Public Health Ontario | Santé publique Ontario

TECHNICAL NOTES

Alcohol-Attributable Hospitalizations Health Equity Snapshot

Updated: January 2024

Introduction

Health equity is created when all people (individuals, groups, and communities) have a fair opportunity to reach their fullest health potential.[1] Health inequities are driven by the political, cultural, economic, and social structures that create inequitable distribution of power, privilege, and resources, including capitalism, systemic racism, and colonialism. These social and structural determinants influence the conditions that people are born into, grow up in, live, and work. They have impacts on access to high-quality health and social services, experiences within the healthcare system, and health outcomes.[2]

This Health Equity Snapshot reports on health inequities by summarizing how rates of alcohol-attributable hospitalizations vary across levels of marginalization for the province, public health units (PHUs), and Local Health Integration Networks (LHINs) (for historical purposes). Data are reported by two year intervals for the years 2009-2010 to 2021-2022 based on year of admission to hospital. This Snapshot contains seven summary measures of socioeconomic inequality which are used to quantify the relationship between alcohol-attributable hospitalizations and marginalization.

Ontario Marginalization Index

Rates of alcohol-attributable hospitalizations are measured across quintiles of neighbourhood marginalization using the Ontario Marginalization Index (ON-Marg).[3] ON-Marg was created by combining Canadian census data across a number of indicators into four distinct dimensions of marginalization.[4] The differences in health status between quintiles of ON-Marg reported in this Snapshot reflect different pathways in which social and structural determinants of health impact health and wellbeing:

- The **material resources** dimension is closely connected to poverty and refers to the inability for individuals and communities to access and attain basic material needs relating to housing, food, clothing, and education. The differences reported in this Snapshot may be reflecting the pervasive impact that socioeconomic position has on a person's access to necessities for good health, exposure to unhealthy stress and instability, and support for healthy behaviours.
- The **racialized and newcomer populations** dimension measures the proportion of newcomers and/or nonwhite, non-Indigenous populations, and relates to the impacts of racialization and xenophobia. The differences reported in this Snapshot may be the result of interpersonal and structural racism, and not necessarily the result of individual-level causal factors.[5] While newcomers to Canada often have better overall health outcomes than Canadian-born counterparts, a phenomenon commonly known as the "healthy immigrant effect," many newcomers may experience declining health linked to the adoption of a Western lifestyle (e.g., sedentary

lifestyle and diet) and the cumulative exposure to stress associated with racism and discrimination, and systemic barriers to employment, housing, and health care.[6]

- The **households and dwellings** dimension relates to family and neighbourhood stability and cohesiveness, and is based on measures of the types and density of residential accommodations and family structure characteristics. The differences reported in this Snapshot may reflect the impact socially supportive environments have on mental health and overall wellbeing.
- The **age and labour force** dimension relates to the impacts of disability and dependence. It refers to area-level concentrations of people who do not have income from employment, including older adults (age 65+), children, adults whose work is not compensated and/or those unable to work due to disability. The differences reported in this Snapshot may reflect the impact of age and disability on communities, including the obstacles to health due to discrimination (e.g., ageism), social exclusion, and difficulty accessing quality health care.

Indicator Definition

Description

Age-standardized rate per 100,000 population of hospitalizations for conditions that are entirely attributable to alcohol use. Rates are reported across five levels of marginalization for each of the four dimensions of ON-Marg, and summarized using socioeconomic measures of inequality. This indicator definition was adapted from Canadian Institute for Health Information Hospitalizations Entirely Caused by Alcohol Indicator.[7]

Numerator

- Number of hospitalizations for conditions that are entirely attributable to alcohol use and captured in the Discharge Abstract Database (DAD) or the Ontario Mental Health Reporting System (OMHRS) (as of April 1, 2006). The list of ICD-10 All Dx Codes, DSM-IV Codes and DSM-5 Codes are found in Appendix 1.
- Includes those in acute care facilities and acute adult mental health beds only.

Denominator

- Census population.

Exclusions

- Records with invalid or missing postal codes
- Records with invalid age
- Non-Ontario residents
- Cases geocoded to dissemination areas that are not assigned ON-Marg quintile values

Summary Measures of Socioeconomic Inequality

Seven summary measures of socioeconomic inequality are provided which quantify the association between marginalization and health status. For more information, please see Summary Measures of Socioeconomic Inequalities in Health.[8]

Rate Difference

The absolute difference in rates of the health outcome between the most marginalized and least marginalized (Quintile 5 - Quintile 1). The rate difference is zero when there is no inequity, while higher values indicate that the burden of poor health is higher among the most marginalized, and negative values indicate that the burden is highest among the least marginalized.

Rate Ratio

The relative difference obtained by dividing the rate of the most marginalized by the rate of the least marginalized group (Quintile 5/Quintile 1). The rate ratio is one when there is no inequity. The rate ratio can only assume positive values. Values of greater than one indicate that the burden of poor health is higher among the most marginalized, and values less than one indicate that the burden is highest among the least marginalized.

The Slope Index of Inequality (SII)

An absolute summary measure of inequality which represents the slope of the linear regression line across all quintiles of marginalization. Values of zero indicate no inequities across quintiles, while positive values indicate a social gradient where health status decreases as the population becomes more marginalized. Negative values indicate a social gradient where health status improves with increasing marginalization. The SII is zero when there is no inequity, while higher values indicate that the burden of poor health is higher among the most marginalized, and negative values indicate that the burden is highest among the least marginalized.

The Relative Index of Inequality (RII) (ratio)

A relative summary measure of inequality which represents the slope of a log-linear Poisson regression model across all quintiles of marginalization, as outlined in Moreno-Betancur et al. (2015).[9] Can be interpreted as the predicted value of the health outcome in the hypothetical least marginalized individual divided by the predicted value of the hypothetical most marginalized individual. The RII is one when there is no inequity. The RII can only assume positive values. Values of greater than one indicate that the burden of poor health is higher among the most marginalized, and values less than one indicate that the burden is highest among the least marginalized.

The Relative Index of Inequality (RII) (mean)

A relative summary measure of inequality, calculated by dividing the slope index of inequality by the mean rate of the health outcome in the population. Values of zero indicate no inequities across quintiles, while positive values indicate a social gradient where health status decreases as the population becomes more marginalized, while negative values indicate a social gradient where health status improves with increasing marginalization. The RII mean is zero when there is no inequity, while higher values indicate that the burden of poor health is higher among the most marginalized, and negative values indicate that the burden is highest among the least marginalized.

Population Attributable Fraction (PAF)

The projected reduction, in relative terms, in the rate of a health indicator if each quintile of marginalization experienced the rate of the least marginalized quintile (quintile 1), expressed as a percentage of the total health outcome. The larger the value of PAF, the larger the level of inequity. PAF is zero if no further improvement can be achieved (i.e., if all quintiles have reached the same level of health status as the least marginalized quintile). Negative values represent the percent increase in additional cases that would result if each quintile experienced the rate of the least marginalized group.

Population Impact Number (PIN)

The projected reduction, in absolute terms, in the number of cases of a health indicator if each quintile of marginalization experienced the rate of the least marginalized quintile group (quintile 1), expressed as a count. The larger the value of PIN, the larger the level of inequity. PIN is zero if no further improvement can be achieved (i.e., if all quintiles have reached the same level of health status as the least marginalized quintile). Negative values represent the number of additional cases that would result if each quintile experienced the rate of the least marginalized group.

Metrics

- Age-standardized rates per 100,000 (by quintile of ON-Marg, from quintile 1 (low marginalization) to quintile 5 (high marginalization)).
- Summary measure of socioeconomic inequality. No results are provided for geographies that contain quintiles with zero cases.
- Statistically significant summary measure of socioeconomic inequality.
- Statistical significance of summary measure of socioeconomic inequality compared to Ontario (values are considered statistically significantly different if 95% confidence intervals do not overlap).
- Case counts by quintile and population denominators are available in the download data file.

Methods

The analytic approach taken to calculate the results presented in this Snapshot is as follows:

1. Assign cases to a level of marginalization
2. Calculate age-standardized quintile-specific rates of health status
3. Calculate summary measures of socioeconomic inequality

Assign Cases to a Level of Marginalization

Individuals who appear in administrative health data are assigned to a quintile of ON-Marg based on the dissemination area (DA) of residence. A DA is a standard census geographic unit with a population of 400 to 700 persons. Quintiles are ordered from 1 to 5, with quintile 1 neighbourhoods having the lowest level of marginalization and quintile 5 neighbourhoods having the highest level of marginalization. Two different methods of creating quintiles are used in this analysis:

- **Local cutoffs:** With this method, quintiles are weighted specifically for each individual PHU or LHIN. Each quintile will contain 20% of all dissemination areas within a given PHU or LHIN. This option should be selected by users who are interested in defining the level of marginalization based on the local population characteristics, rather than population characteristics of Ontario.
- **Ontario cutoffs:** With this method, quintiles are weighted provincially, so that each quintile contains 20% of all Ontario dissemination areas. This means that the distribution of quintiles across sub-provincial geographies such as PHUs and LHINs will not necessarily be equal. This option should be selected by users who are interested in making comparisons between groups defined by a level of marginalization based on the entire province, or for making comparisons between geographies using provincially comparable measures of marginalization.

The Statistics Canada Postal Code Conversion File Plus (PCCF+) is used to geocode cases to DAs based on their postal code. Once cases have been assigned to DAs, ON-Marg is used to assign cases to a level of marginalization for each of the four dimensions, for both local and Ontario cutoffs. To account for changing levels of marginalization over time, health status data are assigned to the closest version of ON-Marg by date (e.g., 2018 cases are assigned to quintiles using the 2016 version of ON-Marg, while 2019 cases are assigned to quintiles using the 2021 ON-Marg).

Calculate Age-Standardized Rates

Numerators were created by aggregating health status data by ON-Marg quintiles. Denominators for each ON-Marg quintile were created by aggregating DA-level age-group specific counts for the 2006, 2011, 2016 and 2021 censuses. Numerators were assigned denominator data of the closet census year. For example, 2016 census counts are used as the denominator for 2014-2018 health status data.

Rates were directly age-standardized to the 2011 Canadian population using 15-year age groups to account for potential differences in the age structure of each quintile, and to account for changes in age structure over time. Fifteen year age-groups (0 to 14, 15 to 29, 30 to 44, 45 to 59, 60 to 74, 75 and older) were used for more stable population estimates. Two years of data were combined for analysis to provide more stable rates. Age-standardized rates and associated variances have been calculated using methodology described on the APHEO website.[10]

Calculate Summary Measures of Inequality

Summary measures of socioeconomic inequality were calculated in SAS to summarize differences in health status across the five quintiles of marginalization. Seven summary measures were calculated for each of the four ON-Marg dimensions using the local and Ontario quintile cutoffs, and for each two year grouping of analysis.

Suppression

Due to the replacement of the 2011 long-from census with the National Household Survey, the 2011 version of ON-Marg was derived using alternative administrative data sources.[11] The use of these data sources in 2011 may impact the ability of ON-Marg to analyze trends over time for some sub-provincial geographies. Health equity analysis results have been suppressed for the years 2009-13 for some public health units and Local Health Integration Networks.

Suppression was applied to only those dimensions, geographies and years susceptible to potential impact from the use of 2011 alternative data sources. The use of these data sources may have changed the quintile of marginalization of some DAs more than expected. DAs that have similar measures of

marginalization in both 2006 and 2016, but have divergent measurements in 2011, are considered outliers that may impact trends over time. Health equity analysis results for those geographies and dimensions with a large number of outlier DAs relative to the total number of DAs per geography, weighted by the magnitude of the difference, have been supressed for the years 2009-13.

Data Sources

Numerator:

- Discharge Abstract Database, 2009-2022 [data file]. Ottawa, ON: Canadian Institute for Health Information [producer]; Toronto, ON: Ontario. Ministry of Health, IntelliHealth Ontario [distributor]; [data extracted 2023 Sep 21].
- Ontario Mental Health Reporting System (OMHRS). 2009-2022 [data file]. Ottawa, ON: Canadian Institute for Health Information [producer]; Ontario. Ministry of Health and Long-Term Care, IntelliHealth Ontario [distributor]; [unpublished] [data extracted 2023 Sep 21].

Denominator: Census Population

- Statistics Canada as extracted by Ontario Agency for Health Protection and Promotion (Public Health Ontario). 2006 census of population – dissemination area: profile of age and sex for Canada, provinces, territories, census divisions, census subdivisions and dissemination areas, 2006 census [Internet]. Ottawa, ON: Statistics Canada; 2007 Aug 14 [extracted 2017 Feb 20]. Available from: http://www12.statcan.gc.ca/global/URLRedirect.cfm?lang=E&ips=94-575-XCB2006002
- Statistics Canada as extracted by Ontario Agency for Health Protection and Promotion (Public Health Ontario). 2011 census of population – dissemination area: census profile - age and sex for Canada, provinces, territories, census divisions, census subdivisions and dissemination areas, 2011 census [Internet]. Ottawa, ON: Statistics Canada; 2012 May 29 [extracted 2017 Jun 22]. Available from: http://www12.statcan.gc.ca/global/URLRedirect.cfm?lang=E&ips=98-311-XCB2011007
- Statistics Canada as extracted by Ontario Agency for Health Protection and Promotion (Public Health Ontario). 2016 census of population – dissemination area: census profile - age and sex for Canada, provinces, territories, census divisions, census subdivisions and dissemination areas, 2016 census [Internet]. Ottawa, ON: Statistics Canada; 2017 Nov 29 [extracted 2018 Apr 24].Available from: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/download-telecharger/comp/GetFile.cfm?Lang=E&TYPE=CSV&GEONO=044_ONTARIO
- Statistics Canada as extracted by Ontario Agency for Health Protection and Promotion (Public Health Ontario). 2021 census of population – dissemination area: census profile - age and sex for Canada, provinces, territories, census divisions, census subdivisions and dissemination areas, 2021 census [Internet]. Ottawa, ON: Statistics Canada; 2023 Feb 8 [extracted 2023 Feb 22]. Available from: https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/download-telecharger/comp/GetFile.cfm?Lang=E&FILETYPE=CSV&GEONO=006_Ontario

How to Cite This Snapshot

Generic Citation Format:

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Alcohol-attributable hospitalizations health equity snapshot measure in sentence case [Internet]. Toronto, ON: King's Printer for Ontario; cYYYY [modified YYYY Mon DD; cited YYYY Mon DD]. Available from: https://www.publichealthontario.ca/en/Data-and-Analysis/Health-Equity/Alcohol-Attributable-Hospitalizations

Example:

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Alcohol-attributable hospitalizations health equity snapshot: relative risk [Internet]. Toronto, ON: King's Printer for Ontario; c2024 [modified 2024 Jan 19; cited 2024 Jan 19]. Available from: https://www.publichealthontario.ca/en/Data-and-Analysis/Health-Equity/Alcohol-Attributable-Hospitalizations

References

1. Ontario. Ministry of Health and Long-Term Care, Population and Public Health Division. Health equity guideline, 2018 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2018 [cited 2023 May 25]. Available from: https://files.ontario.ca/moh-guidelines-health-equity-guideline-en-2018.pdf
2. Solar O, Irwin A. A conceptual framework for action on the social determinants of health: social determinants of health discussion paper 2 (policy and practice). Geneva: World Health Organization; 2010. Available from: https://apps.who.int/iris/handle/10665/44489
3. Matheson FI (Unity Health Toronto), Moloney G (Unity Health Toronto), van Ingen T (Public Health Ontario). 2021 Ontario marginalization index. Toronto, ON: St. Michael's Hospital (Unity Health Toronto); 2023. Joint publication with Public Health Ontario.
4. Matheson FI (Unity Health Toronto), Moloney G (Unity Health Toronto), van Ingen T (Public Health Ontario). 2021 Ontario marginalization index: user guide. Toronto, ON: St. Michael's Hospital (Unity Health Toronto); 2023. Joint publication with Public Health Ontario.
5. Iroanyah N, Cyr M. Navigating systemic racism in Canadian healthcare [Internet]. Toronto, ON: Healthy Debates; 2020 [cited 2023 May 18]. Available from: https://healthydebate.ca/2020/07/topic/navigating-systemic-racism/
6. Elshahat S, Moffat T, Newbold KB. Understanding the healthy immigrant effect in the context of mental health challenges: a systematic critical review. J Immigr Minor Healt. 2022;24(6):1564-79. Available from: https://doi.org/10.1007/s10903-021-01313-5
7. Canadian Institute for Health Information (CIHI). Hospitalizations entirely caused by alcohol [Internet]. Toronto, ON: APHEO; c2023 [cited 2023 Oct 24]. Available from: https://www.cihi.ca/en/indicators/hospitalizations-entirely-caused-by-alcohol
8. Moreno-Betancur M, Latouche A, Menvielle G, Kunst AE, Rey G. Relative index of inequality and slope index of inequality: a structured regression framework for estimation. Epidemiology. 2015;26(4):518-27. Available from: https://doi.org/10.1097/EDE.0000000000000311
9. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Summary measures of socioeconomic inequalities in health. Toronto, ON: Queen's Printer for Ontario; 2013. Available from: https://www.publichealthontario.ca/-/media/documents/S/2013/socioeconomic-inequality-measures.pdf
10. Association for Public Health Epidemiologists in Ontario (APHEO). 10 methods for age standardizing survey data [Internet]. Toronto, ON: APHEO; c2003 [cited 2023 Oct 24]. Available from: http://core.apheo.ca/index.php?pid=194
11. van Ingen T, Matheson FI. The 2011 and 2016 iterations of the Ontario Marginalization Index: updates, consistency and a cross-sectional study of health outcome associations. Can J Public Health. 2022;113(2):260-71. Available from: https://doi.org/10.17269/s41997-021-00552-1

Appendix 1: ICD-10 codes, DSM-IV codes and DSM-5 codes for conditions considered entirely attributable to alcohol

Table 1. ICD-10 codes for conditions that are entirely attributable to alcohol use for use with Discharge Abstract Database (DAD)

Condition	ICD-10 Code
Alcohol-induced Pseudo-Cushing's Syndrome	E24.4
Mental and Behavioural Disorders Due to Use of Alcohol	F10
Degeneration of Nervous System Due to Alcohol	G31.2
Alcoholic Polyneuropathy	G62.1
Alcoholic Myopathy	G72.1
Alcoholic Cardiomyopathy	I42.6
Alcoholic Gastritis	K29.2
Alcoholic Liver Disease	K70
Alcohol-Induced Acute Pancreatitis	K85.2
Alcohol-Induced Chronic Pancreatitis	K86.0
Maternal Care for (Suspected) Damage to Fetus from Alcohol	O35.4
Fetal Alcohol Syndrome (Dysmorphic)	Q86.0
Finding Of Alcohol In Blood	R78.0
Toxic Effects Of Alcohol	T51
Accidental Poisoning by and Exposure to Alcohol	X45
Intentional Self-Poisoning by and Exposure to Alcohol	X65
Poisoning by and Exposure to Alcohol, Undetermined Intent	Y15

Table 2. DSM-IV codes for conditions that are entirely attributable to alcohol use for use with Ontario Mental Health Reporting System (OMHRS)

Condition	DSM-IV Code
Alcohol Intoxication Delirium Alcohol Withdrawal Delirium	291.0
Alcohol Persisting Amnestic Disorder	291.1
Alcohol Persisting Dementia	291.2
Alcohol-Induced Psychotic Disorder, With Hallucinations	291.3
Alcohol-Induced Psychotic Disorder, With Delusions	291.5
Alcohol Withdrawal	291.81
Alcohol-Induced Sleep Disorder	291.82
Alcohol-Induced Anxiety Disorder Alcohol-Induced Mood Disorder Alcohol-Induced Sexual Dysfunction	291.89
Alcohol-Related Disorder Not Otherwise Specified	291.9
Alcohol Intoxication	303.00
Alcohol Dependence	303.90
Alcohol Abuse	305.00

Table 3. DSM-5 codes for conditions that are entirely attributable to alcohol use for use with Ontario Mental Health Reporting System (OMHRS)

Condition	DSM-5 Code
Alcohol Intoxication Delirium Alcohol Withdrawal Delirium	291.0
Alcohol Persisting Amnestic Disorder	291.1
Alcohol-Induced Major Neurocognitive Disorder, Nonamnestic Confabulatory Type	291.2
Alcohol Withdrawal	291.81
Alcohol-Induced Sleep Disorder	291.82
Alcohol-Induced Anxiety Disorder Alcohol-Induced Bipolar and Related Disorder Alcohol-Induced Depressive Disorder Alcohol-Induced Sexual Dysfunction	291.89
Alcohol-Induced Psychotic Disorder Unspecified Alcohol-Related Disorder	291.9
Alcohol Intoxication	303.00
Alcohol Use Disorder, Moderate/Severe	303.90
Alcohol Use Disorder, Mild	305.00

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Technical notes: alcohol-attributable hospitalizations hospitalization health equity snapshot. Toronto, ON: King's Printer for Ontario; 2024.

Disclaimer

This document was developed by Public Health Ontario (PHO). PHO provides scientific and technical advice to Ontario's government, public health organizations and health care providers. PHO's work is guided by the current best available evidence at the time of publication. The application and use of this document is the responsibility of the user. PHO assumes no liability resulting from any such application or use. This document may be reproduced without permission for non-commercial purposes only and provided that appropriate credit is given to PHO. No changes and/or modifications may be made to this document without express written permission from PHO.

Public Health Ontario

Public Health Ontario is an agency of the Government of Ontario dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, front-line health workers and researchers to the best scientific intelligence and knowledge from around the world.

For more information about PHO, visit publichealthontario.ca.

Ontario