Defining Needs-based Urban Health Planning Areas is Feasible and Desirable

A Population-based Approach in Toronto, Ontario

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ABSTRACT

Reporting health data for large urban areas presents numerous challenges. In the case of Toronto, Ontario, amalgamation in 1998 merged six census subdivisions into one megacity, resulting in the disappearance of standard reporting units. A population-based approach was used to define new health planning areas. Census tracts were used as building blocks and combined according to residential income homogeneity, respecting natural and man-made boundaries, forward sortation areas and the City of Toronto's community neighbourhoods whenever possible. Correlations and maps were used to establish area boundaries. The city was divided into 5 major planning areas which were further subdivided creating 15 minor areas. Both major and minor areas showed significant differences in population characteristics, health status and health service utilization. This commentary demonstrates the feasibility and describes the outcomes of one method for establishing planning and reporting areas in large urban centres. Next steps include the further generation of health data for these areas, comparisons with other Canadian urban areas, and application of these methods to recently announced Ontario Local Health Integration Networks. These areas can be used for planning and evaluating health service delivery, comparison with other Canadian urban areas and ongoing monitoring of and advocacy for equity in health.

MeSH terms: Socioeconomic factors; urban population; health planning

La traduction du résumé se trouve à la fin de l'article.

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Reporting of health-related information in urban areas tends to follow administrative or political boundaries that may not correspond well with the population characteristics that are important for health. When these boundaries include heterogeneous areas, important differences in population characteristics, health risks, health needs, health care utilization and health outcomes may be obscured.¹ A few Canadian urban areas have established internal boundaries that correspond to some extent with health needs,^{2,3} but this is not the case for most cities.

Canada's largest city, Toronto, Ontario, lost its major internal political divisions, including its census subdivisions, with amalgamation of its six component cities in 1998. With a population of 2.5 million people (8% of Canada's total population), it became one large reporting unit in national surveys and in the Canadian census. Toronto health and social service agencies currently use a large number of different boundaries, but few of them correspond with the population characteristics that determine health needs.

Toronto's population is highly diverse in socio-demographic characteristics and cultural backgrounds. Significant disparities in health status and utilization of health services are apparent.^{4,5} Given its large size, high diversity, and lack of consistent and appropriate internal boundaries, there was a need for defining comprehensive units in Toronto that would facilitate the understanding of area differences in population health status and present a consistent way of reporting health information as well as planning and delivering health services. The purpose of this commentary is to demonstrate the feasibility and describe the outcomes of one method for establishing planning and reporting areas in a large urban centre. These new planning areas were not meant to rationalize health service areas or to define and replace catchment areas for health service agencies.

Iterative process

Several steps were used in developing the new health planning areas, including: deciding on population versus service-based approaches; identifying socio-demographic characteristics(s) that most relate to health needs; deciding whether planning areas should be contiguous or

composed of scattered units across the city; selecting an appropriate building block that could be aggregated into new areas; using area characteristics to establish boundaries; and evaluating the new areas by examining area variation in socio-demographic characteristics and health indicators and holding community consultations with relevant stakeholders. The process was designed to be iterative, with final boundaries emerging at the end of the process.

First, we adopted a population-based approach to define the proposed new planning areas which considers where people live instead of where they receive services. This approach reflects population characteristics that are major determinants of health and need for health services. We used the proportion of the population below Statistics Canada's low income cut-off as the main population characteristic for defining health planning areas.⁶

Another fundamental decision was whether to aggregate geographically adjacent areas or to establish planning areas that could be composed of units scattered across the city such as income quintiles or deciles. While the latter approach would be expected to achieve greater separation of population characteristics, contiguous geographic units are needed for planning health interventions and service delivery at the population level and so the former approach was adopted.

An appropriate building block was selected by appraising the characteristics of available census geographic areas. The census tract (CT) was chosen as a building block for the new planning areas because it was consistent from one census year to another, it contained sociodemographically homogeneous populations and it could be aggregated into many existing political and administrative units. Enumeration areas and dissemination areas, although small and homogeneous, have changed across census years and have significant suppression of values, especially for income. Forward sortation areas (FSAs – corresponding with the first three digits of the postal code) were felt to be too large and heterogeneous to be an appropriate building block in our setting.

The city was divided according to income homogeneity but respecting natural and man-made boundaries such as rivers and major highways, City of Toronto

Figure 1. Map of major and minor health planning areas for Toronto based on census tract (CT) and percent of low income

Figure 2. Distribution of population in low income households (quintiles) by CTs and 15 minor areas, 2000

neighbourhood boundaries and FSAs whenever possible. These requirements made purely statistical or spatial approaches^{7,8} difficult and therefore homogeneity was assessed mostly by visual inspection. We used overlays of choropleth (shaded) maps and simple measures of correlation and variation to compare different groupings of CTs.

Socio-demographic data were obtained from the 2001 Canadian census. Mortality rates were obtained from

Statistics Canada and included all deaths for Toronto residents occurring in the community and institutions for three years from 1996 to 1998. Self-reported health status was obtained from the Canadian Community Health Survey cycle 1.1, 2000/2001. Low birthweight was obtained from Toronto Public Health and included only singleton live births for 1996-1997. All rates were adjusted for age and sex using the 1991 Canada population.

TABLE I

Socio-demographic Characteristics for Major and Minor Health Planning Areas, 2001 Census

Major Areas		Population	Average Household Income (range among census tracts)	% Population with Less Than Grade Nine Education	% of Unemployment Rate for Population 15+	% of Renters	% with No Knowledge of Official Language
1)	Toronto West	316,575	75,209 (33,633-214,918)	9.3%	5.7%	38.7%	2.8%
2)	Toronto Central West	694,675	52,329 (30,675-89,398)	18.6%	7.5%	55.8%	7.4%
3)	Toronto Central East	528,995	99,404 (32,107-423,989)	4.5%	6.0%	50.2%	3.0%
4)	Toronto Central South	347,920	58,643 (21,845-186,805)	8.7%	7.6%	60.2%	4.8%
5)	Toronto East	593,265	61,155 (27,000-117,874)	9.8%	7.7%	37.7%	5.8%
Total		2,481,430	69,125 (21,845-423,989)	10.8%	7.0%	49.3%	5.1%
High/Low *		2.2	1.4	4.1	1.4	1.6	2.6
Minor Areas							
1a)	Rexdale	101,395	63,369 (43,280-87,745)	12.3%	6.1%	39.6%	3.8%
1b)	Etobicoke South	215,180	79,790 (30,633-214,918)	8.0%	5.6%	38.3%	2.4%
2a)	Humber-Downsview	252,135	51,301 (30,675-89,250)	18.2%	8.1%	54.9%	6.6%
2b)	York Weston	174,950	50,779 (34,798-80,994)	20.3%	7.1%	52.8%	6.7%
2c)	York Junction	160,210	55,570 (36,866-89,398)	19.1%	7.0%	53.0%	7.9%
2d)	Parkdale	107,380	51,990 (32,700-73,466)	16.1%	7.4%	65.5%	9.9%
3a)	Willowdale	186,095	71,204 (46,372-134,416)	6.4%	7.2%	41.5%	5.1%
3b)	North Toronto – Don Mills	155,290	114,824 (42,620-404,193)	2.9%	5.6%	47.3%	1.7%
3c)	Midtown	187,610	109,638 (32,107-423,989)	4.0%	5.4%	58.7%	1.8%
4a)	Danforth East York	161,775	53,246 (31,003-77,779)	11.0%	7.8%	54.4%	5.4%
4b)	Downtown & Waterfront	186,145	62,490 (21,845-186,805)	6.7%	7.4%	64.3%	4.3%
5a)	Agincourt	173,935	64,042 (43,423-85,291)	12.4%	8.1%	30.3%	11.31%
5b)	Rouge	98,230	77,680 (48,866-117,874)	6.4%	6.4%	22.0%	2.7%
5c)	Scarborough Centre	229,420	53,139 (27,000-79,734)	10.0%	8.3%	47.2%	4.4%
5d)	Scarborough Cliffs	91,680	61,870 (42,489-86,320)	8.0%	7.2%	40.2%	2.2%
Total		2,481,430	69,125 (21,845-423,989)	10.8%	7.0%	49.3%	5.1%
High/Low*		2.8	2.3	7.0	1.5	3.0	6.5

* High/Low is the ratio of the highest to lowest value

Figure 3. Age-/sex-adjusted all-cause mortality, 1996-98, for minor planning areas

Stakeholder involvement in this process occurred through participation of several key agencies in the Toronto Small Planning Areas Advisory Committee and through a series of consultation meetings held across health sectors. This project was approved by the research ethics board at St. Michael's Hospital in Toronto.

Planning area characteristics

The city was divided into 5 major areas ranging in population from 316,575 to 694,675. Each of these 5 areas was further subdivided, creating a total of 15 minor areas with populations ranging from 91,680 to 252,135 (Figure 1). Figure 2 shows the minor health plan-

ning areas in relation to low-income households.

Socio-demographic characteristics of major and minor health planning areas are found in Table I. The major areas show a moderately high degree of diversity, with a range of low household income from 16.3% to 28.2% of the population (1.7-fold difference) and a 1.4-fold difference in average household income. There is a larger range for the population age 20 years and over with less than grade 9 education (4.1-fold difference) and for no knowledge of official languages (2.6-fold difference). Socio-demographic diversity is even higher in the minor health planning areas than in the major areas, reaching a 7.0-fold difference for the population age 20 years and over with less than grade 9 education and a 6.5-fold difference for no knowledge of official languages.

All-cause mortality differences of 1.2-fold for females and 1.5-fold for males are found across major planning areas (Figure 3). Similarly, self-reported health status shows a 1.2-fold difference for those rating their health as excellent/very good and low birthweight has a 1.4-fold difference (Table II). As with socio-demographic characteristics, there is a larger range of mortality, self-reported health status and low birthweight values across minor plan-

ning areas than across major ones (Figure 3, Table II).

Implications

This study is among the first to adopt a population-based approach, using census tracts as the unit of analysis and income homogeneity as a guiding principle, to divide an urban area into geographically contiguous areas for health planning. These approaches and methods are likely to be of relevance for health planners in Canadian and other urban settings globally.

We faced several challenges in the process of dividing a large urban centre into meaningful planning areas, including incompatibility of geographic units, lack of sociodemographic homogeneity in large areas, and data quality limitations. One consequence of choosing the CT as a building block was the challenge of compatibility between CTs and FSAs, which are often used by health providers. To facilitate conversion from postal codes to planning areas, updated versions of the Postal Code Conversion File Plus (PCCF+)⁹ contain Toronto health planning areas and an Excel look-up table of postal codes and planning areas is being developed.

Minor planning areas are considerably smaller, more homogeneous, and better reflect health-related population differences than major planning areas. The major planning areas, however, are desirable for certain kinds of health reporting, such as comparisons between Toronto and other Canadian cities and for sampling and reporting for provincial and national surveys. The major planning areas provide good separation of population characteristics and reasonable separation of health status and rates of health care utilization. They are much more internally homogeneous than the six cities that were dissolved with amalgamation.

Data limitations included missing postal codes for Ontario births and deaths, lack of sub-metropolitan public-use data from national surveys, and outdated addresses for ambulatory utilization data.¹⁰

Stakeholder consultations generated positive responses to the methods employed and usefulness of the areas. Providers that use service-based planning and those with catchment areas that extend beyond the

TABLE II

Health Status – Self-reported Health 2000/2001 & Singleton Low Birthweight 1996/97 for Major and Minor Planning Areas

Major Areas	Self-reported Health Excellent/Very Good (95% CI)	% Low Birthweight
1) Toronto West	65.2 (59.3, 71.1)	5.1% (4.6, 5.6)
2) Toronto Central West	56.8 (52.0, 61.6)	5.8% (5.5, 6.2)
3) Toronto Central East	66.8 (62.6, 70.9)	4.2% (3.8, 4.6)
4) Toronto Central South	66.8 (61.7, 71.9)	5.2% (4.8, 5.7)
5) Toronto East	67.7 (62.7, 72.8)	5.9% (5.5, 6.3)
Total	63.8 (61.5, 66.1)	5.4% (5.2, 5.6)
High/Low*	1.2	1.4
Minor Areas		
1a) Rexdale	64.5 (50.2, 78.8)	6.7% (6.4, 6.9)
1b) Etobicoke South	65.5 (59.2, 71.9)	4.1% (4.0, 4.2)
2a) Humber-Downsview	56.6 (48.7, 64.6)	6.9% (6.7, 7.0)
2b) York West	54.8 (44.1, 65.4)	5.7% (5.6, 5.9)
2c) York Junction	58.9 (49.8, 68.1)	4.8% (4.8, 5.0)
2d) Parkdale	56.7 (43.1, 70.4)	4.5% (4.7, 5.0)
3a) Willowdale	61.7 (54.3, 69.1)	4.7% (4.4, 4.7)
3b) North Toronto – Don Mills	71.8 (65.3, 78.3)	4.2% (4.1, 4.3)
3c) Midtown	67.1 (59.8, 74.5)	3.8% (3.6, 3.9)
4a) Danforth – East York	68.9 (59.3, 78.6)	5.5% (5.3, 5.6)
4b) Downtown & Waterfront	65.5 (59.1, 72.0)	5.0% (4.9, 5.2)
5a) Agincourt	63.8 (55.9, 71.7)	5.3% (5.1, 5.4)
5b) Rouge	77.3 (66.5, 88.2)	6.1% (5.9, 6.4)
5c) Scarborough Centre	66.3 (57.8, 74.8)	6.2% (6.0, 6.3)
5d) Scarborough Cliffs	68.7 (54.4, 83.0)	5.6% (5.4, 5.9)
Total	63.8 (61.5, 66.1)	5.4% (5.3, 5.4)
High/Low*	1.4	1.8

Source: Statistics Canada, Michel B. Seguin, CCHS 2000/2001; Toronto Public Health, Low Birth Weight data 1996/1997

* High/Low is the ratio of the highest to lowest value

boundaries of Toronto noted these limitations to their use of the new areas. Although some of the agencies consulted had public representation, we were unfortunately unable to conduct a comprehensive public consultation.

CONCLUSION

A process to divide a large Canadian urban area into meaningful health planning units is feasible. It has potential for enhancing collaboration across health sectors through

use of compatible planning areas, facilitating evaluation and ongoing monitoring of health equity, and improving capacity to perform intra- and inter-urban comparisons. While the long-term uptake and utility of these health planning areas is not yet known, they appear to be a needed step toward appropriate planning and evaluation of health and health services in Canada's largest urban centre and may serve as a model for similar processes elsewhere.

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RÉSUMÉ

La communication des données liées à la santé pour les grandes zones urbaines présente plusieurs défis. À Toronto (Ontario) par exemple, la fusion de six subdivisions de recensement en une seule mégapole, en 1998, a entraîné la suppression des unités déclarantes standard. On a adopté une approche fondée sur la population pour délimiter les nouvelles zones de planification des services de santé. Les secteurs de recensement ont servi de composantes de base et ont été combinés selon la répartition résidentielle en fonction du revenu (de manière à respecter les limites naturelles et artificielles) pour favoriser les zones de tri et les quartiers communautaires de la ville de Toronto, lorsque cela était possible. On s'est appuyé sur des corrélations et des cartes pour délimiter les zones. La ville a été divisée en cinq zones principales de planification, par la suite subdivisées en 15 zones secondaires. L'observation des zones principales et secondaires met en évidence des différences notables à l'égard des caractéristiques de la population, de son état de santé et de son utilisation des services de santé. Ces observations indiquent la faisabilité d'une telle entreprise et présentent les résultats d'une méthode d'établissement des zones de planification et de secteurs de déclaration dans les grands centres urbains. Les prochaines étapes viseront la production d'autres données liées à la santé pour ces zones, la réalisation d'analyses comparatives avec d'autres zones urbaines canadiennes et l'application de ces méthodes aux réseaux locaux d'intégration des services de santé, dont la création a été récemment annoncée par le gouvernement de l'Ontario. Ces zones peuvent servir à la planification et à l'évaluation des modes de prestation des services de santé, à la réalisation d'analyses comparatives avec d'autres zones urbaines canadiennes et à la surveillance et la promotion continues de l'équité dans le domaine de la santé.

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