



Project Concept: Measuring Trends in Health Inequalities in Cities

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Measuring Trends in Health Inequalities in Cities

In recent years, The Canadian Institute of Health Inequality (CIHI) has explored inequalities in health at the national and provincial levels (2015). However, it has been almost ten years since CIHI published *Reducing the Gaps* (2008), the last report to systematically examine health inequalities at the city level throughout the country.

The Urban Public Health Network (UPHN) is working with health information partners—Statistics Canada, CIHI, and the Public Health Agency of Canada (PHAC)—to calculate current health inequalities in Canada’s cities and lay a foundation for more regular monitoring under the project banner “Measuring Trends in Health Inequalities in Cities” (MTHIC, pronounced “Mythic”).

The UPHN is a network of Medical Officers of Health in Canadian urban centres who came together in 2004 to address public health issues that are common to urban populations. The UPHN’s 23 member cities¹ collectively represent more than 50% of the Canadian population.

Project goals

MTHIC is guided by two primary project goals:

1. To work with leading Canadian data sources on health to present a national-level portrait of urban health inequalities in the 23 UPHN member cities.
2. To help UPHN member cities use these resources and further monitor health inequalities using their own local data sources.

While achieving these two goals, MTHIC will identify best practices for monitoring health inequalities in Canada’s cities and for making meaningful comparisons among them.

¹ The UPHN member cities are listed in Table A1 in the appendix.

Health information in Canada comes from four main sources: hospital records, self-reported survey responses, vital statistics, and public health surveillance. MTHIC will work with project partners to use data from each of these sources to monitor and compare health inequalities in each of the four areas of health status identified in the Health Indicators Framework (CIHI 2013): well-being, health conditions, human functioning, and deaths.

In order to capture health inequalities, MTHIC will examine how health status varies, first, by socioeconomic status, measured by household adjusted income quintile, and, second, by non-income determinants of health. The latter approach will draw on a new typology of neighborhoods that will be developed by Statistics Canada using big data and machine learning tools that will group similar neighborhoods throughout the country.

Throughout the project, MTHIC will develop and share deliverables in ways that are useful to practitioners and the public at large.

Beyond MTHIC

There is currently a groundswell of support for more fine-grained analysis of health and its determinants in Canada's cities. This interest is typified by research investments like the CIHR-IPPH Building Healthy Cities granting initiative. Meanwhile, investments in data linkages by CIHI and Statistics Canada are creating new forms of big data that are allowing Canadian researchers and practitioners to dig deeper into questions of urban health.

Looking ahead, MTHIC is conscious of the fact that it marks a kind of new beginning for city-level studies of health inequalities in Canada (after the Reducing the Gaps era). The methods and workflow developed in this project will ideally lead the way in the creation of a more robust and long-term system and infrastructure for comparative monitoring and reporting on health inequalities in Canada's urban centres.

This concept paper

This document provides a high-level summary of the main concepts and steps that will go into realizing the MTHIC project goals. It also sketches a division of responsibilities, a list of deliverables, and a timeline that extends from the present to early-2019. We will begin by answering the question, "What is health inequality?"

A second document, the MTHIC: Technical Paper, summarizes several methodological decisions that have to be made to monitor health inequalities in Canada and how MTHIC will answer them:

1. How will we operationalize SES?
2. Within which jurisdiction will we examine inequality?
3. Which health outcome(s) will we consider?
4. How will we work with health inequalities over time?
5. How will we summarize inequalities?
6. How can we make meaningful comparisons among cities?

What is Health Inequality?

There are several commonly used definitions of health inequality in public health and related fields (Regidor 2004). However, traditionally, it has been defined as “differences in health by socio-economic status or social class” (Asada 2007:11). This description will be the working definition adopted by MTHIC.

Socioeconomic status (SES) is itself complex concept (Denny and Davidson 2012). In the MTHIC Technical Paper, we consider several factors that contribute to SES and think critically about how it should be measured. Rather than measuring it using a more complex index, we measure it as high or low neighbourhood household adjusted income quintile.

Adopting a simplistic measure of SES will allow us to more explicitly examine additional important determinants of health such as gender, citizenship status, able-bodiedness, and ethnicity at later stages of the project.

Inequality and inequity

Frequently, health inequality is viewed as an objective state of affairs while inequity is seen as a subjective matter of moral judgement (for example, see Krieger 2001). Inequities refer to unjustifiable differences in health between SES groups. Unfortunately, people tend to disagree about which differences in health are unjustified. For the sake of this project, we set aside the matter of equity.

Nonetheless, it is important to note that even though this project is not primarily concerned with health inequities, the health inequalities that it measures are oftentimes essential indicators of inequities.

Within- and between-city inequalities

City-level studies examining health statuses and health care utilization have found that lower SES is associated with poorer overall health and higher use of health services (CIHI 2008; Kozyrskyj et al. 2002; Lemstra et al. 2009; Predy et al. 2008; Tompkins et al.

2010; Wilson et al. 2004). Chronic diseases disproportionately affect residents of lower SES neighbourhoods, so that low-income residents are more likely to be hospitalized and contribute disproportionately to healthcare costs (Stanwick 2006; Wilson et al. 2004; Lemstra et al. 2009).

Calculating health inequalities for a given city involves providing answers to several broad methodological questions that we expand on in the MTHIC Technical Paper. However, providing answers to these questions is still a relatively straightforward task compared to making comparisons in health inequalities between cities or even within the same cities over time.

Populations tend to change over time in ways that complicate how we interpret changes in health inequalities. For example, elderly populations are at higher risk of poor health and have been growing in Canada in recent years (Statistics Canada 2017a). For this reason, standardizing city-level health outcomes by age is standard practice (for example, see (CIHI 2008; Kozyrskyj et al. 2002; Lemstra et al. 2009; Predy et al. 2008; Tompkins et al. 2010; Wilson et al. 2004). But age is one of many demographic features of cities that can change. For example, patterns of immigration change dramatically from one decade to another (Statistics Canada 2017b).

Making comparisons among cities tends to be even more difficult. Cities throughout Canada benefit from vastly different distributions of economic and social opportunities and resources that affect health (Raphael 2006). For example, a city with more people belonging to populations that are predisposed to poorer health can reduce these inequalities, but it may still report poorer outcomes than another city with fewer vulnerable individuals.

In summary, it is important to integrate various differences among cities when making comparisons among their health inequalities. Comparisons should be executed intelligently, respectfully, and carefully.

Filling the Gaps

It is through making comparisons, either within themselves over time or among one another, that cities can set benchmarks and track progress in combating health inequalities. In order for comparisons to be more useful, they have to be made consistently and in ways that take into account factors that make communities unique.

Since 2008, a handful of Canadian cities have measured health inequalities in their communities. However, we continue to lack a country-level perspective; research has been done on a city-by-city and ad hoc basis. As a result, methodological decisions have

not been made uniformly across studies, with some years and cities being missed altogether.

MTHIC is working toward establishing ongoing monitoring and reporting practices on health inequalities among the project partners. One of its primary and early achievements will be to establish a set of agreed-upon best practices around measurement. Ideally, city-level health numbers could be produced at regular intervals and calculated in the same way to make comparisons more transparent and straightforward.

MTHIC will ensure that our analyses are reported in such a way that they will be useful to the groups that need them, namely: researchers, practitioners, advocates, and the public.

Proposed Analysis in Three Phases

It has been over ten years since the last systematic, country-wide examination of health inequalities in Canada's cities was carried out. MTHIC will update these numbers and identify key developments in health inequalities. In addition to measuring city-level health inequalities in Canada, MTHIC will make meaningful comparisons among cities and within cities over time.

The project will involve three overlapping phases of analysis, generating three different sets of results.

Phase 1

Phase 1, to be completed between roughly January and June of 2018, will estimate city-level health inequalities in Canada for each year we choose to study (tentatively, 2006, 2011, and 2016, data permitting) in basically the same manner as was done in Reducing the Gaps.

These estimates will be calculated by each of the project partners based on which data source they draw on (see Data sources and responsibilities below).

Phase 2

Once we estimate city-level inequalities, we will make meaningful and useful comparisons among them. This will require more sophisticated statistical techniques that have not been used in city-level research on health inequalities in Canada in the past.

Phase 2, to be completed over the summer of 2018, will use established decomposition techniques (van Doorslaer and Koolman 2004; Speybroeck et al. 2010) to more effectively compare city-level health inequalities over time and among cities. By deploying decomposition analysis, Phase 2 will bring city-level comparisons of health inequalities in Canada in line with the most advanced and established statistical methods for making these kinds of comparisons.

Phase 3

Phase 3 will recast comparisons in ways that are easier to consume and be put to use by practitioners and the public. To be completed over the fall and winter of 2018, Phase 3 will identify and compare similar neighbourhoods across cities. Statistics Canada will identify these groupings using big data and machine learning in much the same way as they have previously done with health region peer-groups (Statistics Canada 2015).

The machine learning technique that Statistics Canada will use is cluster analysis (Everitt et al. 2010). In short, this approach uses algorithms to group communities according to their common characteristics. UPHN members will be consulted to identify which characteristics ought to be used.

Understanding Phases 2 and 3

The difference between the motivations for the decomposition and the cluster comparison methods is a subtle but important one. The decomposition method uses complex multivariate models and regression techniques to tell an arguably more comprehensive story of urban health inequalities in Canada. However, practitioners and the public do not think in terms of *n*-dimensional relationships. They do, however, think in terms of neighbourhoods and the differences among them.

The cluster method, thus, can be thought of as a simplified and more tactile skin that wraps the decomposition methods with a neighbourhood framework. Decomposition methods, for example, might find that the disproportionately poorer health of newcomers in a given city drives its health inequalities, but this fact will become tangible when the city's actual newcomer neighbourhoods are identified and it is found that they are much worse off than similar neighbourhoods in other cities.

Data sources and responsibilities

Information on health and its determinants in Canada are collected from a variety of sources, not all of which are equally useful for doing city-level comparative research. The four leading sources of information on health is public health surveillance, survey

responses, hospital administration, and vital statistics. The two leading sources of information on determinants of health are survey data and the census.

Measuring health inequalities in Canada’s cities entails examining outcomes from all of these data sources. As a general rule, concerning the latter three, MTHIC will proceed by allocating responsibility for the calculation of health inequalities drawn from hospital records to CIHI, survey data to the UPHN postdoc (accessed via the Research Data Centres (RDC) program), and vital statistics to Statistics Canada.

PHAC aggregates public health surveillance data at the national level, but this data is not stored in a way that permits analysis of city-level health inequalities. Willing health regions will be responsible for this kind of analysis. However, MTHIC will provide tools to support these efforts.

Table 1: Summary of data sources and partner responsibilities

Data source	CIHI	Statcan	MTHIC Postdoc	UPHN Members
Hospital administrative records	X			
Vital Statistics		X		
Self-reported survey (CCHS)			X	
Public health surveillance				X

UPHN member-city analysis

Different cities have different interests and needs when it comes to analyses of urban health inequalities. Once each stage of analysis is complete, raw results will be shared with UPHN members for feedback and to support their own health inequality monitoring efforts. UPHN members may choose to dig deeper into these results and produce their own analysis and disseminate products around them.

At various stages of the project, MTHIC will also provide tools to help UPHN member cities produce consistent and comparable analyses of health inequalities in their own public health surveillance data. If enough members are interested, there will be opportunities to combine local-level results on reportable diseases and immunization coverage to produce a national-level perspective on city-level inequalities in these outcomes.

Deliverables: Tools and Dissemination

In order to present a national-level portrait of health inequality in Canada's cities, MTHIC will generate three broad sets of results that reflect the three stages of analysis:

1. City-level estimates of health inequalities estimates over SES.
2. Decomposition of within- and between-city differences in health inequality.
3. Health inequalities over neighbourhood clusters identified by Statistics Canada.

MTHIC will distribute these results so that they build upon previous work while also ensuring that this information will be useful to practitioners, advocates, and the public.

In addition to the kinds of deliverables listed below, UPHN member cities will also have the option to produce their own results in each of these areas using their local health surveillance data.

Tools for UPHN members

Two sets of codings will be generated in the process of completing the three phases of the proposed analysis. The first will assign neighbourhoods throughout the country to SES quintiles and the second will assign them to cluster groups identified by Statistics Canada. These will be shared with UPHN members so that they can extend the analysis to their own surveillance information.

MTHIC will also coordinate the creation of city-level maps of the SES and cluster neighborhood codings. These will provide a visual analogue to the codings similar to those included in the appendix to the Reducing the Gaps report and facilitate understandings and interpretation of the results.

Finally, by measuring health inequalities generally and by relating results within and among cities, MTHIC will develop guidelines for coding surveillance information consistently and comparably.

Dissemination of results

In general, once health inequalities have been calculated, there is considerable flexibility in how we report them, and it will be up to project partners and UPHN members to deem which aspects of reporting they wish to take the initiative on. However, a handful of higher-level reports will be worth pursuing to contextualize and support these efforts:

City-level health inequality estimates – these will be reported in the same fashion as the 2008 Reducing the Gaps (CIHI) report. This collaborative project will ensure continuity with the published record and provide a summary of the first stage of our proposed analysis.

Documents on tools, indicators, and methods – MTHIC will be generating various tools, measurement instructions, and results. These will be complemented by a handful of documents that explain their creation and how they should be interpreted and also provide guidelines for their use. MTHIC is also settling a number of methodological questions that we may want to consider publishing in academic peer-reviewed publications.

Decomposition analysis – this will be shared through academic peer-reviewed publications, likely one that details the methods and another the results. The postdoc working with UPHN will lead this publication process. MTHIC will also write one or more papers for peer-review on the cluster method, focusing on what motivated it and how it is used.

Neighbourhood cluster analysis – This is also the cluster codings that I refer to above. These will have widespread applications beyond our immediate interest in public health. Statistics Canada will determine how to disseminate this work. They may want to roll it into their more general list of analytic products in much the same way that they have with their Health Region Peer Groups.

Health inequality work based on neighbourhood clusters – This should be distributed to the UPHN members and the public in a manner suitable to their needs and interests. The form that this collaborative product will take has yet to be determined. Its distribution will also include the overall health inequalities content distributed in the Reducing the Gaps update.

UPHN member-city reports – At present, the only scheduled report to be completed is the high-level update to Reducing the Gaps. However, three stages of analysis will generate a multitude of results likely to be useful to members. MTHIC will support the initiative of individual UPHN members, or groups of members, who may want to produce their own analysis and reports on outcomes of particular interest to them.

Public health surveillance data analysis – MTHIC will provide members with various tools that can be used to assess health inequalities in surveillance data, which includes health outcomes like disease incidence and immunization coverage. UPHN members may want

to collaborate to produce a city-level comparative analysis on inequalities of these outcomes.

Long run updating and reporting – there is a desire among partners and other interests to set up an infrastructure to ensure regular updating and monitoring of health inequalities at the city level in Canada going forward. It is still unclear how this will be accomplished and what shape it will take.

Work Plan

The aim is for the bulk of the work carried out under the MTHIC-banner to occur within the calendar year of 2018. Stages of analysis and dissemination will occur concurrently over the course of the year, with the latter weighted toward the later months. Though we will be working toward the launch of a UPHN-led Reducing the Gaps-style update in December 2018, some supporting work and independent analysis carried out by project partners and UPHN member is likely to spill over into early 2019.

The following table provides a tentative summary of our work plan:

Table 2: Deliverables, responsibilities and rough timeline by season

	2018				2019
Task	W	S	S	F	W
<i>Analysis</i>					
- P1: Health inequality by SES	X	X			
- P2: Decomposition comparisons		X	X		
- P3: Cluster comparisons				X	
- UPHN member analysis			X	X	X
<i>Tools</i>					
- Technical paper	X				
- SES codings	X				
- Cluster codings		X	X		
- Decomposition methods			X		

- Cluster methods			X	X	
- City SES and cluster maps		X		X	
<i>Dissemination</i>					
- <i>Reducing the Gaps</i> update				X	
- Decomposition results				X	
- Neighbourhood clusters					X
- Cluster comparisons					X
- UPHN member reports					X

Appendix

Table A1: List of UPHN health regions and their primary city centers

Region	City
Vancouver Island Health Authority	Victoria, B.C.
Vancouver Coastal Health Region	Vancouver, B.C.
Fraser Health	Surrey, B.C.
Alberta Health Services	Calgary, AB
Alberta Health Services	Edmonton, AB
Saskatoon Health Region	Saskatoon, SK
Regina Qu'Appelle Health Region	Regina, SK
Winnipeg Regional Health Authority	Winnipeg, MB
Middlesex-London Health Unit	London, ON
Hamilton Public Health	Hamilton, ON
Peel Public Health	Mississauga, ON
Toronto Public Health	Toronto, ON

Ottawa Public Health	Ottawa, ON
Laval Health and Social Services Agency	Laval, QC
Montréal Health and Social Services Agency	Montréal, QC
Montérégie Health and Social Services Agency	Longueuil, QC
Estrie Health and Social Services Agency	Sherbrooke, QC
Quebec City Health and Social Services Agency	Quebec City, QC
New Brunswick – Moncton Area	Moncton, NB
New Brunswick – Saint John Area	Saint John, NB
New Brunswick – Fredericton Area	Fredericton, NB
Capital District Health Authority	Halifax, NS
Eastern Health	St. John's, NL

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