

**Suburban National Capital:
A pilot study of Canada's post-1945 suburbs in Ottawa-Hull**

David L. A. Gordon and Chris Vandyk

ABSTRACT:

We routinely hear that Canada is one of the most urbanized nations (80%+), but all that tells us is that less than 20 % of Canadians live in rural areas. Most Canadians live in post-1945 suburbs. This research project estimates the size and growth rate of Canada's suburban population and considers the policy implications associated with these historic trends. Of course, the size of the suburban population will depend upon the definition of a suburb, and there is currently no standard definition. Suburbia is a loosely defined concept.

The method for this paper involved analysis of census information from 1946 to 2006 for a pilot study in Ottawa-Hull. Multiple definitions of suburbia were tested with a Geographical Information System (GIS) and Google Earth, guided by different suburban policy interests (i.e. housing, transportation, density). The preliminary results from the proposed definitions indicate that a surprisingly large proportion of Canadians live in post-1945 suburban environments.

BIOGRAPHICAL NOTE:

David Gordon is Professor and Director of the School of Urban and Regional Planning at Queen's University. His latest books are *Planning 20th Century Capital Cities* (Routledge 2006; 2010) and *Planning Canadian Communities* (Nelson 2008, with Gerald Hodge) Professor Gordon's current research is on the extent of Canadian suburbs and on the planning history of Canada's national capital, with a major book due in 2011. He is a director of the International Planning History Society.

Christopher Vandyk is a real property analyst with Correctional Services Canada. He is a native of Ottawa and holds a Master of Urban and Regional Planning from Queen's University

Submission ID: 333

CONTACT DETAILS:

David L. A. Gordon
School of Urban and Regional Planning
Queen's University
Kingston ON Canada K7L 3N6
Email: david.gordon@queensu.ca
Phone: 1-613-533-2188

Introduction

This paper reports on a pilot project for a larger research program that will estimate the size and growth rate of Canada's suburban population and consider the policy implications associated with these trends.

Although the Canadian urban population is now estimated at approximately 80% (Statistics Canada 2007), this category includes downtown, inner-city and suburban development. Our rough calculations indicate that perhaps half the Canadian population live in neighbourhoods that most observers would consider suburban (i.e. auto-dependant and lots of post-war single homes).

So "urban" is too broad a category for community planning, since centre-city planning problems (intensification, brownfields, etc.) are often different from suburban ones (resource conservation, auto independence). We do not need an exact count of suburban households for practical policy making. However, an improved estimate of the proportion and rate of growth of the Canadian suburban population may be immediately useful for shaping a federal urban infrastructure programme, for example.

Context for the Research Programme

The primary research method for this project is analysis of the 1996-2006 census information and selected previous years to 1951. The coverage for 1996-2006 will be all 33 Census Metropolitan Areas (CMAs). The Canadian census is the obvious source of data for this research, since it collects data on housing type, population characteristics and (recently) the mode of transportation to work.

The principal difficulty in estimating the extent of suburban development is defining the phenomenon. There is currently no standard definition and it is unlikely that a single definition would fit all policy analysis requirements. But there is no reason why working definition(s) could not be developed to help consider the policy implications of suburbia.

Other imprecise concepts such as "urban", "inner-city" and "downtown" (Ley & Frost 2006) have been measured and compared for years, as discussed below. This project will use expert judgement to refine and evaluate several working definitions of suburbia to help deal with this difficulty. The objective is to produce several "roughly correct" definitions for practical policy making, similar to Statistics Canada's recent set of five definitions for rural population (du Plessis et al., 2001; 2002).

Suburbs Literature Context

We have a good literature on how Canada became an urban nation, summarized by McCann and Smith (1991) and a precise method of measuring urban population (Stone 1967). The first census when the urban population exceeded the rural was 1931, which means that Canada likely was an urban nation for only about a half-century, since preliminary calculations indicate that many CMAs became majority suburban during the 1980s.

The pre-World War II urban areas had suburbs, of course, with pleasant neighbourhoods of mainly single detached homes within walking distance of the central city in the nineteenth century and streetcar suburbs in the early twentieth century (McCann 1996; 1999). Some superb historical scholarship by Richard Harris has demonstrated that there was considerable

diversity in these pre-war neighbourhoods, including unplanned suburbs where working class citizens would build their own homes (Harris 1996; 2004; Harris & Larkham 1999).

In contrast, the scale and delivery of suburban development changed rapidly after 1945, as the federal government encouraged mass home ownership with long-term mortgages at the same time as automobile ownership soared. Large-scale land developers emerged, capable of building entire satellite communities, with Don Mills as an influential example (Hancock 1994; Sewell 1993). This new version of suburbia proved to be quite popular and these automobile-dependent neighbourhoods expanded to comprise half of our urban population in a remarkably short time - perhaps as early as 1981.

Post-war suburban expansion was not unique to Canada, of course – the United States also saw rapid and wide-scale emergence of low density, automobile-oriented suburban neighbourhoods (Beauregard 2006; Hayden 2003; Lucy 2006). The broad extent of American suburban expansion was attacked as urban sprawl (Burchell et al 2002; Duany, Plater-Zyberk & Speck 2000, Kunstler 1993) or dangerous to public health (Frank & Frumkin 2004), while others suggested it was a preferred lifestyle and reflection of market demand (Bourne 2001; Breugmann 2005; Gordon and Richardson 1997).

There is a large literature on the geography of the suburban expansion of Canadian cities (Bourne & Ley 1993; Bunting & Filion 1999; 2006; Bunting, Filion & Priston; and Smith 2006;) and a growing literature on planning Canadian suburbs (Grant 2007; 2006; 2004; Filion & McSpurren 2007; Filion 2001; Friedman 2002; Tamminga 1996). Unfortunately, the scholars of the history, geography and planning of Canadian suburbs do not appear to have produced an estimate of the extent of this phenomena similar to our estimates of urban and rural population.

Analytic Methods:

Previous research (Mendelson 2001; Talen 2003) has indicated that measuring urbanization requires careful attention to methodological issues, even for relatively simple calculations like the ones proposed for this project. Some interesting approaches to the measurement of suburbs have emerged recently (Bagley et al., 2002; Katz & Lang; Parr 2007; Song & Knapp 2007) but these mostly deal with survey data collected for specific sites, rather than census information that could be used across a diverse country. Statistics Canada developed a variety of techniques for estimating the size of rural population using census data (du Plessis et al. 2002; 2001), recommending that policy analysts use the definition that most closely fits the problem they are addressing.

Some initial methodological considerations can be extracted from the literature. Using political boundaries of urban and suburban municipalities likely will not work, due to varying municipal governance structures and annexations (Parr 2007). Instead, the census tract (CT) programme is the ideal level of analysis for urban planning purposes at the neighbourhood level (Leung 2003, Ch. 4). The 1951 start for census tracts fits the post-war era's rapid expansion of suburban development (Harris 2004; Hodge & Gordon 2007, Ch. 5). Although there may be smaller variations within census tracts, the boundaries have been carefully selected to fit relatively homogeneous neighbourhoods, with an average population of about 5,000. The CT boundaries are also stable – they may split after growth, but they rarely change, making time-series analysis much easier.

Secondly, density and distance from the centre city have been found to be important variables in suburban transportation analysis (Boarnet & Crane 2001, Ewing and Cervero 2001; Filion & McSpurren 2007; Heisz & Larochelle-Côté 2005). However, gross population density is difficult to measure in a comparable manner due to the presence of employment areas, water bodies, and environmental protection areas (Gordon & Vipond 2005) and density gradients have been changing across Canadian metropolitan areas (Filion et al 2004; 1999).

Another potential method to define the inner city / suburban divide might be to take a morphological approach to the built form of neighbourhoods within the metropolitan area (Whitehand & Carr 2001; Filion & Hammond 2003). This might be done relatively simply with housing type data at the census tract level (Walks 2007).

The research team built a simple model to map suburban definitions at the census tract level, using a Geographic Information System (GIS). Google Earth was used to check the morphology of neighbourhoods that straddle the inner-city/suburb divide.

Ottawa- Gatineau CMA Pilot Study

A pilot study of this technique was completed using the Ottawa-Gatineau CMA. Historical analyses will be performed for those CMAs with census tracts going back to 1951. We mapped the expansion of the suburban neighbourhoods from 1951-2006.

The pilot project used information gathered through the identification and testing of practical suburban definitions to determine the proportion of the population that live in suburban developments within the Ottawa-Gatineau CMA. Historical trends associated with the prevalence of suburban development were also examined, in order to determine if and when the Ottawa-Gatineau CMA became primarily suburban.

In order to effectively identify the proportion of people living in suburban development, as well as the historical point at which the shift to a suburban dominant metropolitan was made, it was necessary to use GIS mapping techniques applied to Canadian census data, local air photos and satellite imagery. The method used for this study required an iterative process that examined several sets of neighbourhood classification definitions, which were analysed for effectiveness in identifying suburban development.

Air photo interpretation of typical suburban characteristics were used to compare of the various classification schemes. The results of these comparisons reveals that the built form classification scheme provides a more accurate and intuitive representation of typical post-war suburban development than the method suggested by Statistics Canada (Turcotte, 2008).

The pilot study suggested that a more effective way of classifying suburban census tracts used a set of built form criteria.

Table 1. Built form classification criteria

Characteristic	Criteria	Inclusion / Exclusion
Inner City	CT pre-1946 housing stock greater than CMA average	Exclusion
Rural	Less than or equal to 105 people per sq km	Exclusion
Unit Mix Ratio (Incl. Attached)	66-100% of a CT's dwellings is singles, semis, and attached.	Inclusion
Post-WWII (1946) Ratio	25% or greater of a CT's dwellings are built post-1946	Inclusion
Ownership Ratio	55% or greater of a CT's dwellings are owned	Inclusion

This classification scheme does an adequate job in identifying modern suburbs, but could be improved to pickup more mature suburban neighbourhoods, adjacent to the inner city. Mature CTs are typically found closer to the inner city of the CMA, and in most cases are located within the suburban selection zone¹. This observation suggests that suburban CTs can be further classified into two styles of suburban development: a modern suburb, and an inner suburb. The inner suburb seems to classify neighbourhoods that were earlier considered to be a suburb, but over time have been blended into the fringe of the inner city. Suggesting that CTs classified as suburban at any time, will always maintain suburban development characteristics even as the rural fringe moves away from the city centre (Figure 1).

As shown in Table 2- the results of the built form classification scheme, as well as the concept of the inner suburb, it was determined that approximately 71% of the CMA's population in 2001 lived in suburban type census tracts.

Table 2. Modern and Inner Suburbs 1991-2001

Year	Criteria	Unit Mix Ratio	Ownership Ratio	Post-1946 Ratio	CMA Area (sq Km)	% of CMA Area	Total Population	% of CMA Population
1991	Revised/ Modern Suburbs	73%	79%	97%	257	6%	362,154	39%
	Inner Suburbs	33%	39%	94%	99	2%	244,765	27%
2001	Revised/ Modern Suburbs	69%	83%	98%	387	8%	498,556	47%
	Inner Suburbs	31%	40%	94%	105	2%	260,495	24%

Conclusions and Limitations

The difficulty with establishing a universal classification scheme for suburbs within a CMA exists because a standard set of criteria must be established for a rather flexible concept. Determining a standard set of criteria for identifying suburban development should, ultimately, enable an analysis of a variety of CMAs across the country. The results of this pilot project show some promise for application on a larger scale, especially in the definition of inner city and rural zones. However, the inclusion of criteria such as town houses and row homes may be more relevant to the nature of post-war suburban housing in the Ottawa-Gatineau CMA, rather than the entire

¹ The suburban selection zone is delimited by the area of the CMA that is not excluded using either the rural definition of 105 people per sq. km or inner city designation as defined by Ley.

country. More specifically, the inclusion of high-density dwellings in the suburban unit mix ratio could be due to a real estate situation that is unique to the more modest income distribution of the Ottawa-Gatineau CMA. This classification method should be examined closely in other CMAs.

The analytic process revealed that in the 1950's and 1960's the percentage of single detached dwellings was a representative characteristic of suburban development. Towards the end of the study period, it was revealed that town homes and apartments were much more prevalent components of typical suburban communities like Kanata, Barrhaven, and Beacon Hill. Given this finding, it should be noted that built form classification schemes based solely on the percentage of single-detached homes may not be effective in identifying more modern suburban communities.

The built form classification scheme made good use of David Ley's (2000) definition of inner city. By defining the inner city as the census tract which have an average build year older than that of the CMA average, it was revealed that the progressive expansion of the inner city occurred as expected, producing a chronology of inner city growth during the study period. This exclusion criterion proved to be an essential and robust component of suburban classification, and consequently should be considered as a foundation for any further related research.

Another essential component of the built form classification scheme was the exclusion of rural census tracts within the CMA. In applying a density criterion of 105 people per square kilometre (Ohio State University, 2002), it was revealed that many of the larger census tracts located on the periphery of the CMA exhibited similar characteristics of rural areas. This density criterion produced seemingly consistent results throughout the different census years, and should also be useful in establishing the rural/suburban fringe in any further applications.

The rural and inner city exclusion criteria left a ring of undesignated census tracts located between the edge of the inner city and the boundary of the rural areas. The census tracts contained within this region generally exemplified characteristics of either a modern suburban development or of an inner suburb. The identification of the undesignated region between the inner city and rural areas as a 'suburban selection zone' could be valuable when examining other Canadian CMAs.

In addition to excluding inner city and rural areas, it would also be prudent to include the use of digital air photos interpretation as a form of site verification of anomalies in further research. The ability to evaluate varying types of land uses within a census tract proved to be an invaluable tool in analysis of various anomalies found throughout the classification results. Google Earth proved to be a useful tool for this task in the Ottawa-Gatineau CMA.

Throughout the literature, density is referred to as an important tool for evaluating the type of development contained within a census tract. Despite the importance of such a tool, it was difficult to incorporate during the evaluation of the classification results, as there were many anomalies associated with oversized census tracts and small residential developments. This particular issue was addressed in the census tracts that contained large parks, or new residential development on the rural fringe that has not been given its own entire census tract.

The historical analysis originally intended for this study, restricted the inclusion of transportation data into the classification scheme, as the data was not available until later census years.

Similar to the concept of density, transportation has been established as an important component to the identification of suburban development, as it provides a method of determining the extent to which the habitants of a particular census tract are dependent on various methods of transportation. In most cases, individuals living within suburban communities rely largely on the automobile, and therefore it would be in most cases prudent to include this type of information when classifying suburban census tracts.

Although this built form classification produced results that appeared to be more reasonable than the statistics Canada proposal, it still left many anomalies. Its complex criteria did not transfer smoothly to other cities. For this reason, we began to explore other classifications based upon travel characteristics rather than built form.

Acknowledgement:

The authors wish to thank Mark Janzen for his assistance in preparing this paper.

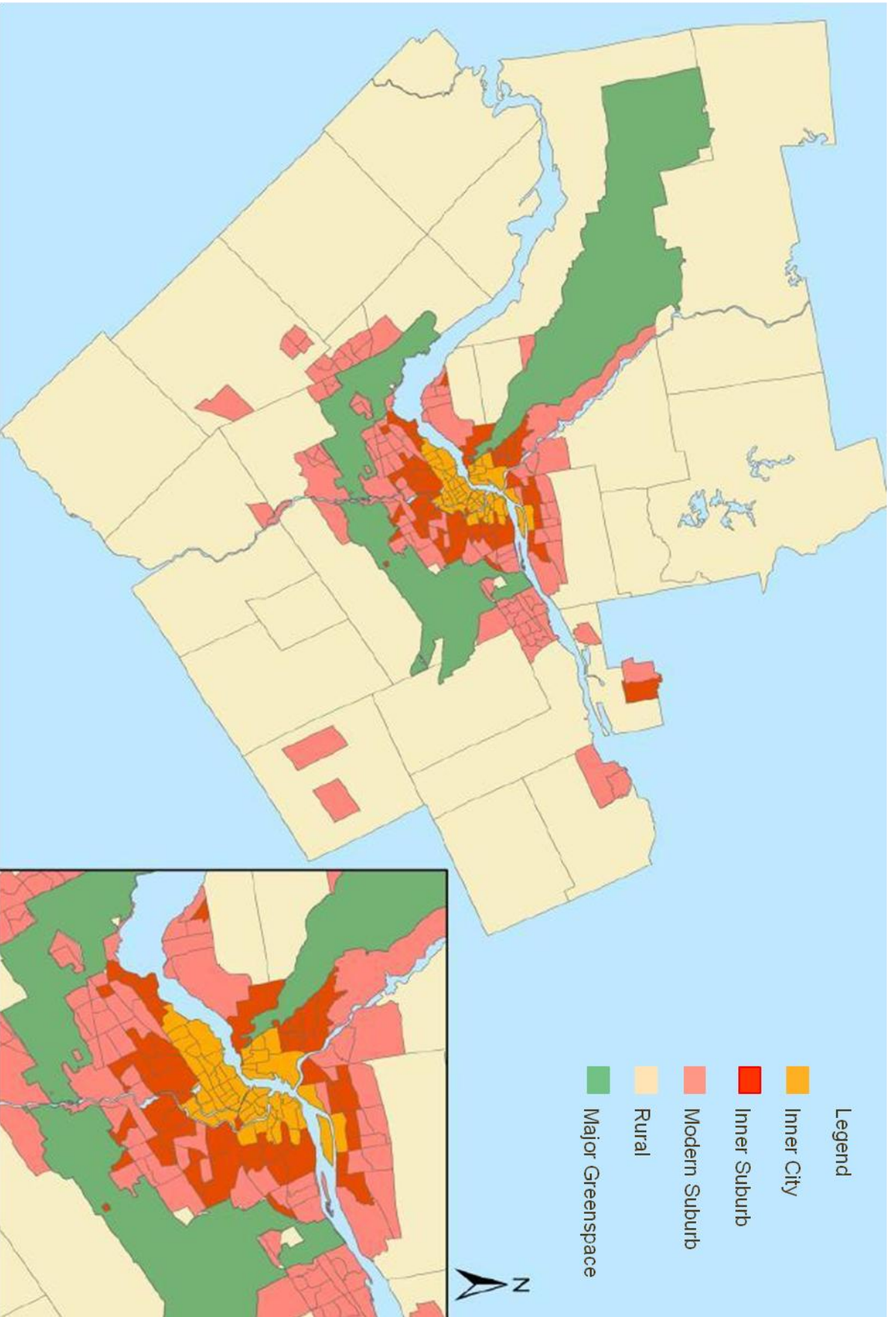


Figure 1

2001 Census / Vandyk

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