] and is an indication of oral health problems that potentially could have been prevented by regular visits to the dentist as well as the burden it places on the healthcare system

Premature Mortality

Data source: Vital Statistics, Deaths, 2013-2015, Ministry of Health, IntelliHEALTH ONTARIO, Date of last download: May 2019

Universe: Ontario residents aged < 75 years

Years: 2013-2015

Age standardization: approximately 15-year age groups >>> 0-14, 15-29, 30-44, 45-59, 60 -74

Numerator: Count of all deaths of Ontario residents (Province Code = 'ON) younger than 75 years of age in the region being examined

Denominator: Aggregated 2016 DA census population by age and sex x 3 for the region being examined

Notes: A premature death is one in which an individual dies before the age of 75 – a death considered to occur too early in life. It is a standard epidemiological health status measure and is considered a long-term health outcome.

A note on exclusions

Records were excluded if sex was not recorded or sex was not male or female; age was greater than 105 years or no age recorded; postal code was not recorded, invalid, or did not link with a valid DI score (see section below).

Neighbourhood-level equity stratifier definitions

Institut national de santé publique du Québec (INSPQ) Deprivation Index

The INSPQ Deprivation Index was originally developed for use in Québec in the late 1990's, but versions have been derived for 1991, 1996, 2001, 2006, 2011, and 2016 at the national level, at various region levels, including Ontario, and for different SAC geographies [6]. It has been extensively studied and validated [7-9].

Table 1 INSPQ Deprivation Dimensions and Component Indicators

Material Deprivation	**Social Deprivation**
• Average income of the population aged 15 years and over • Proportion of the population aged 15 years and over with no high school diploma or equivalent • Ratio of employed individuals to total population 15 years and over	• Proportion of single-parent families • Proportion of the population aged 15 years or over who are divorced, widowed, or separated • Proportion of the population aged 15 years or over living alone

The index is based on principal components analysis of census data aggregated at the DA level, and links to postal codes of cases. It is composed of two dimensions, with three indicators each (Table 1). The material dimension measures the inability of neighbourhood residents to obtain the goods and services that are a part of modern life. The social dimension measures social isolation and the fragility of the household structure within the neighbourhood.

During development of the INSPQ index each of the six component indicators were standardized according to the age and sex structure of the Canadian population (except for the lone-parent indicator), using the direct standardization method [6]. This was done to minimize bias due to the age and sex structure of the Canadian population at the DA level. The indicators are combined using principal components analysis – resulting in the two dimensions, each with a factor score. Typically, the factor scores for each of the dimensions are analyzed in population quintiles; however, the quintile groups from each dimension can also be combined into a combined material-social population quintile grouping.

For analysis in the SHED, the 2016 version of the INSPQ index was used. The two dimensions, material and social deprivation, were analyzed separately as two different variables. Quintile categories for each dimension were based on index scores distributed at the Ontario level. For both dimensions, quintiles 1 – 3 have been grouped into 'less deprived' and quintiles 4-5 are grouped into 'more deprived'. This is done primarily to ensure adequate cell counts. Dissemination area codes, along with their DI factor scores and Ontario quintile designations were abstracted Jan 17, 2019 from Equivalence table, Canada, 2016 [10].

Urban/rural geography

The Statistical Area Classification (SAC) groups census subdivisions into a census metropolitan area (CMA), census agglomeration (CA) or census metropolitan influenced zone (MIZ) depending on their population density, census geography and residents' commuting patterns [11].

Census metropolitan areas and CAs are areas consisting of one or more neighbouring municipalities situated around a core. A CMA must have a total population of at least 100,000 where 50,000 or more must live in the core. A CA must have a population of at least 10,000. Census subdivisions outside a CMA or CA are grouped into one of five MIZ categories [11].

Records with postal codes from the IntelliHealth data platform (DAD, NACRS, VS) were available for download with SAC codes already assigned. These were not used in analysis but were used for data checking purposes. For the purposes of this analysis, SAC codes were dichotomized into 'urban' (CMA or CA: codes 1 - 3) and 'rural' (any MIZ category or rural/remote: codes 4 - 8) geography [12]. Dissemination area codes, along with SAC codes were abstracted from the 2016 Census Boundary file for Dissemination Areas on April 24, 2019 [13].

Numerators: Assigning Postal Codes to DAs

The Postal Code Conversion File (PCCF) is a digital file that enables geocoding of Canada Post Corporation six-character postal codes to Statistics Canada's standard geographic areas [12]. This allows for linking of postal codes to various statistics and other useful data for planning and research purposes (e.g. INSPQ Deprivation Index). Sometimes a postal code can link to more than one census geography, especially in rural areas. Typically, with the PCCF, the single link indicator (SLI) is used to assign a postal code to the "best match" and ignores all other geographic areas covered by the postal code. However, this is biased, especially for small geographical areas like DA (similar to neighbourhoods), and in rural areas [12]. In SHED, instead of using the PCCF and the SLI, postal codes are assigned to 2016 DAs using a SQL Server based algorithm and files in the PCCF+ SAS program [14]. Postal codes with a single DA link are assigned directly, while rural postal codes linked to multiple DAs are probabilistically assigned using the weight conversion file in the PCCF+ [14]. Any urban postal codes linked to multiple DAs are probabilistically assigned based on relative population sizes of the DAs.

More information on this method can be provided upon request. Once DA has been assigned, the record is linked to the equity stratifier values associated with a particular DA (e.g. DI and SAC).

Denominators

Denominator counts are based on DA counts by age and sex and include only the DAs found in the specific region being examined. DA counts from the 2016 census, by age and sex, were abstracted from the Canadian Census Analyzer (2016 Census Profiles Files / Profile of Census Dissemination Areas) @ CHASS March 29, 2019 [15]. These DA counts have been linked to INSPQ material and social deprivation quintiles using the Equivalence Table, 2016, abstracted Jan 17, 2019 [10] and to SAC codes, abstracted from the 2016 Census Boundary file for Dissemination Areas on April 24, 2019 [13].

Canadian Community Health Survey (CCHS)

Years: 2015-2016, 2017, 2017-2018, 2019-2020, 2020

Exclusions: Those who stated 'don't know' or who refused for equity stratifier or health outcome

Equity stratifiers: sex, income, education, immigrant status, language, sexual orientation, and urban or rural geography (described in detail in the following sections)

Equity stratifier definitions

Sex

- Males
- Females

Income

The income variable indicates the total household income and is categorized into two levels:

1. Lower income (quintiles 1 and 2) and
2. Higher income (quintiles 3, 4 and 5)

The income variable is derived by grouping the distribution of respondents' income into quintiles, with quintile 1 representing the lowest income quintile and quintile 5 representing the highest income quintile. It is based on the adjusted ratio of a respondent's total household income to the low-income cut-off corresponding to their household and community size. It provides, for each respondent, a relative measure of their household income to the household incomes of all other respondents in Ontario.

Education

The education variable indicates the highest level of education attained among all members of the household and is categorized into two levels:

1. High school diploma or less (education levels 1 through 4, see below)
2. More than high school diploma (education levels 5 through 9, see below)

The education variable is based on the following nine different levels of education:

1. Grade 8 or lower
2. Grade 9-10
3. Grade 11-13
4. Secondary graduate (no post-secondary education)
5. Trade certificate or diploma
6. Non-university certificate or diploma from a college, CEGEP, etc
7. University certificate, diploma or degree above bachelor's level
8. Bachelor's degree
9. University certificate, diploma or degree above bachelor's degree

Immigrant status

This variable indicates if the respondent is an immigrant or not.

- Immigrant: includes landed immigrant and non-permanent residents
- Non-immigrant: includes respondents who declared being born in Canada

Language

The language the respondent most often speaks at home. For sufficient sample size, respondents have been grouped into English only and French and all others. Respondents who speak English and another language (including French) most often at home are classified as French and all others.

Sexual orientation

Respondents were asked their sexual orientation where the response options were "heterosexual", "lesbian or gay", "bisexual" and "or please specify". Heterosexual means having sexual relations with people of the opposite sex. Homosexual means having sexual relations with people of your own sex. Bisexual means having sexual relations with people of both sexes.

- Heterosexual: includes heterosexuals
- Lesbian, gay or bisexual: includes all other categories other than heterosexuals, including those who chose other.

Urban/rural geography

The Statistical Area Classification (SAC) groups census subdivisions (CSDs) according to whether they are a component of a census metropolitan area (CMA), a census agglomeration (CA), a census metropolitan area and census agglomeration influenced zone (strong MIZ, moderate MIZ, weak MIZ or no MIZ), or the territories (Northwest Territories, Yukon and Nunavut). A SAC code type is assigned to each CSD.

- Urban: CMA, tracted CA, non-tract CA.
- Rural: strongly influenced zone, moderately influenced zone, weakly influenced zone, non-influenced zone and territories.

Health-related outcome definitions

Universe: Adults 18 years or older. Denominators for each of the health-related outcomes are all adults 18 years or older for the region being examined who were not excluded because of missing equity stratifier or outcome data. Exceptions to this are the Alcohol and Smoking indicators, where the universe is 19+.

Alcohol: 2023 Guidance per week

The proportion of survey participants, 19+, who drank 2 standard drinks or less in the past week. This is considered 'low' or 'no risk' according to Canada's Guidance on Alcohol and Health, 2023.

Alcohol: 2023 Guidance per occasion

The proportion of survey participants, 19+, who complied with drinking 2 or fewer standard drinks per occasion in the past week to decrease risk of harms to self and others, including injuries and violence, according to Canada's Guidance on Alcohol and Health, 2023.

Alcohol: Binge Drinker

The proportion of survey participants, 19+, that have consumed 4+ (females) or 5+ (males) drinks on any one occasion, at least once, in the past 12 months.

Alcohol: Heavy Drinker

The proportion of survey participants, 19+, who reported drinking 4+ (females) or 5+ (males) drinks on at least one occasion per month in the past 12 months.

Alcohol: Regular Drinker

The proportion of survey participants, 19+, who reported drinking 1+ drinks at least once per month in the past 12 months.

Body mass index

The proportion of survey participants who were considered overweight or obese. This indicator used self-reported heights and weights. However, as height and weight are often underreported, an adjustment factor or 'correction equation' was applied. This indicator used the International Standards to classify people as underweight (BMI < 18), normal weight (BMI 18.5-24.9), overweight (BMI 25.0-29.9), or obese (BMI > 30).

Canada's Food Guide (CFG): heard of CFG

The proportion of survey participants who responded with 'Yes' to the question: "Have you ever seen or heard of Canada's Food Guide?".

Cannabis: Ever used in lifetime

The proportion of survey participants who had ever used cannabis, even just once, in their lifetime. The term "cannabis" refers to marijuana, hashish, hash oil or any other product of the cannabis plant. The usage of cannabis could be for medical or non-medical purposes.

Cannabis: Used 2+ times in lifetime

The proportion of survey participants who have used cannabis 2+ times in their lifetime. The term "cannabis" refers to marijuana, hashish, hash oil or any other product of the cannabis plant. The usage of cannabis could be for medical or non-medical purposes.

Cannabis: Used 2+ times/12 months

The proportion of survey participants who have used cannabis 2+ times in the past 12 months. The term "cannabis" refers to marijuana, hashish, hash oil or any other product of the cannabis plant. The usage of cannabis could be for medical or non-medical purposes.

General Health Status – self-rated

The proportion of survey participants who responded with 'excellent' or 'very good' (versus 'good', 'fair', or 'poor') to the question: "In general, would you say your health is excellent, very good, good, fair, or poor?"

Healthcare provider – has healthcare provider

The proportion of survey participants who responded affirmatively to the question: "Do you have a regular health care provider? By this, we mean one health professional that you regularly see or talk to when you need care or advice for your health."

Life Satisfaction

The proportion of survey participants who responded 6 through 10 on a ten-point scale to the question: "Using a scale of 0 to 10, where 0 means 'Very dissatisfied' and 10 means 'Very satisfied', how do you feel about your life as a whole right now?". Answer options 6 though 8 are grouped into 'Satisfied' and answer options 9 through 10 grouped into 'Very Satisfied'.

Life Stress: Quite a bit/ extremely stressful

The proportion of survey participants who responded 'quite a bit stressful' or 'extremely stressful' (versus 'not at all stressful', 'not very stressful', 'a bit stressful') to the question: "Thinking about the amount of stress in your life, would you say that most of your days are...?".

Life Stress: Not at all/Not very/ A bit

The proportion of survey participants who responded 'not at all stressful', 'not very stressful', or 'a bit stressful' (versus quite a bit stressful' or 'extremely stressful') to the question: "Thinking about the amount of stress in your life, would you say that most of your days are...?".

Mental Health Status – self-rated

The proportion of survey participants who responded with 'excellent' or 'very good' to the question: "In general, would you say your mental health is excellent, very good, good, fair, or poor?"

Physical Activity

The proportion of survey participants who met the Canadian 24-hour movement guidelines of having at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week.

Sedentary Activities: more than 2 hrs/day of screen time

The proportion of survey participants who spent more than 2 hrs/day of their free time (NOT on a school or workday) watching television or a screen on any electronic device while sitting or lying down.

Sense of Community Belonging

The proportion of survey participants who responded 'very strong', or 'somewhat strong' (versus 'somewhat weak' or 'very weak') to the question: "How would you describe your sense of belonging to your local community? Would you say it is...?".

Smoking: Current smokers

The proportion of survey participants, 19+, who were current smokers, which includes daily and occasional smokers.

Smoking: Never smoked

The proportion of survey participants, 19+, who have never smoked (never had a whole cigarette).

Vegetable and Fruit Consumption

The proportion of survey participants who consumed less than 5 vegetables and fruits per day.

Analysis

The statistical program R was used in all analysis. A custom program in R was created using the 'dsr' package to analyze data from health administrative data sources [16]. The survey package was used to analyze survey data sources.

General methods for analysis followed those discussed in the Key Health Inequalities in Canada report [17].

A note on regions

To obtain the DA of the case based on postal code, those with postal codes that link to multiple DAs may be assigned to a different PHU than what they were assigned in the original data source – this is due to random probability and overlapping geographical boundaries. Counts for a particular region are always calculated based on where the case was allocated in the present analysis, not based on previously derived indicators in the original data source. Counts by PHU or SE region therefore may not be comparable to previously calculated measures using the same indicator definitions. Estimates for the SE Region are calculated by aggregating records across each of three areas.

Health-related outcome rates

Total crude and age- standardized rates (prevalence / incidence) along with their 95% CIs were first calculated by time for each of the regions (where data is available) and by sex. Age-standardization used the 2011 Canadian Census Population. Age groups used in standardization depended on the distribution of cases by region, equity stratifier, sex, and age. For health administrative data, 15-year age groups were used whenever possible; however, in certain instances this has been expanded to ensure the stability of estimates. Incidence was calculated per 100,000 population and prevalence as a percentage.

Next, crude and age- standardized rates with their 95% CIs were calculated by time for each region (where available) **by equity stratifier groups,** and then further stratified by sex within these groups.

For calculating incidence using health administrative data sources, 95% confidence intervals were derived using the gamma method [16].

Health gap measures

Rate Difference (RD)

The absolute difference in health-related outcome rate between the **most advantaged** equity stratifier group (reference) and a comparison group of interest was calculated for each outcome by equity stratifier variable available.

$RD = R_c - R_r$, where R_c is the comparison group rate and R_r is the reference group rate.

RDs were calculated as both crude and age-standardized overall, and then further stratified by sex.

Rate Ratio (RR)

The ratio of health-related outcome rate between the **most advantaged** equity stratifier group (reference) and a comparison group of interest was calculated for each outcome by equity stratifier variable available.

$RR = R_c/R_r$, where R_c is the comparison group and R_r is the reference group rate.

RRs were calculated as both crude and age-standardized overall, and then further stratified by sex.

Confidence Intervals

All estimates for prevalence and incidence measures, as well as health gaps measures, are accompanied by a confidence interval in the dashboard. The confidence interval is the range of values around the estimate within which the true health measure can be expected to fall 95% of the time. Confidence intervals are shown on the graphs with error bars and in text and tables within brackets. Confidence intervals provide an estimate interval, which gives a measure of precision around the estimate. The wider the confidence interval is, the more variability there is in the data, and the less precise the estimate will be.

Statistical significance

Incidence and Prevalence Measures

Statistically significant differences occur when the confidence intervals between two estimates **do not** overlap. Note that some estimates are based on a small number of people (denoted by an † in the dashboard). This means that there is high variability in the estimate. The confidence intervals are quite wide for these estimates limiting the ability to show significant differences between estimates, even if a true difference between estimates exists.

Health Gap Measures

For a RR or RD, if the confidence interval of the estimate **does not** cross the centre line, the RR or RD is considered **statistically significant**. For RR, this line represents **1**, and for RD, the line represents **0**. If the confidence interval of the estimate **does** cross the centre line, the RR or RD is **not** considered statistically significant. When comparing two RRs or RDs, statistically significant differences occur when the confidence intervals between two estimates **do not** overlap.

Release Guidelines

For measures based on health administrative data, the following criteria was applied to determine when data was **not** releasable [18]:

- Crude rates and associated health gap measures if numerator < 5 and/or denominator < 10
- Age-standardized rates and associated health gap measures if numerator < 20 and/or denominator < 40
- Health gap measures if confidence limits were unstable (e.g., usually this occurs when a lower confidence limit cannot be calculated based on standardized rates).

Limitations

Each of the health-related outcomes defined here has its own set of caveats, which is beyond the scope of this technical document. Please refer to APHEO Core Indicators for more detailed information [19].

Quality of postal code data may vary over time, by region, by data source and by outcome. This may be due to changes or differences in record-keeping and other administrative procedures, the lived experiences of social groups more likely to experience certain outcomes, the nature of the outcomes themselves, etc.

Neighbourhood-level equity stratifiers like deprivation may underestimate inequities compared to individual-level measures; however, they are the best alternative when individual socioeconomic data is unavailable [8], as is the case with most health administrative data. These measures may also reflect underlying area-based socioeconomic constructs in their own right, which are separate from individual-level constructs [7].

Incidence estimates from health administrative data that use postal code-derived equity stratifiers **should not be** considered representative of the population for several reasons:

- denominators are from the 2016 census DAs, not yearly estimates or projections,
- cases without valid postal codes are excluded,
- health-related outcomes only include DAs with valid DI scores.This effectively takes out cases that live in DAs with a high number of institutions, and also decreases the overall regional denominator - in KFL&A for example, 15 DAs are excluded, so the overall 2016 denominator is lower (about 4%) than it would be compared to when all DAs are included,
- rounding error. Population counts by DA and then by age and sex can become small. To protect privacy and confidentiality, Statistics Canada has rounded DA total, age, and sex counts to within 5 of the actual value.

Frequently Asked Questions

Why is the INSPQ deprivation index used and not ON-MARG?

ON-MARG does not have a social capital-related dimension and INSPQ does. ON-MARG has four dimensions including material deprivation, dependency, ethnic concentration, and residential instability [20] - INSPQ already has a material deprivation dimension and the racial/ethnic diversity in southeastern region of Ontario is not large enough to validly use the ethnic concentration dimension of ON-MARG when age-standardized AND stratified by sex. The INSPQ also has been extensively documented and peer-reviewed.

Why are health-related outcome rates and health gap measures by material and social deprivation aggregated to less deprived (Q1-Q3) versus more deprived (Q4-Q5)?

This was done for a few reasons. The main reason was to have adequate cell sizes during analysis – they can become very small when taking the health-related outcome and then stratifying it by small regions (PHUs), sex, and five categories of deprivation. This makes analysis difficult and sometimes impossible, especially with respect to age-standardization. The second reason was to simplify output and interpretation for the user. The final reason was that allocation from postal code to DA is not always precise – aggregation may make this imprecision less impactful on the results.

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