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Measuring Population Growth in Canada's Central Living Neighbourhoods

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Context

Canada is a highly urbanized country, with a majority of the population living in larger urban population centres. Over seven-tenths (71.0%) of Canadians lived in census metropolitan areas (CMAs) in 2016, up from 70.2% in 2011 and 69.2% in 2006. In addition, the growth of the Canadian population living in CMAs outpaced the growths of those who did not live in CMAs and the overall Canadian population between both 2006-2011 and 2011-2016.

Of course this growth is not homogenous among Canadian CMAs, neither is it inside those CMAs. For example, the rural areas at the edge of the CMAs grew by 20% on average between 2006 and 2016, while the active cores of the CMAs on average only grew by 9% over that time span[1]. While urban spreading is indeed a phenomenon occurring within CMAs, some smaller areas in older parts of the cities could show dynamic growth as well. With its blend of recent condo towers and older neighbourhoods (to varying degrees for each CMAs), downtown may be the most intriguing of these areas to explore. Is the phenomenon of urban spread impacting some of Canada's largest cities, is the population living in downtowns and their surrounding living areas growing at a slower pace than their outlying areas?

But the definition of a downtown and its surrounding living area is elusive and can take on different meanings over different eras in different cities. So how does one then define and measure the downtown area? This article aims to identify the downtowns of 12 Canadian CMAs in Canada and their surrounding neighbourhoods by the use of a methodology based on the concentration of workers, and then compare the population growths of these areas between themselves and with other areas of the CMAs.

Data and Methodology

This research uses the *place of work* variable from the 2006, 2011 and 2016 short-form censuses. The dissemination area (DA) was chosen as the geographic area to delineate the downtown and its surrounding area for this analysis mainly because DAs are the smallest standard geographic area for which detailed census data are disseminated.

Job-density levels of census dissemination areas were calculated to replicate the methodology of the Local Employment Dynamics[2] to correspond to the irregular and idiosyncratic shapes of

[1] Gordon, D. L., Hindrichs, L., & Willms, C. (2018). Still Suburban? Growth in Canadian Suburbs, 2006-2016. Toronto: Council for Canadian Urbanism.

[2] Levy, P. R., & Gilchrist, L. M. (2014). Downtown Rebirth: Documenting the Live-Work Dynamic in 21st Century U.S. Cities. Philadelphia: International Downtown Association.

commercial areas to produce downtowns and their surrounding one-kilometer buffer area termed the central living neighbourhood (CLN). Using the Vancouver CMA as an example, Figure 1 defines the process in defining the downtown areas. Map 1 demonstrates why some other methodologies available are less efficient in order to select the right DAs to form a downtown. It first presents the number of workers per square kilometer in each DA of the 12 selected CMAs, using Jenks natural breaks[3] to build the five categories. One way to form the downtown area would have been to select every DA from the fifth category (the category with the highest density of workers), but that would have implied including some non-contiguous DAs. On the other hand, selecting only contiguous DAs would potentially mean leaving some dense working areas out of the downtown. Secondly, the map illustrates the limitations of defining a downtown by a radius around the city hall (in this case 1,000 meters), as used previously by the U.S. Census Bureau (U.S. Census Bureau, 2012), namely that the city hall is not necessarily situated in the main business areas.

In order to use the LED methodology, the number of workers by DA were converted in random points (Map 2). This allowed for the use of the Kernel density tool, which outputs a density surface visualized using a gradient that easily identified the areas with the highest concentration of workers (Map 3) (ArcGIS Pro, 2018). The density surface was set with five categories, and an empirical evaluation of the 12 CMAs showed that the three densest categories best represented the downtown. This ensured that the downtown areas were similar to those from the LED study, for metropolitan centres of similar population size. Every DA whose centroid (indicated by the black dot) fell inside the surface was selected as the downtown area (Map 4).

Once the downtown areas were selected, a buffer analysis[4] was performed (Map 5). DAs whose centroid fell within a 500m distance from the downtown boundary formed the half-kilometer area, and those with a centroid between 500m and 1,000m from the downtown formed the one-kilometer area. These buffer areas were important because the downtown and the encompassing half-kilometer and one-kilometer living areas of the downtown made up the central living neighbourhood (CLN). The CLN is the primary area used in this analysis to compare population changes against that of the CMAs and CSDs[5]. Figure 2 shows an example of the maps created to represent the CLN of each of the 12 CMAs selected. Lastly, populations for each category of the CLNs were calculated by summing the populations of their respective DAs, using data from the 2006, 2011 and 2016 short-form censuses[6].

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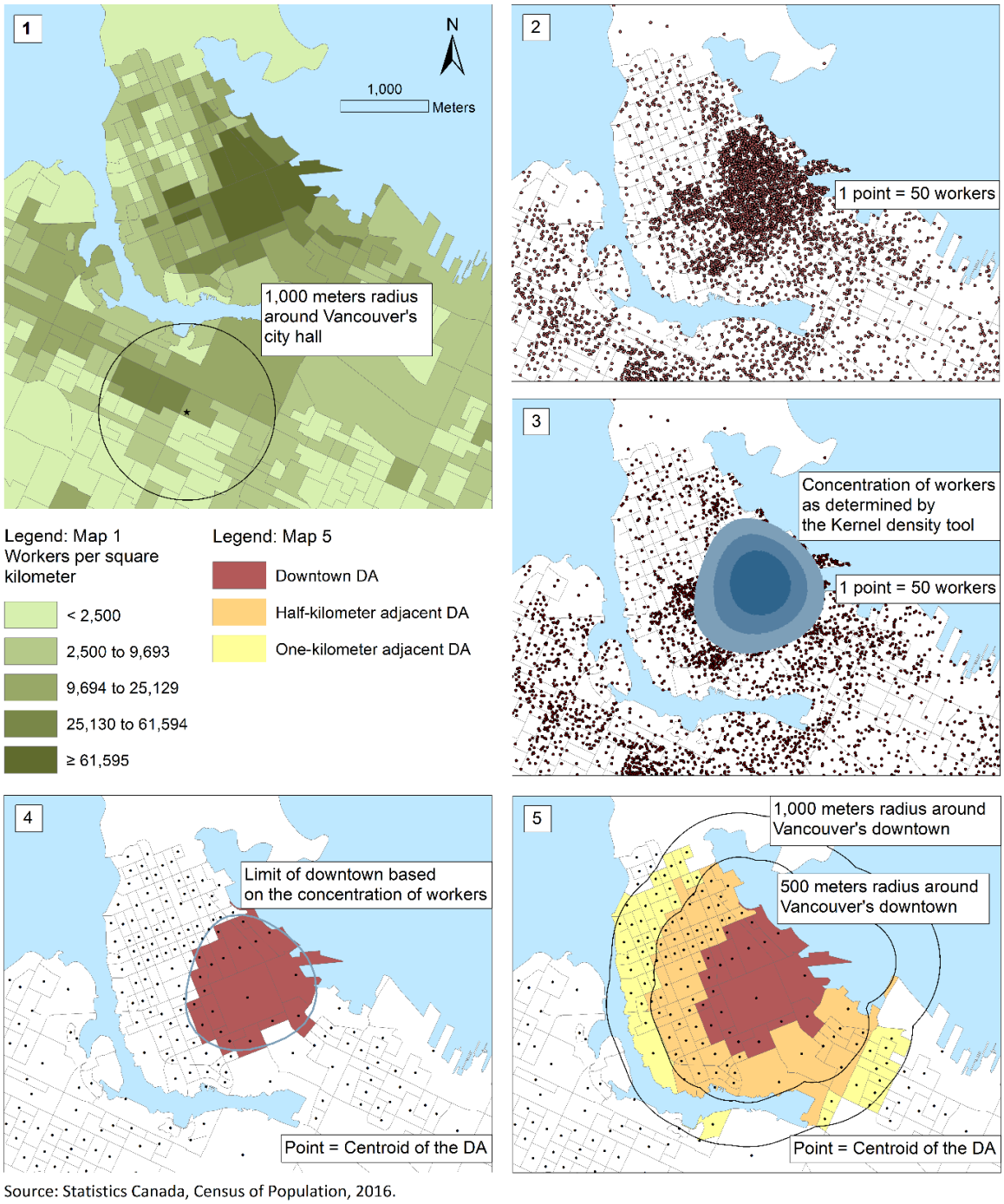
[3] Natural break classes are based on natural groupings inherent in the data. Class breaks are identified that best group similar values and that maximize the difference between classes (ArcGIS Pro, 2018).

[4] A buffer analysis is the process of defining a zone surrounding an object on a map, typically measured in distance. In this case, a buffer of 500m and 1,000m was performed around the DAs' centroid of the downtown.

[5] Note: the central living neighbourhood (the sum of population living in the downtown, and the encompassing half-kilometer and one-kilometer living areas) was chosen to compare against the CMAs and CSDs and not just the downtown. Since the downtown area's land size was relatively small and may not have accurately depicted all the people living in the most central district of the CMA (due to the density of commercial and office buildings where people do not live), it was decided to use the population of people living downtown and within one-kilometer of the downtown to compare against the CMAs and CSDs.

[6] The 2006, 2011 and 2016 short-form censuses were preferred to the long-form because the short form covers the whole population. The "census long-form includes the same target population as the short-form census, with the exception of Canadian citizens living temporarily in other countries; full-time members of the Canadian Forces

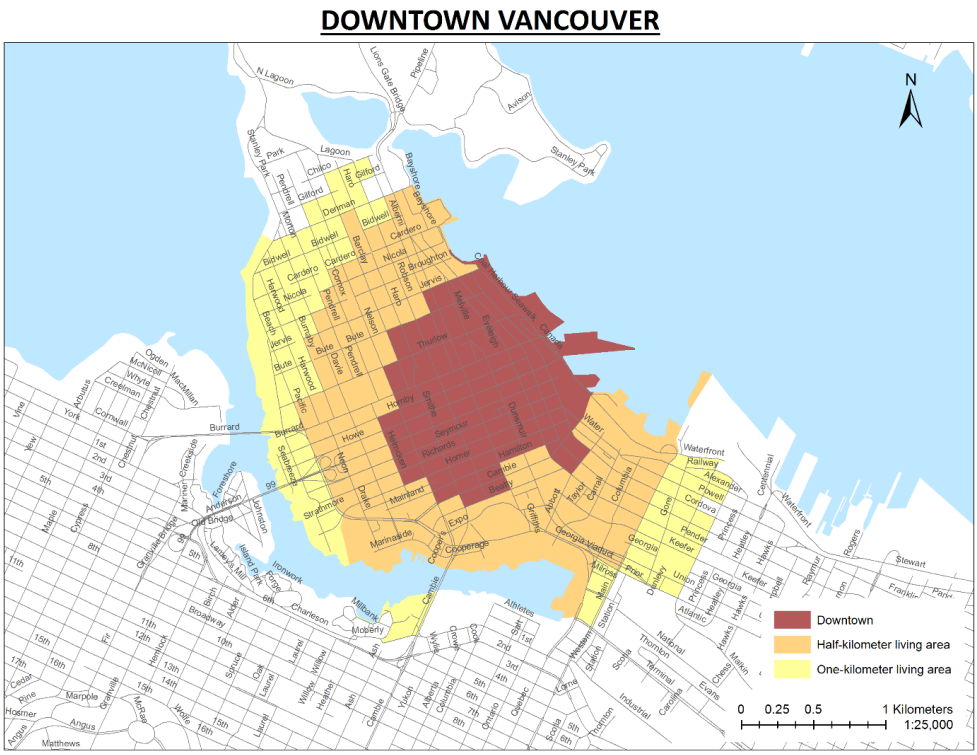
Figure 1
Process in defining the downtown area using the place of work variable, by dissemination area (DA), Vancouver



Source: Statistics Canada, Census of Population, 2016.

stationed outside Canada; persons living in institutional collective dwellings such as hospitals, nursing homes and penitentiaries; and persons living in non-institutional collective dwellings such as work camps, hotels and motels, and student residences" (Statistics Canada, 2017).

Figure 2 – Central living neighbourhood (CLN), Vancouver



Source: Statistics Canada, Census of Population, 2016.

Results

Preliminary findings indicate that the CLN's population in some of Canada's largest CMAs, most notably Toronto, Montréal and Vancouver, were increasing at a faster rate than their respective CMAs. In contrast, the population of the CLNs in some of the least populated CMAs studied were declining, while the CMA population still rose.

Furthermore, the downtown part of the CLNs were found to be the fastest growing area analyzed in the majority of CMAs studied when compared with the growth of the half-kilometer and one-kilometer living areas, the CLN as a whole, the CSDs and the CMAs themselves. This growth was more prevalent in some of the most populated CMAs, notably in Toronto, with a 46.1% growth rate between 2011 and 2016.

Table 1 – The 12 central living neighbourhoods (CLN) and their respective census metropolitan area (CMA) population growth between 2006-2011 and 2011-2016

CMA	Sum of 2011-2016 Population change (%)		Sum of 2006-2011 Population change (%)	
	CLN	CMA	CLN	CMA
Toronto	**24.5%**	6.2%	**27.4%**	9.2%
Vancouver	**14.4%**	6.5%	8.0%	**9.3%**
Montréal	**10.7%**	4.2%	**7.3%**	5.1%
Calgary	9.9%	**14.6%**	4.0%	**12.6%**
Ottawa - Gatineau (Ontario part)	**8.1%**	5.9%	1.1%	**8.7%**
Winnipeg	5.0%	**6.6%**	1.4%	**5.1%**
Edmonton	2.5%	**13.9%**	4.0%	**12.1%**
Halifax	0.9%	**3.3%**	**4.9%**	4.7%
Charlottetown (CA)	0.2%	**5.8%**	1.8%	**8.5%**
Saskatoon	-0.7%	**12.5%**	3.4%	**11.4%**
Moncton	-3.7%	**4.0%**	-3.5%	**9.6%**
St. John's	-4.7%	**4.6%**	-1.4%	**8.7%**

Figure 3 – Population change (%) of central living neighbourhoods, downtowns, half-kilometer and one-kilometer living areas of CMAs studied, from 2011 to 2016, Canada

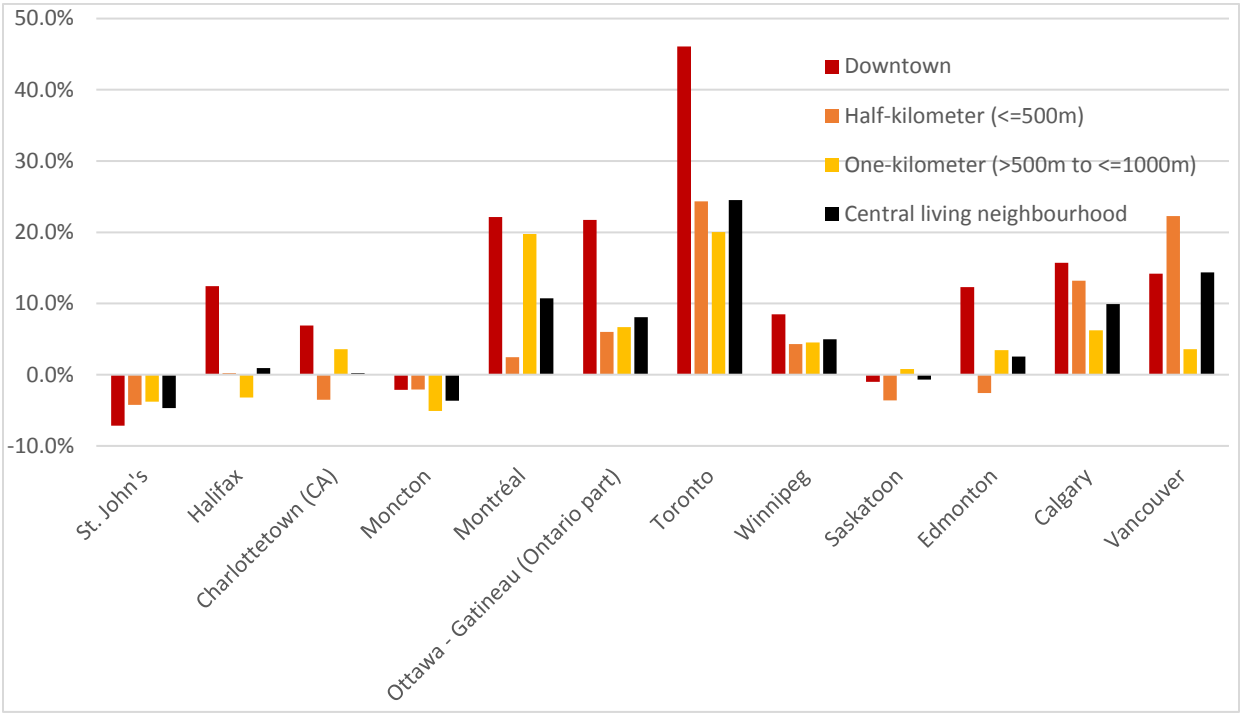
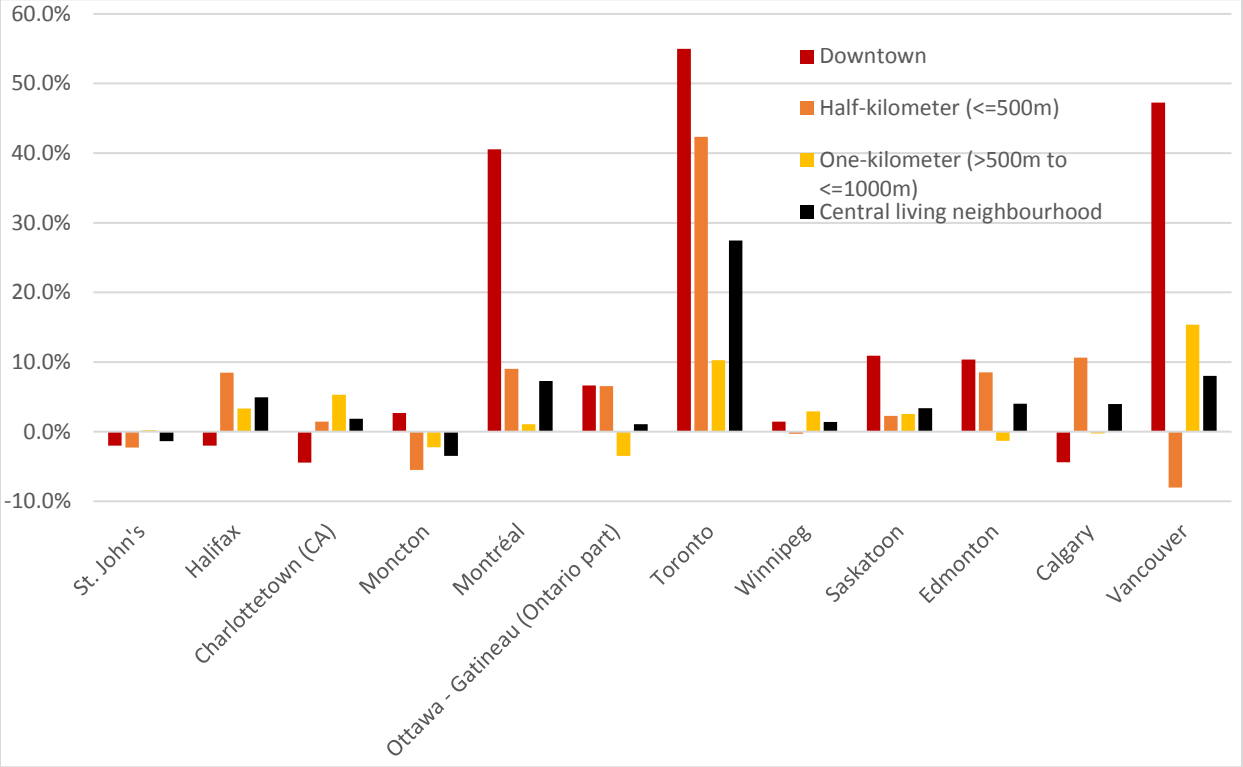


Figure 4 – Population change (%) of central living neighbourhoods, downtowns, half-kilometer and one-kilometer living areas of CMAs studied, from 2006 to 2011, Canada



Even with the phenomenon of urban spread, the CLNs surrounding the clusters of dense commercial business areas in some of the most populated CMAs were experiencing relatively fast population growth. The fact that there is this sustained population growth in the downtowns and their surrounding areas does not mean that the urban spread trend reversed. It should be clear that urban spread is still an ongoing phenomenon, even if paradoxically, the most central neighbourhoods are showing high population growth rates. To understand more about the CLNs and their varying growths, further socio-economic analysis of more encompassing indicators on the CLN areas of these CMAs (and potentially more) will come in future articles.

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