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Community Distress
Towards a National Measure

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Abstract

This report developed and tested a proposed Canadian Distress Index (CDI) model capable of exploring distress across and within Canadian cities. The proposed index is discussed in terms of its ability to inform policy making concerning Canada's urban centres. The report considers a community to be in distress when it displays significantly weaker social, economic, environmental, and physical attributes; and has insufficient internal resources and capacity to respond to those conditions. The report reviews the primary theories that explain and explore distress and are captured broadly within theories of neighbourhood change. It examined national and international precedents for measuring distress, which vary substantively in approach and application with the most comprehensive examples drawing on both qualitative and quantitative information sources. International measurements of urban distress were examined for their capacity to capture a national perspective. From this review it was determined that factor analysis would be a useful analytical tool. Twenty-four variables were drawn from the Census of Canada. Following a series of preliminary analytical steps, factor analysis was then used to develop the final models variables representing four domains comprising the Canadian distress index (CDI). Final weightings for each of the domains were proposed using statistical tests. The CDI model was then tested using 10 cities and 2500 census tracts to produce rankings of the cities and census tracts for both their composite score and also how they ranked among the four domains. It was determined that the composite ranking provides a glimpse into relevant factors, but that a local context would be necessary to fully interpret the results. This might involve the review of more local qualitative data or opinions from local experts to help understand the local contributors to distress. The Index was found effective in comparing cities within tiers in the urban hierarchy, but less capable of comparing cities across tiers.

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Executive Summary

This document reports on the development and testing of a proposed Canadian Distress Index (CDI) capable of exploring urban economic, social and physical distress across and within Canadian cities. The following is a summary of the processes examined and the key findings offered in the development of the CDI model. It is separated into four sections (conceptualizing distress; measuring distress; testing distress; and recommendations for moving forward).

Conceptualizing Distress:

- A community is thought to experience distress when it displays significantly weaker social, economic, environmental, and physical attributes; and has insufficient internal resources and capacity to respond to those conditions.

- Community distress is complex and dynamic process contributing to a community's ability to respond to or succumb to the characteristics associated with it.

- The primary theories that explain and explore distress are captured broadly within neighbourhood change and explored in this report within three key areas: ecological, sub-cultural and political economy theories.

Measuring Distress:

- National and International measures of distress vary substantively in approach and application with the most comprehensive examples drawing from both qualitative and quantitative sources of information.

- Assessing local influences at the neighbourhood level is a crucial step but is the most costly and least practical when working at a national scale.

- While methodological approaches vary quantitative measures that include composite indexes or rankings of neighbourhoods or cities are commonly used to assess distress or urban deprivation.

Testing Distress:

- International examples of urban distress measures were examined for their capacity to capture a national perspective. From this review it was determined that factor analysis was a useful analytical tool that had been successfully used elsewhere by researchers and communities.

- To develop and test a model of distress, it was determined that 24 variables, drawn from the Census of Canada, met the criteria for inclusion.

- Following a series of preliminary analytical steps, factor analysis was then used to develop two models consisting of variables representing four domains comprising the Canadian distress index (CDI) model.

- Final weightings for each of the domains for each model were proposed using statistical tests.

- The two CDI models were then tested using 10 cities and 2500 census tracts to produce rankings of the cities and census tracts for both their composite score and also how they ranked among the four domains.

- The overall result is a method of assessing distress that utilizes a composite score or overall ranking initially, then a second step involved a subsequent analysis of the results of the rankings by each of the four domains.

- This second step makes it possible to explore the variables thought to be contributing to the high distress level at both the census tracts and individual city level.

- The rationale behind this second step is to offer a practical means by which policy and program interventions might be better tailored. Moreover, this approach is also thought to offer a more comprehensive understanding of the drivers of distress at the various levels of geography.

- Using Winnipeg as an example, the results of CDI were mapped and shown to correspond to local policy documents that also identifies high need areas.

The Results of the Pilot Test:

- Overall, the pilot study proposed two general measures of community distress that take into account the multi-dimensional nature of the concept by disaggregating the indexes into factors or domains.

- The results for the cities determined that the composite ranking can provide a first glimpse into the factors contributing to high distress.

- Overall, less than 10 percent of the nearly 2600 census tracts used in this analysis were thought to display characteristics associated with high levels of distress

- The results of the factor analysis denoted that a strong relationship existed amongst the indicators considered to be representative of *Poverty*.

- In both models, the dependency ratio and labour force participation rate are particularly relevant for visible minorities and Aboriginal persons. These groups are more likely to have a larger number of children in the household and to include an

extended family of older members. Similarly, they are also more likely to have low participation rates.

- Montreal and Toronto ranked highest among the ten cities with Winnipeg being third.

- The Canadian Distress Index focuses on poverty related to housing and income that was particularly relevant to the experiences of Toronto and Montreal. Because of this emphasis on poverty, these two metropolitan centres had the highest rankings for the composite distress index in comparison to the other pilot study cities.

- The high ranking of Montreal, Toronto, and Winnipeg reveals that the Canadian Distress Index emphasizes the importance of both poverty and marginalization to identify community distress. The significance of poverty and marginalization as indicators of community distress is reinforced by the review of literature.

- Census tracts in both Winnipeg and Regina have high proportions of Aboriginal persons who are over-represented by households living in sub-standard housing

- The subsequent detailed analysis and mapping of the Winnipeg case study revealed a distinct pattern of concentration within the inner city, which is a zone of heightened levels of distress.

- The Winnipeg assessment also strengthened the need to have a localized context to understand the multi-dimensional nature of urban distress.

Recommendations for Moving Forward:

- A spatial representation of the results within each centre would be a valuable tool in identifying the extent to which distress is spatially concentrated. This should take the form of mapping the results and comparing them to locally-derived documents as was demonstrated in pilot test.

- Spatial analysis would also reveal the inequities occurring within centres, for instance displaying (as was the case in Winnipeg), the unique circumstances in inner city areas.

- Exploring the results over a broader timeframe is critical to determining the extent to which distress might be expanding or retracting. This could be done for 1996, 2001 and the forthcoming 2006 Census results.

- Comparing cities across tiers (one, two and three) as was done in this report was useful but it might be more meaningful to compare results within each tier, thereby eliminating the potential dominating influence of Toronto and Montreal and the sheer number of census tracts within these centres.

- Running the results for all Canadian CMAs and CAs would be an important next step to help confirm findings or affirm the above point on separating out centres by size.

- More specific attention is needed to understand and measure distress for smaller communities that lack readily available census tract data, and also for rural areas that were not captured in the pilot test phase of this project, as their characteristics are thought to vary substantively from those of urban centres.

- While the CDI model has, in effect, been established with "default weightings" for each domain, use of this index for specific policy and program objectives might require calibration of these weightings to better suit these purposes.

- A local context is necessary to help interpret the results. This might involve the review of more local qualitative data or opinions from local experts to help understand the local contributors to distress.

1.0 Introduction

Community distress presents an ongoing concern and policy challenge that many Canadian jurisdictions encounter. In some instances distress has led communities down a path of heightened and sustained periods of decline with little hope for recovery. In contrast, other more resilient centres have mobilized their internal resources and capacities to attack their stresses head-on with positive outcomes[1]. Community distress is manifested spatially , most evidently in older inner city neighbourhoods that have struggled with high rates of poverty and disillusionment, among other challenges. Ultimately, any conceptualization of community distress becomes complicated because the factors that have contributed to decline are as varied as the responses enacted to ameliorate the situation.

Responding to community distress has therefore taken the form of many policy and program iterations over the last few decades as community residents, service providers, city planners and all levels of government have tried to come up with both meaningful measures and practical solutions. However, while many cities have implemented policies and programs to address urban issues, distress remains an ongoing challenge across neighbourhoods, districts and city regions. There have also been few attempts to identify distress, by way of statistical models or otherwise, that have extended beyond the individual city. While many jurisdictions have implemented measures of analyzing their own neighbourhoods or districts for the purposes of planning and program delivery, there have been few attempts at a single measure to assess the state of distress across cities or for that matter, Canadian neighbourhoods as a whole.

Therefore, to inform policy makers and to better understand the extent of community distress in Canada, this research effort reports on the findings of a multi-city pilot test, undertaken to assess the potential development of a Canadian community distress index (CDI). The CDI is based on a scan of selected Canadian cities using the census tract as the main geographic unit of analysis. The outcome of this effort is the development of two models that incorporate Statistics Canada based variables within four weighted domains that reflect the key determinates of distress as identified in the literature.

Overall, our approach contends that understanding and measuring community distress is complex matter and that the unique characteristics of the urban milieu make comparison across centres challenging given that each community has its own primary determinants of distress. To this point we offer the following definition of distress that is drawn from the literature and theories and helped ground the present effort:

> *A Community experiences distress when it displays significantly weaker social, economic, environmental, and physical attributes; and has insufficient internal resources and capacity to respond to those conditions*[2].

[1] See the work of Mike Lewis and others at the Centre for Community Enterprise

[2] It is recognized that to assess distress requires the establishment of a benchmark from which to determine whether a community exhibits characteristics of distress.

This research used a ranking scheme to assess each of the ten centres across the four domains to produce a composite ranking. In this approach all cities (or census tracts) were ranked based on the extent to which they displayed characteristics of distress and how these cities or census tracts fare when compared to others.

While the initial ranking provided an important tool for assessing the broad elements of distress, it does not provide the detail necessary to determine what is driving the distress locally, or to identify unique local influences. Therefore, our approach includes a second analytical tool, one which ranks each centre by the four domains. This allows one to view how a given geography's ranking varies by each of the domains, providing a follow-up view. This second view also allows for further discussion and consideration of the specific influences of distress for a given location.

1.1 Objectives

The objective of this project was to identify a grounded approach capable of recognizing and measuring the extent to which Canadian communities exhibit characteristics associated with distress. To achieve this objective the research addressed the following:

- developing a working definition of distress;
- undertaking a review of the theories and approaches that explained the nature, development and "drivers" of distress;
- examining how various cities conceptualize "community distress" – the various "domains" that are part of their measures, the indicators or data variables collected in each domain and their statistical approaches or methods of analysis;
- developing a model capable of identifying distress in Canadian communities;
- pilot-testing the model to refine and calibrate the approach; and
- offering final thoughts and recommendations for future application of the community distress index.

Overall, the intent was to develop, test and utilize measurement and assessment tools of community distress at the most appropriate level of geography, and to determine if these tools offer any predictive capacity of identifying distress across a broad range of geographies.

1.2 Conceptualizing Community Distress

The following elements comprise the basis of our conceptualization of distress and the key considerations used to inform all components of this project. Each point was informed by the literature and theories that have been summarized in the project:

- *Community conditions must be viewed as a continuum between conditions of well-being and distress:* Communities should not be looked at as being either in distress or not in distress, but that features or elements within a community can reflect varying degrees of well-being and distress.

- *Characteristics of distress have a geographic locus*: The characteristics of distress operate at varying geographic scales and may not be confined within a recognized geopolitical unit, such as a neighbourhood or Census tract but can extend to larger units such as the inner city.

- *Distress has multiple socio-spatial characteristics*: Distress comprises characteristics at every unit of social organization (individual, family, neighbourhood, town, etc.), as well as physical ones – again at every unit of physical organization (house, neighbourhood, town, city, etc.). This recognizes the integral relationship between the social and built environments.

- *Distress has financial dimensions:* The financial capacity of the community is diminished by conditions of distress, including a weakened residential and business tax base to support the daily life of the community, or special interventions. Businesses, institutions and governments may then withdraw investment, compounding the financial distress of the community.

- *Characteristics of distress are unique:* Circumstances in every community across the country are place-specific; as a result attempts to fully measure community distress at the local level need to adjust to conditions and the availability of data about those conditions. This is equally true of policy and program responses.

- *Characteristics of distress can be objectively measured:* Many of the relevant characteristics in these domains are empirically measurable through statistics, and facilitate the development of useful indicators.

- *Characteristics of distress can be subjective and qualitatively assessed:* Distress may also be revealed through subjective social perceptions about the community (by neighbourhood / community residents / organizations / business owners / institutions and/or by external observers).

- *Characteristics of distress are necessarily comparative*: Both objective and subjective measurements are used to compare with some past or hypothetical future state; or to neighbourhoods with positive well-being outcomes / characteristics.

- *Characteristics of distress are compared with benchmarks or thresholds:* In order to be meaningful, conditions are compared with some previously-established benchmark, or trigger a response when they reach or surpass a previously-established threshold.

- *Characteristics of distress are interdependent and cumulative (within a domain or across domains):* Each characteristic contributing to community distress is not independent but operates in tandem with others, reinforcing and exacerbating the negative impacts of each over time.

- *Dependence on macroeconomic and political forces*: The conditions in the community are not isolated from external forces in the policy environment and the overall economy. External political and economic forces can thus exacerbate internal community conditions of distress.

- *The role of community capacity (a community's ability to define and solve their own problems):* The conditions in question demand action, but the internal response no matter how vigorous or well-intentioned may be insufficient to the task. Lower levels of capacity do not allow a community to respond to conditions of distress. Absence or weakness in community capacity can determine if a community becomes "*Defeated or Defended."* (Temken & Rohe, 1996). (For more on this theme, see Appendix E).

1.3 Methods

This project began with a review of the literature pertaining to the theories of urban distress. The intent of this phase was to provide a broad but sound overview of the key processes involved in understanding neighbourhood change. The literature review was also central to the development of the CDI in that it helped inform our understanding of distress and interpreting the domains that comprised the final model.

Following the review of the literature, the research team then examined how other jurisdictions have measured distress. This included Canadian and international examples that employed a variety of approaches and measures which helped to draw out the framework necessary to develop the CDI and the variables that should be included. Twenty-four possible variables were identified.

The final step in the process was to pilot test our approach to determine if it was capable of assessing the state of distress across ten Canadian centres that contained between them some 2500 census tracts. Factor analysis was the main analytical tool used to develop and test two models. This approach allowed the research team to identify variables within four domains (*poverty, education, labour & marginalization*). The report concludes with recommendations and conclusions on moving the process forward.

1.3 Limitations

As will be further explained and illustrated below, the approach tested in this report has a number of key limitations:

- The domains, indicators and indexes developed below are only able to identify characteristics *associated* with distress; and how these characteristics are spatially distributed; but they are not capable of *predicting* distress, where it will occur, or if it will increase or decrease;

- The indexes will rank cities *relative* to one another in terms of distress characteristics, but they will not be able to measure *absolute* distress. That is, we will not be stating that a given census tract is 45% distressed, while another is only 20% distressed;

- The pilot test was undertaken by selecting 10 cities; therefore it is far from being a complete portrait of urban Canada. It will demonstrate how *selected* cities rank relative to one another, not *the most distressed* cities in Canada;

- The resulting indexes result in a cross-sectional portrait, rather than trends over time;

- The CDI can facilitate -- through the use of readily available national data -- the identification of urban areas which may be suffering from distressed conditions, but it would require the use of local data sources to confirm the nature and extent of this distress, as well as the means to address it.

2.0 Overview: Theories of Urban Distress

Community distress is essentially "shorthand" for the manifestation of an interconnected mix of environmental, social and economic circumstances, sometimes exacerbated by public policies. It can also be conceived as a dynamic process of community change.

As investigations into neighbourhood change have been undertaken for most of the past century, the literature is vast and so our literature review is by necessity selective. Similarly, sets of indicators have been heavily used at the community level for decades to document local conditions; so again, a comprehensive review of these initiatives would not be possible. To contain the report within a manageable area, we have attempted to select those sources and examples that best illustrate what we believe to be the most important themes for the approaches we are proposing.

The Canada Mortgage and Housing Corporation (2001) indicate that urban distress does not have a readily identifiable starting point or single isolated cause. Instead, distress is a complex, self-reinforcing phenomenon in which symptoms of decline themselves become causes. Once underway, distress tends to be evolutionary and accretive.

An examination of the scholarly literature reveals diverse approaches to the concepts relevant to this research, in that the primary terminology employed varies significantly. Some studies have looked at urban *deprivation* (Broadway & Jesty 1998), others at *spatial inequalities* (O'Loughlin 1983) and *urban hardship* (Nathan & Adams 1989), while still others employ more commonly used terms such as *decline* (e.g., Rumsey 2005) *decay* (e.g., Vigdor 2006) and, of course, *distress* (Kasarda 1993).

The literature also identifies numerous causes triggering decline in inner cities including poverty (Jargowsky 1997; Wilson 1987, 1996; Driedger 1991; Turner & Hayes 1997; Orfield 1998; Center on Urban and Metropolitan Policy 2000), racial conflict (Wilson 1987, 1999), ageing of the population (CMHC 2001), suburban sprawl (Bradford 2002), the spatial distribution of affordable housing (Center on Urban and Metropolitan Policy 2000), decline of inner-city schools (Orfield 1998), the presence – or absence – of creativity (Florida 2002; Gertler 2001), and unintended policy effects (CMHC 2001; Miller 2001; Carley 1990; Orfield 1998).

In an effort to better frame and understand these complexities, urban theorists have developed models of change include natural evolution, ecological succession and down filtering, middle class flight, obsolescence of the built environment, changes in urban form, structural economic change and class and racial conflict among others.

Examination of these theories contribute to a better understanding of the interaction and interdependence of neighbourhood, city-wide, regional, national and international influences, and both macro- and micro- level processes that contribute to disinvestment and decline in urban areas.

Scholars generally identify three major schools of thought[3] with regard to our theoretical understanding of how and why neighbourhoods change – ecological, subcultural, and political economy:

Ecological models originate from the work of urban sociologists and economists and focus on exogenous forces that shape the dynamics of neighbourhood change. Such factors include ecological forces, analogous to those in biology, that cause invasion and succession of people with different characteristics and different types of land uses during the life cycle of a neighbourhood; filtering processes in the housing stock that cause neighbourhoods to decline with age; socio-economic and demographic factors that change with time; and economic factors that shape the bid-rent functions for urban land.

Subcultural models are less deterministic and focus on factors such as social networks, socially determined neighbourhood reputations, and sense of neighbourhood attachment (social cohesion and social capital). Just like economic capital, we "invest" in social capital by participating in groups and activities and networks. This participation brings a "return" in the form of a higher level of connectedness and trust with one another. The building up of this social capital "stock" then becomes as asset that can be "drawn upon" in times of need or times of opportunity (Warner et al. 2004). The absence of such networks contributes to distress. According to this perspective, resident confidence, satisfaction, commitment and social networks are important for understanding neighbourhood change. There are many subcultures that vary across neighbourhoods and neighbourhoods can remain stable or even improve if the social structure is strong (see Appendix E).

Finally, **political economy models** focus on the forces of capital accumulation and the institutions through which accumulation takes place. In these models the type and location of capital investments are critical factors in neighbourhood change. Another stream of the political economy's understanding of neighbourhood change is "urban restructuring" or "globalization" and spatial mismatch between jobs and population distribution. According to Smith Caris & Wyly, (2001) "Any explanation of neighborhood 'decline' must account for the shifting flows of capital investment and disinvestment that underlie the more visible symptoms of 'white flight' or "invasion and succession" (pp. 500-501).

The theories and paradigms noted above have been further analyzed to assess and draw out the key domains that they represent. The purpose of this step is to better understand how these theories can help inform the development of the CDI by illustrating the key areas of interest such as poverty, marginalization and quality of housing. Therefore, the following abbreviated table denotes the key concepts along with potential research domains. The identification of these domains will be revisited in the pilot test phase (Section 4.0).

[3] For more detail on these models, please consult **Appendix One.**

Table 2.1: Theoretical Approaches and Potential Research Domains	
Key Concepts	**Possible Domains of Emphasis**
ECOLOGICAL Locational decisions in free market; trade-offs; availability of devalued housing; inevitability of decline.	**Housing**: physical characteristics; nature of tenure; valuation; **Social**: characteristics describing qualities of social groups **Population**: demographic characteristics at various stages of the *neighbourhood life cycle* **Employment**: socio-economic characteristics reflecting nature and output of *local economy* **Income**: Reflective of ability of individuals to find and fill economic niches in the community
SUBCULTURAL Loss of social control; underclass; social characteristics of residents influences land use; urban poor contribute to worsening their own situation; community capacity can defend community against distress.	**Housing**: physical characteristics and nature of tenure *as reflective of neighbourhood culture* **Social**: characteristics describing qualities of social organization *or dysfunction* within a community **Population**: demographic characteristics at various levels of *social organization* **Employment**: socio-economic characteristics reflecting nature and output of *local economy* **Income**: socio-economic characteristics reflecting household capacity to flourish in the local economy
POLITICAL ECONOMY Economic shifts, job losses; forces of capital accumulation; capital flows; investment and disinvestment; institutionalized discrimination.	**Housing**: physical characteristics, nature of tenure, and valuation – *as reflective of institutional forces and constraints* **Social**: social organization within a community *in context of power relations* **Population:** socio-economic characteristics reflecting nature and influence of *global economy* **Employment**: ability of individuals and groups to compete in the global economy **Income**: socio-economic characteristics reflecting household capacity to flourish in the global economy

Based on the above table, a community in distress could conceivably be studied solely in terms of its physical characteristics; its social pathologies; or its abandonment by forces of capital. Poor-quality housing stock could therefore be seen as the result of locational preferences, neglect on the part of a persistent underclass, or the concerted efforts of banks and real estate interests to undervalue certain districts for future redevelopment purposes.

The point that should be made is that none of these perspectives has a monopoly on accuracy or validity of assessing distress. In the end, they all have something of value to offer, and for the purposes of this research considering elements of each is critical to develop a Canadian based analytical tool.

2.3 Characteristics of Community Distress

As these theories suggest, cities and their constituent neighbourhoods are continually being subject to (and are themselves generating) a wide range of socio-physical processes. The problems afflicting these areas are mutually reinforcing, each exacerbating the other, making it difficult to address just one problem without simultaneously addressing a number of others. Therefore, distress, however defined, is not a static condition, but part of the ongoing processes of neighbourhood change can be characterized broadly by the following nine key areas of consideration:

Poverty
Since the early 1970s concentration of poverty and economic inequality has become the most important indicator of declining inner-city neighbourhoods (Gertler 2001; Cutler & Glaeser 1995; Hatfield 1997; Lee 2000; Bradford 2002; Broadway & Jesty 1998; Lynn & McGeary 1990; Massey & Denton 1993; Wilson 1987, 1999; Jargowsky 1997; Iceland et al. 2003; Glennerster et al., 1999). In poor neighbourhoods consistently similar set of social attributes can be found simultaneously (Gertler 2001): low levels of educational attainment, high unemployment rates, high levels of housing need, a predominance of elderly residents (particularly elderly women), lone-parent families, recent immigrants, non-permanent residents, and (in some cities) people of Aboriginal origin.

Unemployment
Wilson (1999) argues that the consequences of high neighbourhood joblessness are even more devastating than those of high neighbourhood poverty. He shows that many of today's problems in America's disadvantaged inner-city neighbourhoods - crime, family dissolution, welfare, low levels of social organisation and so on - are related to the disappearance of work (Wilson 1996). It is employment changes that have triggered these polarisation effects but once set in motion they become self-reinforcing.

Educational Attainment
Low educational attainment is considered to be an important indicator of areas of decline. Levels of education in several North American inner cities have been consistently lower than those in other city areas, which restrict inner city residents to low-wage jobs with few opportunities for advancement.

Segregation
The causes of distress are often discussed in the context of racial and ethnic segregation. Most North American cities have experienced the rise in residential segregation since 1970 (Myles et al. 2000, Wilson 1996, Jargowsky 1997, Hatfield 1997, Lee 2000). The factors that contribute to differing racial and ethnic residential patterns include preferences for living in neighbourhoods with those of similar race and ethnicity, socio-economic differences, housing discrimination, and poverty among minority groups. Institutions such as banks and insurance companies have played a key role in contributing to spatially segregating people by race – through such practices as “blockbusting” and redlining (Squires 2003) – but it can also take the form of informal “gatekeeping” practices on the part of residents, such as relying only on

word of mouth to advertise vacancies, and pressuring neighbours to only rent or sell to Caucasian households (de Sena 1994).

Vacant and Abandoned Property
Vacant and abandoned property is one of the most visible indicators of inner-city distress: deteriorating houses, apartments, commercial and industrial buildings undermine the vitality of neighbourhoods. Poor condition of housing stock is often accompanied by poor landscaping, the incidence of vandalism, graffiti, littering in public areas, crime rates, and overall poor quality of life (Burchell et al 1981, Carley 1990, Accordino & Johnson 2000). At the same time, "although it is true that abandoned homes are symptomatic of other problems, they also contribute to neighbourhood decline and frustrate revitalization efforts by becoming eyesores, fire hazards, and sites for drug-related activity, vagrancy, and rodent infestation" (Cohen 2001, p. 416).

Disinvestment and Economic Decline
Disinvestment is one of the major characteristics of declining neighbourhoods. The disinvestment process is triggered when a community offers lower returns to the investor, or appears to do so when compared to the advantages offered in another location. As incomes fall and families leave a community, prices and rents in that community decline in comparison to other areas and owners become less interested in maintenance. Thus disinvestment is associated with poor housing stock condition, deterioration, and eventual abandonment of residential units and business premises.

Changing Land Uses
The inner-city areas are often the sites of under-utilized commercial space, which are inexpensive to lease and therefore become a magnet for businesses serving the underprivileged. Among these are payday loan and cheque-cashing outlets, pawnshops, temporary labour centres, low-priced saloons, sex shops, massage parlours and others. It has been documented in many North American cities that the location of adult entertainment uses degrades the quality of life in the areas of a community where they are located. Studies have shown secondary impacts such as increased levels of crime, decreased tax base, and blight (Miller 2001; Buckland *et al* 2003).

Demographic/Social Change:
Declining areas share certain demographic features. Among them: the steady out-migration of more advantaged families and overall depopulation; ageing population; high rates of single parenthood; changes in class, racial and demographic composition; low levels of socio-occupational mix; high crime rates and rates of drug and alcohol abuse; and high mortality and disease rates.

Neighbourhoods in decline often suffer from significant levels of population loss, resulting in a lower population density. The people most likely to leave such neighbourhoods are higher-income residents with families who can afford to relocate to the suburbs (CMHC 2001). Increasing numbers of immigrants and refugees are typically insufficient to reverse the downward trend, particularly in slow growth cities.

A disproportionate number of elderly homeowners often accelerate housing and neighbourhood deterioration and may also lead to a sudden thinning of the area population. Elderly owner-occupiers are frequently unable to maintain their housing due to increasing physical impairment and reliance on a fixed or declining income. Rather than relocating to a smaller unit or one requiring less upkeep, many elderly owner-occupiers age in place. As a consequence, their homes and properties can experience serious disrepair (CMHC 2001).

It should be noted that declining populations are not necessarily evidence of neighbourhood decline; on the contrary it can be a sign that former rooming houses are returning to single-family use, generally seen as a positive trend.

Loss of Human Capital

Another important indication of distress is the loss of human capital among residents of distressed areas. The most essential, in terms of its impact on other aspects of local life, is the decline in civic participation and in the sense of community identity and solidarity (Kamal-Chaoui 2001, Temkin & Rohe 1998). Several characteristics of neighbourhood distress combine to weaken both residents' feelings of belonging to a neighbourhood and as a consequence, the area's social cohesion. Social capacity has been empirically shown to contribute significantly to positive neighbhourhood stability. In their analysis of Pittsburgh neighbourhoods, Temkin & Rohe (1998) demonstrate that:

> neighborhoods with higher levels of social capital…are more likely to remain stable over time. The social capital model of neighborhood change has more explanatory power than other models based on traditional explanatory variables such as the age of the housing stock, distance to the CBD, and mortgage credit availability (p. 84).

Doak and Kusel see both socioeconomic status and community capacity as key to community well-being, noting that a community with a high socio-economic status may not rate highly in terms of community capacity (1997).

Figure 1. **A Social Capital Model of Neighborhood Change**

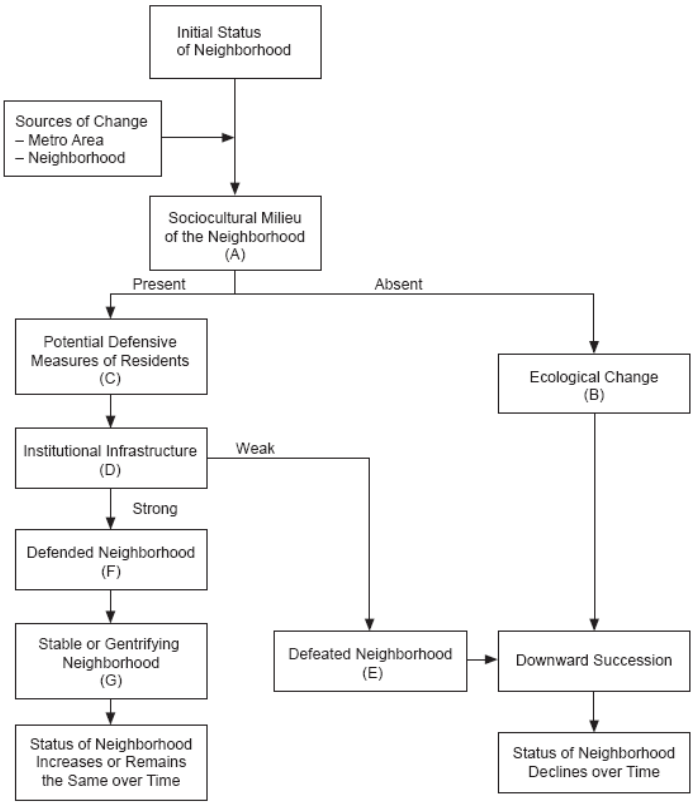


Figure 2.1: A Social Capital Model of neighbourhood Change (Source: Temkin & Rohe 1998)

As may be seen by the above figure, community capacity includes other components, such as social cohesion, which according to Reimer,

> is the extent to which people respond collectively to achieve their valued outcomes and to deal with economic, social, political, or environmental stresses (positive or negative) that affect them…social cohesion is highest when groups work together to achieve economic, social, political or cultural objectives or when they do so to deal with the stresses facing them (2002, 13-14).

2.4 Summary

This section briefly highlighted the key theories of neighbourhood change, finding that each approach is unique and offers an interpretation on the leading contributors to urban distress. This review also revealed the primary research domains and factors that are commonly used to identify community distress.

3.0 Major Precedents

The following section explores in detail the examples of how selected jurisdictions have responded to measuring and assessing distress. This review includes a cross-section of Canadian and international experiences, the intent being to better understand the most appropriate variables and domains to be incorporated into a CDI. A useful summary of the precedence section is presented in Table 3.1 (found at the conclusion of this section).

3.1 Canadian Experience

3.1.1 Winnipeg: Neighbourhood Characterization Model

In this model distress is measured on a relative basis. All neighbourhoods in the City are ranked using a Quality of Neighbourhood Index (QNI) and various thresholds are established to allocate neighbourhoods to one of four categories. Neighbourhoods falling below certain thresholds on the QNI are designated Major Improvement Areas, Rehabilitation Areas, Conservation Areas and Emerging (new suburban/downtown residential conversion) Areas.

The city uses a statistical model to develop neighbourhood designations. A working group was established to determine what indicators would be used to designate areas. Four indicator categories (Housing, Crime and Safety, Economic Conditions and Social Health and Well-Being) were identified. As Housing Policy was the focus of the city's programming, 30 indicators within these four categories were measured to determine which indicators had the highest correlation with the housing indicator (housing condition).

The seven indicators with the highest correlation were designated as primary indicators: median selling price, housing conditions, average effective age, rental tenure, low-income cut-off, crime and unemployment. Seven secondary indicators (lower correlation level) include placarded dwellings, maintenance and occupancy orders, demolition, rooming houses, building permits, labour force participation and population change. Indicators are collected on a neighbourhood level. Data sets come from Statistics Canada, the files of various city departments, Winnipeg Real Estate Board, and the Provincial Conservation Department.

The seven primary indicators became the basis for the Housing Policy Neighbourhood Designation Index (HPNDI). This weighted index:

$$HPNDI = aM + bH + cL + dR + eA + fC + gU$$

Where M - Median Selling Price, H – Housing Condition Indicator, L – Low Income Cut-Off, R - % of Rented Dwellings, A – Average Effective Age, C - % Total Crime, U – Unemployment Rate.

A panel of 11 experts determined the weighting of each primary indicator and assigned the coefficients for the equation. Although these decisions were subjective the model was tested using 25 years of data and proved to be accurate.

A trend analysis of both primary and secondary indicators indicating decline, improvement, or little change in neighbourhood indicators is used to strengthen and validate the QNI. All neighbourhoods are ranked and compared within the City but no comparison to other cities is undertaken (City of Winnipeg 2000b).

3.1.2 Calgary Neighbourhood Sustainability Index

A number of data sets are collected for all neighbourhoods in the City. For some data sets indexes are developed. Data indicators and indexes are compared to threshold or benchmark levels developed by using city wide data, provincial or national benchmark levels or in some cases thresholds developed for roll-ups of certain areas of the city. Depending on where a particular indicator for a neighbourhood falls relative to these thresholds it may be considered "distressed" or in decline.

Indicators collected to define and measure the level of distress include population and household characteristics, income and employment, health, education and skills, housing, crime, citizen satisfaction, business growth, ethno-cultural characteristics, land use, services and amenities, consumption, sustainability/footprint measures and others. Major data sources include Statistics Canada, citizen satisfaction surveys, the data of various city departments, the Calgary Business Registry, Canadian Community Health Survey, survey of household spending, homeless count and more.

Data analysis involves development of community profiles (neighbourhood level, areas of the city, and the city). Neighbourhoods are ranked within the city, and citywide indicators are compared with other cities where appropriate. Quality of life and sustainability indexes for various geographies are developed as well as target group profiles i.e. Aboriginal, recent immigrants. The method of analysis is both comparative, relative to particular benchmarks and formula-driven depending on the theme of the work and the data sets involved (City of Calgary 2006).

3.1.3 Index of Community Vulnerability

The Index of Community Vulnerability defines distress as "continuous population decline." The project uses the notion of "vulnerability" to describe socio-economic disadvantage. The focus of using this index is rural communities in Canada. National census figures for multiple years were used. Consolidated Census Subdivisions (a formal geographic measure of Statistics Canada, consisting of two or more neighbouring census subdivisions) were used as the geographical scale.

The project uses a conceptual framework involving three sets of indicators:

- Stressors (e.g. exposure to global competition)
- Assets (e.g. human capital)
- Outcomes (e.g. population decline)
- A total of 29 community and regional indicators were used.

For analyzing data an econometric model was developed (a probit model) to estimate the probability of population decline (over the 1981-2001 period) as a function of stressor and asset indicators (from 1981). The coefficients that were generated were then used to predict the future (post-2001) related to the long-term probability of population decline of a given community (and thus, an Index of Community Vulnerability). No ranking of communities was undertaken, but each community was plotted along a continuum of the Index, showing where it fits in terms of vulnerability to population decline (Alasia *et al*).

3.1.4 FCM Quality of Life Reporting System

The Federation of Canadian Municipalities (FCM) Quality of Life reports trends with respect to key issues, i.e., whether the situation is becoming worse or improving. Participation in FCM's Quality of Life Reporting System is open to all Canadian cities with a population greater than 100,000. At the time of the most recent report, there were 21 participating municipalities.

The reporting system has eleven main issue areas, linked to a total of 76 indicators:

- Demographic Background Information
- Affordable, Appropriate Housing
- Civic Engagement
- Community and Social Infrastructure
- Education
- Employment
- Local Economy
- Natural Environment
- Personal & Community Health
- Personal Financial Security
- Personal Safety

Most of the indicators used in the FCM reporting system have national data sources including Statistics Canada, CMHC's Housing Market Survey and data collected by specialized national institutions such as the National United Way, the Canadian Centre for Justice Statistics and the Office of Industry Canada's Superintendent of Bankruptcy. However, some indicators, such as housing prices, crisis calls and recycling information draw from local data sources. The majority of the indicators used in the FCM QOL framework could be relevant to small and rural communities, but other indicators would need to be included to reflect issues

unique to rural areas. The availability of data at the smaller geographies of rural areas and small communities may pose challenges for some of the current indicators (FCM 2001).

3.1.5 Social Index: Human Resources Development Canada

The 'Social Index' was created by Understanding the Early Years staff working at Human Resources Development Canada. Understanding the Early Years is a national initiative that provides information to help strengthen the capacity of communities to make decisions about the best policies and most appropriate programs to serve families with young children.

The Social Index was developed in order to create a profile of the level of socio-economic well being in the neighbourhoods by combining social and economic risk factors into one score so that the characteristics of each neighbourhood could be considered individually and in relation to the rest of the neighbourhoods in North York. The Social Index assigns each neighbourhood a point for each potential risk factor. Risk factors included such variables as having a higher unemployment or poverty rate, or a larger proportion of lone-parent families than the national average. The following indicators made up the Social Index (the Canadian averages for the indicators are in brackets).

- Prevalence of low-income status of individual residents (18.6%).
- Proportion of males 15 and over who worked full-time, full year (39.7%).
- Proportion of individuals 15 years and over without a high school diploma (37.0%).
- Proportion of families with children headed by a lone parent (22.7%).
- Proportion of the population speaking neither official language (1.4%).
- Proportion of the population that immigrated to Canada since 1991 (3.2%).
- Mobility or moves into and out of the neighbourhood in one year (16.0%).
- Home ownership (64.8%).
- Proportion of the total income of the neighbourhood coming from government transfer payments (i.e., CPP, Child Tax Benefit, provincial social assistance payments) (18.5%).

All data were from the 1996 Census. Each indicator was considered a risk factor if the community percentage was lower than the national one. The total number of risk factors made up the Social Index. Social Index scores range from 0 to 9: a score of zero indicates that a neighbourhood does not show signs of risk, while a score of nine indicates that the overall area is exposed to a number of risk factors. The Social Index showed clusters of low- and high-risk areas in the community (Human Resources and Social Development Canada).

3.1.6 Socio-Economic Index: Manitoba Centre for Health Policy

The Manitoba Centre for Health Policy (MCHP) at the University of Manitoba developed an index that combines those socioeconomic characteristics that are most strongly related to health outcomes into a single score (Martens et al. 2002). These characteristics included unemployment, high school completion, lone-parent households and female participation in the workforce. MCHP calculated this index for 1,146 small areas (census dissemination areas) within Winnipeg and 1,172 areas outside of Winnipeg, using publicly available data from the 2001 Census. A socioeconomic index score for each of 25 Winnipeg neighbourhoods was generated using a weighted average of the scores for each dissemination area in the neighbourhood. The scores for these 25 neighbourhoods were then divided into four groups based on how they differed from the average score for all 25 neighbourhoods: low socioeconomic status (SES), or most disadvantaged, low-middle SES, middle SES and high SES. A similar process was followed for each of 46 districts outside of Winnipeg.

3.1.7 Socio-Economic Status (SES)

MCHP has created indexes to examine the relationship of a population's socioeconomic characteristics to its health status and use of health care services. Measures of SES include: Income and Education, and Socio-Economic Risk Index (SERI) or Socio-Economic Factor Index (SEFI) scores. SES is often ranked from 1 (poor) to 5 (wealthy), based on income quintiles, each containing 20% of the population.

3.1.8 Socio-Economic Risk Index

The Socio-Economic Risk Index was developed by MCHP to examine the relationship of a population's socioeconomic characteristics to its health status and use of health care services. From a set of 23 socioeconomic indicators derived from public use census data, stepwise multiple linear regression determined that six measures explained the maximum amount of variance. Variables used for SERI included dwelling characteristics, educational attainment, employment, income, mobility and social characteristics. The socioeconomic index was formed from the weighted sum of the standardized forms of the six selected measures, with regression coefficients used as weights. The summary index was generated to provide profiles for the eight health regions of the province. Each indicator was normalized by subtracting the provincial average from the observed score for each municipality and dividing the result by the variable’s standard deviation.

Regional scores were plotted against an index of health status measures and against measures of health care utilization developed by MCHP. Strong regional variations were found in all of these measures, and the socioeconomic risk index explained 87% to 92% of the differences in health status and acute hospitalizations. Regions with the worst socioeconomic risk index were also found to have the highest numbers of consumers of health services.

3.1.9 Socio-Economic Factor Index

The Socioeconomic Factor Index was developed by MCHP as a measure of the socioeconomic factors, which are indicative of poor population health and need for health care resources. It is based on several measures derived from Canadian Census data. Negative

values indicate low risk, and positive values indicate high risk. In general, the greater the socioeconomic risk, the poorer the regional overall health status and the more their need for health care services. SERI indicators included labour force participation of women, age dependency ratio, percent single parent households, percent female single parent households, and two aggregated factors representing unemployment and education.

3.2 International Expérience

3.2.1 UN Habitat Agenda Indicators

UN Habitat recommended 42 indicators to determine trends in selected key areas in the implementation of the UN Habitat Agenda. The Habitat Agenda Indicators consist of:

- "20 Key indicators both important for policy and relatively easy to collect [overcrowding, informal employment, solid waste disposal, etc.]. They are expressed as either numbers, percentages and ratios;

- 9 Check–lists…give an assessment of areas that cannot easily be measured quantitatively [right to adequate housing, disaster prevention and mitigation instruments, local environmental plans etc.]. They are audit questions generally accompanied of [sic] *yes* or *no* answers. They are either present or absent.

- 13 Extensive indicators intended to complement the results of the key indicators and qualitative data in order to make an in-depth evaluation of the issue [housing price and Rent-to-income, evictions, regular solid waste collection, etc.]". (United Nations Human Settlement Program p. 7).

For ease of analysis, t indicators are then grouped into two clusters:

- "CLUSTER A: indicators to be obtained from Censuses and national households surveys, including Demographic and Health Surveys and Multiple Indicators Cluster Surveys;

- CLUSTER B: indicators to be obtained from other sources such as official records and published studies of Government institutions, housing boards and agencies, service [agencies], finance institutions, police, NGOs as well as using informed estimates made by small groups of experts on specific issues (ibid)."

The design of the indicators project was entirely directed to the international objectives and therefore the indicators chosen are not sufficiently sophisticated for most Canadian domestic policy purposes.

3.2.2 Melbourne Australia: "Suburbs in Time" Analysis

Melbourne's model measures distress relative to certain benchmarks: city wide or national poverty rates, average traffic volumes in the City, green space per 1000 people in the city as

examples. Depending on the data indicator, citywide, state, all metro areas or national benchmarks may be used. The position of the indicator relative to the benchmark is used to determine if the area is experiencing distress. Distress is measured in relative terms.

Indicators are grouped in the following categories: Melbourne's development; people, housing, working and living in Melbourne, equity and accessibility, learning, sustaining the environment, inclusive and engaging City. Data sets come from the Australian Bureau of Statistics, City Department files, State Government Departments and special surveys conducted by the city.

Approaches to analyzing data include trend analysis going back to 1981, with some data indicators tracked since 1951; ranking of suburbs by indicators and determining the position of each suburb relative to benchmarks (often grouped in quintiles, variations from the mean, etc.); development of Quality of Life Index and Quality of Neighbourhood Index; and comparison to recognized planning standards. Data is collected for all suburbs in the City. Depending on the particular indicator there is extensive ranking and comparison on a citywide basis; role ups of various areas in the City, comparison to other cities, to state level data and national data (Victoria Department of Planning and Regional Development).

3.2.3 United States. Philadelphia: Neighbourhood Transformation Initiative

The Neighbourhood Transformative Initiative (NTI) was introduced in 2001 to revitalize neighbourhoods and specifically to acquire abandoned property, relocate residents, demolish derelict buildings, and create large tracts of land for redevelopment projects such as market-priced and affordable housing.

City and neighbourhood level data from a variety of sources (city, state, national census) was used to create a database of every neighbourhood in the city and classify the neighbourhoods into six clusters based on market strength. The clusters were determined by: vacancy rates, housing sale prices, owner-occupancy rates, housing age, demolition activity and consumer credit profiles.

The clusters ranged from "regional choice neighbourhoods" to "reclamation neighbourhoods." Based on an analysis of market data, policies were created for each cluster type. Reclamation neighbourhoods had the highest population loss, advanced physical decay, high vacancy rates and low property values. It was intended that this type of neighbourhood would receive the most intervention (McGovern 2006).

3.2.4 UK: Index of Multiple Deprivation

The Index of Multiple Deprivation (IMD) was developed in part to provide a monitoring tool for assessing the gap between deprived neighbourhoods and the rest of the country. The model behind the IMD is based on the notion that there are many different aspects of deprivation, each of which could be recognized and measured separately. Individuals may experience deprivation in one or more domains. The conceptual framework did not attempt to include all possible causes of deprivation or all types of deprivation. Three major categories

of data sets used to prepare the IMD included census data, administrative data from within a variety of government departments and agencies, and data from other sources such as the private sector and universities.

The IMD for 2004 has seven domains, and each contains several indicators, for a total of 37 indicators:

- Income
- Employment
- Health Deprivation and Disability
- Education, Skills, and Training
- Barriers to Housing and Services
- Crime
- Living Environment

For each domain a single measure is developed which provides a meaningful statement about the level of deprivation (e.g., proportions of people or of households experiencing that form of deprivation). The end objective is the creation of a single score or Index of Multiple Deprivation for each neighbourhood. After the data was assembled, a sequence of steps is followed to calculate the composite index.

The first step involves the development of the indicators that include both data derived from small-area statistics, as well as data obtained at the national level modelled to provide ward estimates. To address the potential for measurement error, the second step in the development of the index is the standardization of the data. The indictors are "estimated" using a shrinkage methodology to improve the reliability of small numbers. In cases where the sample size is too small, a calculation is made to move the score towards the district average for that indicator. This standardization is applied to some of the indicators in the Health Deprivation and Disability Domain; Children/Young People sub-domain in the Education, Skills and Training Deprivation Domain; and the Crime Domain. As part of this second step, the indicators are also transformed to a normal distribution.

After standardization of the data, the third step is the application of the maximum likelihood factor analysis method to find appropriate weights for combining indicators into a single score based on the inter-correlations between all the indicators. In the fourth step, the six Domain scores are calculated based on the weights derived from the factor analysis. As a final step, Domain scores are combined in two stages to formulate the composite index. First, the scores are ranked and then standardized (by taking the ranks of each ward) using the exponential distribution that gives greater weight to the more deprived places. The Domain scores are then combined using weights determined by the factor analysis.

The single score for each place within the IMD is arrived at by assigning a weight to each of the domains in the calculation of total score:

- Income Deprivation 22.5%
- Employment Deprivation 22.5%
- Health Deprivation and Disability 13.5%
- Education, Skills and Training Deprivation 13.5%
- Barriers to Housing and Services 9.3%
- Living Environment Deprivation 9.3%
- Crime 9.3%

The IMD is applied at the smallest practicable level of geography. The project uses The Office for National Statistics geographical units called 'Super Output Areas'. These are aggregates of Census Output areas reported at three levels of geography, with the smallest being an average of 1,500 people (i.e., a neighbourhood). Other geographic levels of reporting include district, county and Primary Care Trust levels. The results are ranked and scored on aggregates of all domains and on each domain (Office of the Deputy Prime Minister. (2006).

3.2.5 UK: Towns and Cities Indicators Database Project (TCID)

The British government has developed an action plan for supporting an urban renaissance in English towns and cities, supported by five visions to provide a better quality of life. The Towns and Cities Indicators Project database was developed to monitor urban change and track progress of policies towards achieving these visions.

The TCID incorporates a two-tier indicator system: the first is a set of strategic indicators of urban change; the second is a set of vision indicators related to each of the five visions the country has for towns and cities. The first set is represented primarily by trend indicators that are commonly found in most urban indicator projects. These are designed to measure both the intensity and the dynamics of socio-economic change over time (e.g., population level and change; employment level and change; and unemployment level, change and duration of unemployment). The second set is a mix of qualitative and quantitative indicators such as Office Floor Space, Social Services Satisfaction, Local Attractions, Access to Major Shopping Centres and others.

The major data source is the national census, supplemented by a variety of administrative data, mostly from within the Office of the Deputy Prime Minister: Housing Investment Programme returns from local authorities; Land Use Change Statistics; Valuation Office Agency Statistics; and the National Land Use Database.

The work of the TCID found that it was difficult to obtain data for some of vision indicators. In particular it was noted that appropriate indicators to measure community participation, aesthetic quality and attractiveness of towns and cities, quality of transport systems, and health and life satisfaction were difficult to obtain. In some instances the TCID relied on

survey-based indicators, but the final decision was that they are generally unreliable and open to a wide variety of interpretations.

To analyze data and provide a basis for interpreting performance and change, a "structure-performance model" was developed. The model classifies each urban area by size, regional location and on a "shift-share categorisation" (based on changing employment characteristics), primarily for the purpose of place-to-place comparisons of urban areas within each category. Urban areas were classified into nine categories (ranging from Advantaged Urban Areas and Favourable Growth Environment Areas to Unfavourable Growth Environment Areas and Challenged Urban Areas) on the basis of similarities in scores. There is no specific index or score for a specific city. Instead, the approach is to compare statistics from one city to another. Most of these statistics are descriptive in nature.

For each city and town, local authority districts are used as the building block for a majority of indicators, as most datasets are available at this level. Proponents of the TCID expect to move away from using administrative boundaries and to derive more data for micro areas; so as to produce data for accurately defined urban areas (Office of the Deputy Prime Minister 2004a).

3.3 Summary

Geographies used by different jurisdictions to evaluate distress level of communities vary dependent on project objectives. Most centres collect indicators on a "neighbourhood" basis with neighbourhoods being geographic areas with relatively homogeneous characteristics used as a basis for planning. They may correspond with the boundaries of geographic areas used for national data collection or consist of parts or amalgamations of such areas.

National projects use indicators to measure distress of geographic units across the country using data collected from national sources. Most cities use indicators in one of three ways: to compare their city with other cities (city wide indicators); to compare areas of their city with areas (neighbourhoods) in other cities; and, to compare the relative position of various neighbourhoods within the city.

Selection of indicators varies dependent on policy objectives (for instance some target housing, others – human capital, others – economic development, etc.), however most commonly used domains include poverty level, demographic characteristics, employment, education and housing characteristics.

The most common use of indicators includes the following:

- Trend analysis – measuring the intensity and dynamics of change over time
- Development of neighbourhood profiles
- Development of target or "client group" profiles
- Development of policy/them/domain area profiles, i.e. housing, income etc.

- Development of indexes to position neighbourhood relative to a particular threshold or benchmark.

Often the establishment of weightings for particular indicators that are part of an analysis based on a composite set of indicators is done in a subjective manner, i.e. experts assign a particular weighting based on their knowledge of the community, the nature of the distress they are focusing on and the policy emphasis of the initiative on which they are working.

When indicators are used to rank neighbourhoods the thresholds between neighbourhoods in distress and those that are not is often established in a subjective manner by planners and policy analysts. Alternatively city-wide, national or regional averages (of particular indicators) may be used as thresholds with those below the national average considered "distressed" and those above not distressed.

The following table illustrates the unique aspects of each approach cited in this section and allows for a comparison of the key aspects that include geography, data sources and analytical methods across the eleven examples.

Table 3.1:

Summary of Jurisdictional Approaches to Community Indicator Models

Model	Geographical Basis for Data Collection		Data Source			Comparative Basis			Analytical Approach		Model		Target Profile	
	National	Local	National Census	Local Admin	Special Survey	Neigh. within City	City to City	Areas within Cities	Index	Trend Analysis	Yes	No	Yes	No
Winnipeg Neighbourhood Characterization		X	X	X		X			X	X	X		X	
Calgary Neighbourhood Sustainability		X	X	X	X	X	X	X	X	X	X		X	
Index of Community Vulnerability	X		X				X		X	X	X			X
FCM Quality of Life Reporting System	X		X	X			X			X		X		X
Social Index, HRDC		X	X			X			X		X			X
SES, SERI, SEFI	X		X			X		X	X		X		X	
UN Habitat Agenda Indicators	X		X	X	X		X			X		X		
Melbourne, Australia		X	X	X	X	X	X		X	X	X		X	
Philadelphia, US Neighbourhood Transformation		X	X	X		X							X	
UK: Index of Multiple Deprivation	X		X	X		X			X		X			
UK: Towns and Cities Indicators Database Project	X		X	X	X	X	X	X				X		

The theoretical review of neighbourhood change and the examination of the precedents will be essential in the development of the Canadian Distress Index in a number of ways including:

a. Illustrating the need for grounding the CDI in theories of urban development, neighbourhood change, social dynamics including social capital and the political economy.

b. Facilitating the identification of a number of "domains" or spheres of influence that help characterize and identify distress as poverty, labour force, education, occupation and segregation among others.

c. Identifying a range of specific data indicators within each "domain" that specifically help characterize distress.

d. Help in recognizing the need to measure change over time and the depth of distress.

e. Selecting the necessary indictors and domains that form part of the first step in the pilot phase.

4.0 A Canadian Distress Index: Pilot Study

To evaluate the relative intensity of distress in Canadian communities, the CDI is used to depict the spatial aspects of this phenomenon. The first step in the creation of the CDI is the conceptualization of the key domains and indicators drawn from the literature review and examples cited. Using the domain/indicator framework as a basis, the pilot study establishes a final set of indicators relating to social, economic, and housing characteristics that are organized into four domains. The construction of CDI is described in this section to highlight the incorporation of both conceptual and statistical approaches in the methodology of the pilot study. This section is followed by the application and evaluation of the CDI using two approaches to the development of the final models developed and tested.

4.1 Constructing an Index of Community Distress

The discussion in the theory review section provided the foundation for the identification of domains and the selection of key indicators in this investigation of community distress. Within the indictors and domains identified a composite index was formulated to reflect the multi-dimensional characterization of distress. Compared to a single measure, a composite index has greater validity, robustness, and explanatory power to evaluate the general intensity of distress (Singh, 2003).

Several procedures are available for forming composite indexes; however, a standard approach is lacking in relation to the content and derivation of measures of distress. Although a standardized methodological approach does not exist, a review of existing indexes illustrates that the construction of an index requires the implementation of a series of steps that incorporate both conceptual and statistical approaches (Morris & Carstairs, 1991; Kearns, Gibb, & Mackay, 2000). These steps range from the identification of distress domains through the selection of indictors to their standardization, transformation, and combination into a single measure.

The construction of the CDI required the following steps:

- The selection of data sources and spatial scale
- The selection of indicators and domains with identification of the measurement of indicators
- Collection and preparation of data
- Determination of final domains and indicators using a range of statistical methods including factor analysis
- The standardization of data
- The construction of an index

4.2 Data Sources and Spatial Scale

The basis of the CDI is the combination of variables or indicators which measure conditions at a common spatial scale. The spatial scale of analysis is particularly important because it is possible that functional geographies of multiple distress do not effectively correspond with administrative geographies within which measurements are conducted (Kearns et al., 2000). Moreover, it is very difficult to find a wide range of data sources that are measured at the local level (Wong, 2002). The selection of an appropriate spatial unit of analysis can be a major obstacle in the construction of an index because there is no standardized geography of collection and it is difficult to bring data sets to a common geography.

As the primary objective of the project was to develop an index comprised of quantitative indicators to assist in examining community distress at the national level, the census tract was chosen as the basic geographical unit of analysis. Therefore, the pilot project consisted of an analysis of census tracts with data derived from the 2001 Census of Canada. One drawback of census tract data is that is it only available for CMAs and CAs. Nonetheless, the major quality of the census tract is that it is a small, standardized unit of measurement designed to be uniform in relation to population characteristics, economic status, and living conditions (Kitchen, 2001). The value of utilizing census tract data is twofold: (i) a much wider set of indictors is available at this scale; and (ii) data can be obtained frequently and for reasonable cost (Galster, Hayes, & Johnson, 2004).

The census tracts included in the pilot project were derived from a selection of ten Canadian cities. The criterion for the selection of these cities was based not only on standard conceptions of the urban hierarchy in Canada (for examples, see Ali, Olfert & Partridge, 2007; Shearmur & Doloreux 2007), but balanced with the need to have adequate representation from across the country. While far from arbitrary, these guidelines nonetheless served to avoid selecting cities based on intrinsic qualities – or more significantly – prejudging them relative to their supposed "distressed" condition. The one exception that must be made is that Winnipeg was specifically chosen for the purpose of comparison with existing policy-oriented analysis already in use in Winnipeg, and because much of the research team is based there and would be more readily able to confirm the findings. The final cities included the following:

- **Tier 1**: Toronto, Montreal
- **Tier 2**: Winnipeg, Ottawa, Edmonton
- **Tier 3**: Regina, St. John's, Halifax
- **Tier 4**: Red Deer, Drummondville

4.3 Selection of Indictors and Domains: Goals of the Community Distress Index

Bradford and colleagues (1995) suggest that a deprivation index created for government bodies must be flexible because of the varied purposes for which it may be used. Consequently, the development of an index to identify community distress in Canadian cities was considered from a broad perspective for the pilot study. It should be noted at the outset that the need for a generalized, nationally-based distress index creates difficulty in establishing a definitive methodology that will identify a combination of domains and indicators to accurately identify distress in a range of urban centres. The original version of the community distress index presented a variety of difficulties which, when reviewed, led the team to further refine the index. For comparative purposes, both models are introduced in this section to illustrate how changes in methodology will produce varying perspectives of deprivation.

For the pilot study, the selection of initial indicators of distress was derived from the evaluation of theoretical foundations and precedents discussed in the preceding sections of this report. A typology of six initial domains was identified and 24 indicators were chosen to represent these domains. Table 4.1 identifies and defines the indicators which are grouped into the six domains labelled as *Population*, *Housing*, *Ethnicity*, *Labour Force*, *Education*, and *Income*. Using the initial framework as a basis, this section describes the application of both statistical analysis and theoretical knowledge to establish the final indexes derived from a smaller number of indicators and domains that identify distress in a range of Canadian communities.

4.4 Collection and Preparation of Data

Based on the initial framework of indicators chosen for the pilot study and defined in Table 4.1, data were compiled for a total 2,594 census tracts from the 10 selected cities. After an initial review of this data it was decided to exclude 38 census tracts distributed across the sample owing to difficulties with the data, such as data suppression in sparsely populated census tracts.

A data matrix was created that contained the relevant data for the final sample of 2,556 census tracts. Data from the 2001 Census of Canada was downloaded to Excel and the attribute census data was then modified to create a consistent data-set. The numerical data were converted into ratios by dividing the value by the respective population. These ratios can be converted into proportions by multiplying by 100. The data for the 2,556 census tracts were then exported to SPSS, Version 12.0 (Norusis, 1993), for the statistical analysis that is described in the following sub-section.

Table 4.1. Initial Indicator/Domain Framework for Pilot Study			
Domain	**Indictor**	**Indicator Label**	**Definition**
Population	Population Change	POPCHANGE	% population change between 1996 and 2001
	Age Dependency Ratio	DEPENDENCY	% population that is either 14 years of age or less, or over 65 years of age
	Female Led Lone-Parent Households	FEMALELONE	% households comprised of female lone parents
Housing	Dwellings in Need of Major Repair	MAJORREPAIR	% housing stock in need of major repairs
	Multiple Family Households	MULTIPLE	% households comprised of multiple families
	Renters Paying Over 30%	RENTERS	% renters paying 30% or more of income on shelter
	Owners Paying Over 30%	OWNERS	% owners paying 30% or more of income on shelter
	Mean Housing Value	MEANHOUSE	% mean housing value of CMA/CA
Ethnicity	Visible Minority Groups	MINORITY	% population that identifies as a visible minority
	Aboriginal Population	ABORIGINAL	% population that identifies as Aboriginal
	Segregation Index	SEGREGATION	% population that identifies as either visible minority or Aboriginal
Labour Force	Participation Rate	PARTICIPATION	% population 15 years and over that is employed
	Unemployment Rate, Total Pop.	UNEMPLOYTOTAL	% labour force population that is unemployed
	Unemployment Rate, Females	UNEMPLOYFEMALE	% females in labour force population that are unemployed
	Unemployment Rate, 15-24 years	UNEMPLOYYOUTH	% youth (15-24 years) in labour force population that are unemployed
	Professional and Managerial	PROFESSIONAL	% labour force in professional and managerial occupations
Education	School Attendance	ATTENDANCE	% population 15 to 24 years of age in school full-time
	Less than High School Diploma	HIGHSCHOOL	% population 20 years and over with less than a high school diploma
	Bachelors Degree or Better	BACHELOR	% population 20 years and over with a university bachelor degree or higher
Income	Median Income	MEDIANINCOME	% median income value for CMA/CA
	LICO, households	LICOHOUSEHOLD	% households under the Low-Income Cut-Off
	LICO, families	LICOFAMILY	% family households under the Low-Income Cut-Off
	LICO, individual	LICOINDIVIDUAL	% individual households under the Low-Income Cut-Off
	Government Transfer Payments	TRANSFER	% population dependent on government transfer payments

4.5 Factor Analysis: Determination of Final Domains and Indictors

After the development of the initial framework of domains and indicators (Table 4.1), the next step in the pilot study was to establish a smaller set of robust indicators and domains to be utilized in the formation of the community distress index. Approaches to select and combine indicators into an index vary from statistical methods to conceptual specifications and, according to Rossi and Gilmartin (1980), the optimum process involves a combination of these methodologies. Therefore, the two indexes of community distress developed in the present study is a reflection of a combined methodology utilizing both expert knowledge and statistical techniques.

For the pilot study, the initial development and validation of indicators was based on their theoretical relevance as established in the preceding sections of this report. In comparison, the refinement of the domain/indictor framework that is discussed in this section incorporated statistical methodology in conjunction with the conceptual knowledge of the project team that informed the interpretation of results. While such a combination of methodologies may have strengthened the development of the distress index for this pilot project; this approach also posed difficulties in determining a conclusive final model that would be applicable to a range of urban settings in metropolitan Canada. As the combinations of indicators and domains are limitless, the index that is ultimately derived may identify distress more accurately in cities whose size and regional context are distinct from other communities.

Statistical techniques for the construction of a composite index include descriptive statistics, correlation analysis, linear regression, and factor analysis (Rossi & Gilmartin, 1980; Langlois & Kitchen, 2001). By identifying indicators that are closely related to either one or more of the other indicators, these methods provide the basis to combine indicators into composite indexes. In particular, a wide range of studies give examples of the application of factor analysis to identify robust indicators to be included in an index of community distress (Bradford et al., 1995; Kearns et al., 2000; Langlois & Kitchen, 2001; Wong, 2002; Singh, 2003; Galster, Hayes, & Johnson, 2004).

For the purposes of this study, factor analysis was deemed to be the most effective method of analysis for the following reasons:

- The primary utility of factor analysis is that it provides an alternative to subjective reasoning by detecting less obvious relationships amongst indicators.

- The factor-analytic model is used to study the patterns of relationships among indicators, with the goal of discovering something about the nature of variables that are not measured directly. Factor analysis assumes that measured variables are manifestations of an underlying latent construct (Hogan & Tchernis, 2004).

- The factor analysis method is useful for data reduction by summarizing variance and covariance patterns in multivariate data.

- By using the correlations among indicators, factor analysis introduces a reference system for organizing indicators in terms of a smaller number of factors or domains. Indicators can then be combined on the basis of their relationship to particular components or factors (Rossi & Gilmartin, 1980).

Two separate models of community distress were ultimately developed for this pilot study. The two indexes were derived carrying out a series of factor analyses to determine if there was a spatial coincidence of indicators amongst the ten cities included in the pilot study. Factor analysis provided an examination of the basic structure of the relationships among the indicators compiled in the data matrix for the pilot study, as well as ascertaining the degree to which measures reflected particular dimensions.

For each model, a series of three separate factor analyses was conducted in order to arrive at the final index of community distress. The value of the factor analysis process is that it provided insight into the ordering of the indicator variables and identified relationships amongst these variables:

- The first factor analysis identified indicators that were highly correlated providing the basis for the first reduction of indicators. This first stage was the basis for the development of two separate community distress indexes each represented by a distinct measurement of educational attainment.

- The second factor analysis assisted the project team in identifying those indicators of greatest utility while identifying redundant factors to be eliminated.

- The third and final factor analysis confirmed the inclusion of a reduced number of indicator variables structured within a framework of four factors or domains. The factor loadings of this final model provided a basis for the project team to ascribe relevant weightings for each domain.

Each factor analysis contributed to the reduction of indicators to formulate the final framework for each index. The remainder of this section will provide discussion regarding the results of this series of factor analyses for the development of the two models.

The first factor analysis included the 24 indicators that were chosen by the project team for the initial framework of the pilot study (Table 4.1). The data did not require standardization because it is built into the factor analysis procedure. This exploratory factor analysis was performed to ascertain whether a smaller number of distinct dimensions of distress could be identified.

The results of the initial factor analysis containing 24 indicator variables are presented in Table 4.2. At this stage, the correlation matrix created by the factor analysis was

evaluated to identify indicators that were highly correlated, with the objective of excluding those variables that were redundant. A total of five indictors were removed from the domain/indictor framework due to high correlations amongst similar indicators:

Table 4.2.
Factor Loadings for First Factor Analysis
(24 indicators)

Domain	**Indicator**
1	FEMALELOAN (.781)
	MAJORREPAIR (.432)
	RENTERS (.430)
	OWNERS (.494)
	MEANHOUSE (-.473)
	UNEMPLOYTOTAL (.773)
	UNEMPLOYFEMALE (.706)
	PROFESSIONAL (-.667)
	HIGHSCHOOL (.764)
	MEDIANINCOME (-.879)
	LICOHOUSEHOLD (.930)
	LICOFAMILY (.883)
	LICOINDIVIDUAL (.782)
	TRANSFER (.765)
2	MINORITY (.717)
	SEGREGATION (.656)
	ATTENDANCE (.552)
	BACHELOR (.641)
3	MULTIPLE (.771)
4	DEPENDENCY (.861)
	PARTICIPATION (-.605)
5	UNEMPLOYYOUTH (-.672)
6	ABORIGINAL (.734)
7	POPCHANGE (.885)

- The indicators measuring the percentage of families and individuals under the low-income cut-off (LICOFAMILY and LICOINDIVIDUAL) were excluded. Their high correlation (.966 and .771 respectively) with LICOHOUSEHOLD demonstrates that an overall indicator of percentage of all households under the low-income cut-off is a sufficient measurement.

- The indicators representing the unemployment rate for females and youth (UNEMPLOYFEMALE and UNEMPLOYYOUTH) were excluded because these measurements were correlated (.870 and .486 respectively) with the overall unemployment rate (UNEMPLOYTOTAL).

- The indictor reflecting the percentage of the visible minority population (MINORITY) was excluded from the framework as it was highly correlated (.981) with the segregation index (SEGREGATION).

A high correlation (-.796) was also registered between the indicator reflecting the percentage of the population with at least a university bachelor degree (BACHELOR) and the variable identifying the percentage of the population with less than a high school education (HIGHSCHOOL). To further understand variations in indexes when methodology is modified, it was decided that two separate models would be developed to investigate the outcomes of choosing one of these indicators over the other. Therefore, two models were established: Model A includes the BACHELOR indicator; and Model B contains the HIGHSCHOOL variable.

For each model, a second exploratory factor analysis was conducted with the amended framework of 17 indicators and either of the two indicators of educational attainment. The results of the revised factor analyses for each model are portrayed in Table 4.3. A comparison with Table 4.2 reveals that although neither model retained seven domains in the second factor analysis, the factor loadings for each indicator changed only marginally from the initial version of the analysis.

As the framework of 18 indicators retained a similar composition as the original domain/indicator framework, the project team chose to identify those indicator variables that were of greatest utility as well as those that were redundant. A total of five additional factors were excluded for each model. The reasoning for each of these exclusions is provided below:

- The indicator related to government transfers (TRANSFER) was excluded because while it does measure dependence on the government to maintain levels of personal income, it is not possible to confirm that those individuals collecting such transfers (old age pensions, for example) are in circumstances of distress. Additionally, it was decided that LICO (LICOHOUSEHOLD) is a better measurement of poverty.

- The indicator of multiple family households (MULTIPLE) was excluded because it was determined that many living in those circumstances are also categorized as minorities. Therefore, it was decided that SEGREGATION is a superior indicator.

- The measurement of professional and managerial occupations (PROFESSIONAL) was a further indicator to be excluded because it was determined that the education measurements (BACHELOR and HIGHSCHOOL)

were similar and better-quality measurements.

- The indicator related to school attendance (ATTENDANCE) was dropped because it focuses on persons between 15 and 24 attending school. Other indicators measure the same quality of distress related to education for the entire population.

- The population change indicator (POPCHANGE) was excluded because population decline is not necessarily related to distress. Population decline cannot be assumed to be a characteristic of distress as decline in population might be caused by such events as conversion of high occupancy dwellings (such as rooming houses) back to single family.

Table 4.3
Factor Loadings for Second Factor Analysis (18 indicators),
Models A & B

Model A		**Model B**	
Domain	**Indicator**	**Domain**	**Indicator**
1	FEMALELONE (.790)	*1*	FEMALELONE (.788)
	MAJORREPAIR (.462)		MAJORREPAIR (.472)
	RENTERS (.421)		RENTERS (.427)
	OWNERS (.491)		PARTICIPATION (-.599)
	MEANHOUSE (-.538)		UNEMPLOYTOTAL (.718)
	UNEMPLOYTOTAL (.713)		PROFESSIONAL (-.701)
	PROFESSIONAL (-.725)		ATTENDANCE (-.530)
	ATTENDANCE (-.540)		HIGHSCHOOL (.805)
	MEDIANINCOME (-.891)		MEDIANINCOME (-.887)
	LICOHOUSEHOLD (.842)		LICOHOUSEHOLD (.850)
	TRANSFER (.889)		TRANSFER (.899)
2	BACHELOR (.662)	*2*	MULTIPLE (.631)
3	MULTIPLE (-.848)		OWNERS (.535)
	SEGREGATION (-.607)		SEGREGATION (.745)
4	DEPENDENCY (-.881)	*3*	MEANHOUSE (.602)
	PARTICIPATION (.584)	*4*	DEPENDENCY (-.850)
5	ABORIGINAL (.671)	*5*	POPCHANGE (.839)
6	POPCHANGE (.810)		ABORIGINAL (.432)

With the exclusion of an additional five indicators, each of the final models for the Community Distress Index consists of 13 indicators that are common across cities. For each model, the indicators were then subjected to a factor analysis to determine if there

were common dimensions of distress that were stable across the census tracts selected for the pilot study. The results of these analyses are outlined in Table 4.4 and demonstrate that, in both cases, the structure of the data was represented by four factors, or domains, that identified distinct dimensions of distress.

For Model A, the factors were identified as *Poverty*, *Education*, *Labour*, and *Marginalization*, while the factors for Model B were labelled as *Poverty*, *Housing*, *Dependency*, and *Aboriginal*. In the case of Model A, the four factors or domains account for 49.1%, 13.6%, 15.5%, and 11.5% of the variance of the data thus representing 89.7% of the total variance among variables. For Model B, the four domains account for 62.1%, 11.9%, 8.4%, and 5.5% of the variance thereby representing 87.9% of the variance of all variables included in the model.

Table 4.4
Factor Loadings for Final Factor Analysis (13 indicators), Models A & B

Model A		**Model B**	
Domain	**Indicator**	**Domain**	**Indicator**
Poverty	FEMALELONE (.811)	*Poverty*	FEMALELONE (.804)
	RENTERS (.491)		RENTERS (.488)
	OWNERS (.574)		OWNERS (.566)
	SEGREGATION (.493)		SEGREGATION (.484)
	UNEMPLOYTOTAL (.762)		UNEMPLOYTOTAL (.758)
	MEDIANINCOME (-.883) [1]		MEDIANINCOME (-.880) [1]
	LICOHOUSEHOLD (.894)		LICOHOUSEHOLD (.893)
Education	MEANHOUSE (.610) [1]		HIGHSCHOOL (.714)
	BACHELOR (.754) [1]		PARTICIPATION (-.619) [1]
Labour	DEPENDENCY (.850)	*Housing*	MEANHOUSE (.648) [1]
	PARTICIPATION (-.697) [1]		MAJORREPAIR (.543)
Marginalization	MAJORREPAIR (.631)	*Dependency*	DEPENDENCY (-.837)
	ABORIGINAL (.523)	*Aboriginal*	ABORIGINAL (-.548)

[1] For the calculation of the distress index, indicators were assigned negative values because they represent the opposite of distress in the community.

It is notable that there are differences in the factor loadings of the indicators included in both the second and final factor analyses (Tables 4.3 and 4.4). These differences are relevant to consider because factor loadings are an important component of determining the weighting for each domain in the development of an index. While individual factors did change, these changes were balanced by both increases and decreases in the factor loadings. Therefore, the summation of all factor loadings in each domain did not change significantly from the second to the final factor analysis.

4.6 Constructing the Index

Having developed the two distress models, the next step was the construction of the community distress index. First, the weighting of the four domains for each model was considered using information provided by the factor analyses as a baseline. Proper weighting of indictors permits them to be represented on a common scale. The factor score coefficients derived from the factor analysis can be used to assign weights in proportion to the amount of variance accounted for by each factor (Rossi & Gilmartin, 1980). While the summation of the coefficients was taken into consideration, the assignment of weights to each factor on the part of the project team was also based on consideration of the theoretical relevance of each factor (Table 4.4). For example, in each model, the project team assigned a greater weight for the first domain (Poverty) than was actually ascribed to it by the factor loadings because the indicators in this domain were deemed to be the most germane to the measure of community distress.

For each model, the project team assigned the following weightings to the domains:

Table 4.5
Proposed Models

Model A		Model B	
Domain	**Weighting**	**Domain**	**Weighting**
Poverty	50%	Poverty	60%
Education	19%	Housing	30%
Labour	19%	Dependency	5%
Marginalization	12%	Aboriginal	5%

According to these weightings, the formula for each community distress index was then derived as follows:

❖ **Model A**

$$CDI = .50P + .19E + .19L + .12M$$

where $P = a_{P1}x_{P1} + a_{P2}x_{P2} + a_{P3}x_{P3} + a_{P4}x_{P4} + a_{P5}x_{P5} + a_{P6}x_{P6} + a_{P7}x_{P7}$

$$E = a_{E1}x_{E1} + a_{E2}x_{E2}$$

$$L = a_{L1}x_{L1} + a_{L2}x_{L2}$$

$$M = a_{M1}x_{M1} + a_{M2}x_{M2}$$

- P,E, L and M are the values of the components: Poverty, Education, Labour Force, and Marginalization respectively; the x_i refer to the values of the indicators; and the a_i are the weights associated with each component and indicator (Table 4.5).

Table 4.6
The Canadian Community Distress Index, Model A

Domain	Indicator	Weighting
Poverty	x_{P1}: female lone parent x_{P2}: renters over 30% x_{P3}: owners over 30% x_{P4}: segregation x_{P5}: unemployment x_{P6}: median income x_{P6}: LICO	50%
Education	X_{E1}: mean house X_{E2}: bachelor	19%
Labour	X_{L1}: dependency x_{L2}: participation	19%
Marginalization	X_{M1}: aboriginal X_{M2}: major repairs	12%

❖ **Model B**

CDI = .60P + .30H + . 5D + .5A

where $P = a_{P1}x_{P1} + a_{P2}x_{P2} + a_{P3}x_{P3} + a_{P4}x_{P4} + a_{P5}x_{P5} + a_{P6}x_{P6} + a_{P7}x_{P7} + a_{P8}x_{P8} + a_{P9}x_{P9}$

$H = a_{H1}x_{H1} + a_{H2}x_{H2}$

$D = a_{D1}x_{D1}$

$A = a_{A1}x_{A1}$

- P,H, D and A are the values of the components: Poverty, Housing, Dependency, and Aboriginal respectively; the x_i refer to the values of the indicators; and the a_i are the weights associated with each component and indicator (Table 4.6).

Table 4.7
The Canadian Community Distress Index, Model B

Domain	Indicator	Weighting
Poverty	x_{P1}: female lone parent x_{P2}: renters over 30% x_{P3}: owners over 30% x_{P4}: segregation x_{P5}: unemployment x_{P6}: median income x_{P6}: LICO x_{P7}: high school x_{P8}: participation	60%
Housing	X_{H1}: mean house X_{H2}: major repairs	30%
Dependency	X_{D1}: dependency	5%
Aboriginal	X_{A1}: aboriginal	5%

The formulas provide two indexes with values ranging from 0.21 to 1.34 (Model A) and 0.23 to 1.73 (Model B). Without the application of appropriate corrective measures, it would not be possible to interpret these indexes (Rossi & Gilmartin, 1980). Therefore, a transformation was applied so that the values of the indexes range from 0 (assigned to lowest value of distress) to 100 (assigned to the highest value of distress) with the formula:

$$X = (Y - Y_{min}) * 100 / (Y_{max} - Y_{min})$$

Where X = standardized index
Y = index value for each census tract

4.7 Pilot Test Results

The pilot study proposes two general measures of community distress that take into account the multi-dimensional nature of the concept by disaggregating the indexes into factors or domains. This section considers the applicability of these indexes to identify distress in the urban context of Canada. The discussion begins with an examination of the structure of the indexes from a theoretical perspective. This is followed by an overview of the results of applying the index formulas to the data matrix containing the relevant indicators for the pilot study census tracts.

Generally, the composite and domain indexes of Model A and B that are proposed in this pilot study confirm the findings of previous research. For example, based on the theoretical foundations and precedents discussed in the preceding sections of this report, the research team considers the indicators comprising the *Poverty* Domain in both models to be the most important in relation to community distress as this domain is strongly identified with traditional indicators of distress. Moreover, the indicators of the first domain have great utility as they measure important elements of distress in a range of cities including large-, medium- and small-sized urban centres.

According to the results of the factor analysis, a relationship exists amongst the indicators in the first domain that are considered to be representative of *Poverty*. This is illustrated in both models by the two indicators measuring the proportion of renters and home-owners paying 30% or more of income on shelter, thereby indicating problems of housing affordability. Poverty is also related to the indicators of female-lone parents and segregation, as the literature specifies that incidents of low income are very high amongst female-led households, as well as visible minorities and Aboriginal persons. The indicators of unemployment, median income, and low-income cut-off add further dimensions to notions of poverty. High school attainment and participation rate are additional indicators included in the poverty domain of Model B, potentially providing greater dimensionality for the concept of poverty.

The indicators in the first domain for both Model A and B are either direct measures of, or are related to, poverty. The indicators comprising the remaining domains of both models contribute to the conceptual strength of the first domain. One question that must be raised, however, is whether these additional domains identify other elements of community distress, or are just symptoms of the poverty that is measured in the first domain.

For the second domain, mean housing value is an indicator common to both models. In Model A, the domain is labelled *Education* because of the relationship identified in the factor analysis between mean house value and the proportion of the population with a bachelor degree or better. This relationship is confirmed from a theoretical perspective as an increase or decrease in house value is tied to an increase or decrease in level of educational attainment. Therefore, greater levels of distress will be present where educational attainment levels and housing values are both relatively low.

In Model B, factor analysis provides evidence of a relationship between mean house value and the proportion of housing stock in need of major repairs. This second domain is labelled *Housing* as it has the potential to identify distress related to housing conditions. This domain can also be confirmed theoretically, because housing of lower value will generally be more likely to be in poor condition.

The third domain for Model A (*Labour*) includes both the dependency ratio and labour force participation rate. In comparison, Model B contains a third domain made up of only the dependency ratio (*Dependency*). In both models, these characteristics are particularly relevant for visible minorities and Aboriginal persons. These groups are more likely to have a larger number of children in the household and to include an extended family of older members. Similarly, they are also more likely to have low participation rates.

The final domains for both models also shed light on poverty. For example, the *Marginalization* domain in Model A identifies the concentration of the Aboriginal population which tends to be very marginalized in Canadian cities and thus Aboriginal persons are more likely to live in dwellings in need of major repairs. In Model B, this final domain is comprised of only one indicator, the proportion of the population of Aboriginal ancestry (*Aboriginal*). Most likely we would expect to see a concentration of visible minorities and Aboriginal peoples in pockets of poverty, such as is the case of Winnipeg's inner city. It can be surmised that the magnitude of distress will be greater in areas where these marginalized groups reside and live in poor quality housing.

Overall, it can be concluded that the composite and domain indexes proposed here are accurate from a theoretical perspective. However, it is also important to consider the applicability of the indexes to identify the spatial variability of distress. Using the data matrix with the relevant indicators for the pilot study census tracts, the formulas for Model A and Model B were applied and rankings of the census tracts were calculated for the composite indexes and for each domain index. The frequency distributions of these index rankings are considered in this section to evaluate the effectiveness of the proposed distress indexes to identify the distribution of distress in urban centres within Canada. Tables 4.7 (Model A) and 4.8 (Model B) portray the interval distribution of the composite and domain indixes for the census tracts of each city in the pilot study.

The tables illustrate that the composite index for Model A is more skewed towards less distress, while Model B appears to identify more census tracts that are ranked at a higher level of distress. This observation suggests that Model B may be more useful as a tool to identify the spatial extent of urban distress. However, as the discussion below will illustrate, problems with the distributions of the domain indexes may be indicative of limitations of both models to address the goal of identifying distress in Canadian urban centres.

The overall composite index for both models illustrates that Montreal and Toronto dominate the city rankings. This dominance is the result of the significant number of census tracts in these two cities. The census tracts in Toronto and Montreal comprise 68.7% of the total 2,556 census tracts included in the pilot study. The high number of

census tracts in these two cities thereby had significant influence in the development of the distress index. The Canadian Distress Index focuses on poverty related to housing and income that is particularly relevant to the experiences of Toronto and Montreal. Because of this emphasis on poverty, these two metropolitan centres had the highest rankings for the composite distress index in comparison to the other pilot study cities.

The interval distributions illustrate the predominance of the large number of census tracts in Montreal and Toronto in the development of the community distress index. The composite and poverty domain indexes for these two cities, for example, exhibit distributions that approach a normal curve with census tracts encompassing a broad range of rankings between 0 and 100. In contrast, the distributions of the census tracts in the remaining pilot study cities are concentrated in the rankings between 30 and 60. The absence of normal distributions for the composite and poverty domain indexes of the other pilot study cities is an indication that although the CDI effectively identifies distress in Montreal and Toronto, it does not capture indicators that may be pertinent to smaller sized urban centres in Canada.

As would be expected, Montreal and Toronto are also ranked highest in relation to the *Poverty* domain for both models. Table 4.9 provides the mean value for each indicator for census tracts in the first and tenth deciles of each city. In relation to the poverty domain, the table illustrates that overall, the most distressed census tracts (the tenth decile) in Montreal and Toronto exhibit high proportions of female-led households, renters and home owners paying over 30% of income on housing, high proportions of minority groups, as well as high unemployment and LICO rates and low median income. In Model B, the poverty domain is also characterized by high proportions of the population without a high school certificate in combination with low participation rates. Given that the poverty domain is allotted the greatest weighting for the index, the distress portrayed by these indicators results in the top ranking of Montreal and Toronto for both the composite and *Poverty* domain indixes in Models A and B.

While the *Poverty* Domain of Models A and B appear to contain effective indicators to identify distress, there are actually very few census tracts that record high poverty rankings, which suggest that the models do not comprehensively identify poverty. Furthermore, the interval distributions for the remaining domains illustrate the limitations of the indexes proposed in this pilot study. Both the *Education* Domain of Model A and the *Housing* Domain of Model B portray skewed distributions with most census tracts in the pilot study cities concentrated in the higher rankings above 70. The limitations of these domains can be attributed to the mean housing value indicator. The mean value of housing for a city overall may be disproportionately influenced by the existence of a small number neighbourhoods with much higher-priced housing, so that the mean value of housing in a particular census tract may vary greatly from the mean value for the city as a whole. For example, in Table 4.9, the mean house value in the tenth decile of all pilot study cities, consistently registers a value of 60% or lower in comparison to the mean housing value for the city overall. This suggests that further work is required to find a more appropriate indicator to represent housing.

Furthermore, it bears pointing out that the literature (Australian, Canadian, British and U.S.) is fairly consistent in finding that housing in itself is not the root cause of disadvantage, but only one factor in a set of interrelated factors that determine advantage and disadvantage. Improvements in housing, while positive as far as they go, are not enough in themselves to result in significant improvements in non-housing outcomes. Higher values may be strongly associated with higher incomes, higher levels of education and employment in more professional and managerial positions. However, it is actually income, education and occupation that are the "influential" factors or "drivers" of societal outcomes, not housing values. Likewise, it is these factors that increase or decrease stress as they change – not mean housing values. The link, therefore, is not housing values.

It is also notable that Winnipeg ranks highest, followed by Regina, in the final domain of Models A and B. This confirms that the distress experienced in these Prairie cities is related to the marginal position of many Aboriginal peoples. Table 4.7 illustrates that census tracts in the tenth decile in both Winnipeg and Regina have high proportions of Aboriginal persons who are over-represented by households living in sub-standard housing. The high ranking of Montreal, Toronto, and Winnipeg reveals that the Canadian Distress Index emphasizes the importance of both poverty and marginalization to identify community distress. The significance of poverty and marginalization as indicators of community distress is reinforced by the review of literature.

Similarly, the interval distribution for the *Marginalization* and *Aboriginal* domains approaches a normal curve for the census tracts of Winnipeg and Regina. This normal distribution is an indication that the domain successfully detects the distress in these two cities characterized by a large disenfranchised Aboriginal population. However, marginalization is not an important indicator of distress in the other pilot cities and, consequently, the interval distributions for the census tracts of these cities are concentrated in a smaller range of rankings. This final domain illustrates the difficulties of developing a community distress index that is relevant to all regions of Canada.

It is also notable that the *Marginalization* domain in Model A does portray more census tracts in higher rankings of distress than the *Aboriginal* domain in Model B. This is due in part to the inclusion of the indicator measuring the proportion of houses in need of major repairs as this characteristic is more relevant than the proportion of Aboriginal persons for Canadian cities outside of the prairies. This also illustrates how the manipulation of one indicator within a distress index can change the results significantly.

Table 4.7 **Model A** -- Interval Distribution of the Data: Composite and Domain Indexes,

Composite Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	0.1 (3)	0.1 (1)	0.1 (1)	0.4 (1)	0	0	0	0	0	0	0
10-19	0	0	0	0	0	0	0	0	0	0	0
20-29	0.2 (5)	0.2 (2)	0	0.9 (2)	0	0.6 (1)	0	0	0	0	0
30-39	2.7 (70)	1.4 (12)	1.3 (12)	7.3 (17)	3.6 (7)	3.7 (6)	11.8 (10)	6.1 (3)	4.5 (2)	0	6.7 (1)
40-49	26.8 (685)	23.0 (194)	16.2 (148)	57.5 (134)	37.6 (74)	26.7 (43)	49.4 (42)	38.8 (19)	29.5 (13)	56.3 (9)	60.0 (9)
50-59	48.2 (1233)	57.7 (487)	45.7 (417)	29.6 (69)	51.8 (102)	46.0 (74)	31.8 (27)	36.7 (18)	61.4 (27)	43.8 (7)	33.3 (5)
60-69	17.3 (441)	14.7 (124)	28.6 (261)	3.9 (9)	6.6 (13)	13.0 (21)	5.9 (5)	12.2 (6)	4.5 (2)	0	0
70-79	3.8 (96)	2.4 (20)	6.8 (62)	0.4 (1)	0.5 (1)	5.0 (8)	1.2 (1)	6.1 (3)	0	0	0
80-89	0.7 (18)	0.2 (2)	1.0 (9)	0	0	4.3 (7)	0	0	0	0	0
90-100	0.2 (5)	0.2 (2)	0.2 (2)	0	0	0.6 (1)	0	0	0	0	0

Poverty Domain Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	1.1 (27)	0.5 (4)	0.4 (4)	3.9 (9)	1.0 (2)	1.9 (3)	3.5 (3)	2.0 (1)	0	0	6.7 (1)
10-19	10.2 (261)	7.8 (66)	3.9 (36)	31.3 (73)	18.8 (37)	11.8 (19)	11.8 (10)	14.3 (7)	13.3 (6)	25.0 (4)	20.0 (3)
20-29	40.3 (1030)	40.4 (341)	28.7 (262)	43.3 (101)	55.3 (109)	52.8 (85)	67.1 (57)	65.3 (32)	47.7 (21)	75.0 (12)	66.7 (10)
30-39	33.6 (860)	36.7 (310)	42.5 (388)	18.0 (42)	23.4 (46)	24.2 (39)	12.9 (11)	12.2 (6)	38.6 (17)	0	6.7 (1)
40-49	11.4 (292)	11.5 (97)	19.2 (175)	2.1 (5)	1.0 (2)	5.0 (8)	2.4 (2)	6.1 (3)	0	0	0
50-59	2.3 (59)	21.8 (18)	3.2 (29)	1.3 (3)	0.5 (1)	3.7 (6)	2.4 (2)	0	0	0	0
60-69	0.7 (19)	0.6 (5)	1.4 (13)	0	0	0.6 (1)	0	0	0	0	0
70-79	0.2 (6)	0.1 (1)	0.5 (5)	0	0	0	0	0	0	0	0
80-89	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0
90-100	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0

Education Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drummondville
0-9	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0
10-19	0	0	0	0	0	0	0	0	0	0	0
20-29	0.04 (1)	0	0.1 (1)	0	0	0	0	0	0	0	0
30-39	0.2 (4)	0.4 (3)	0	0.4 (1)	0	0	0	0	0	0	0
40-49	0.04 (1)	0.6 (5)	0.5 (5)	0.4 (1)	0	0	0	0	0	0	0
50-59	0.5 (13)	0.7 (6)	0.5 (5)	0	0	0	2.4 (2)	0	0	0	0
60-69	1.9 (48)	1.8 (15)	2.6 (24)	1.7 (4)	0	0.6 (1)	3.5 (3)	0	2.3 (1)	0	0
70-79	8.1 (208)	7.8 (66)	7.8 (71)	13.3 (31)	7.6 (15)	6.8 (11)	10.6 (9)	4.1 (2)	6.8 (3)	0	0
80-89	44.8 (1145)	43.4 (366)	47.7 (435)	49.4 (115)	40.6 (80)	37.3 (60)	42.4 (36)	42.9 (21)	45.5 (20)	43.8 (7)	33.3 (5)
90-100	44.0 (1125)	45.3 (382)	40.7 (371)	34.8 (81)	51.8 (102)	55.3 (89)	41.2 (35)	53.1 (26)	45.5 (20)	56.3 (9)	66.7 (10)

Labour Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drummondville
0-9	0.1 (2)	0.2 (2)	0	0	0	0	0	0	0	0	0
10-19	0.3 (8)	0.7 (6)	0.2 (2)	0	0	0	0	0	0	0	0
20-29	2.6 (66)	4.5 (38)	1.2 (11)	1.7 (4)	0.5 (1)	0.6 (1)	5.9 (5)	2.0 (1)	9.4 (4)	0	6.7 (1)
30-39	13.3 (339)	20.1 (170)	9.8 (89)	11.6 (27)	5.6 (11)	6.8 (11)	9.4 (8)	4.1 (2)	34.1 (15)	0	40.0 (6)
40-49	34.2 (873)	41.1 (347)	35.4 (323)	28.6 (67)	18.3 (36)	17.4 (28)	45.9 (39)	14.3 (7)	47.7 (21)	6.3 (1)	26.7 (4)
50-59	34.6 (884)	24.3 (205)	37.4 (341)	36.1 (84)	52.8 (104)	50.9 (82)	32.9 (28)	49.0 (24)	9.1 (4)	56.3 (9)	20.0 (3)
60-69	13.0 (333)	7.5 (63)	13.8 (126)	18.0 (40)	22.3 (44)	21.1 (34)	4.7 (4)	26.5 (13)	0	37.5 (6)	6.7 (1)
70-79	1.9 (49)	1.4 (12)	2.1 (19)	3.9 (9)	0.5 (1)	3.1 (5)	1.2 (1)	4.1 (2)	0	0	0
80-89	0.04 (1)	0	0.1 (1)	0	0	0	0	0	0	0	0
90-100	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0

Marginalization Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	30.8 (787)	29.3 (247)	40.2 (367)	34.8 (81)	13.2 (26)	8.7 (14)	20.0 (17)	18.4 (9)	34.1 (15)	18.8 (3)	53.3 (8)
10-19	46.0 (1177)	52.0 (439)	42.2 (385)	47.2 (110)	52.3 (103)	22.4 (36)	62.4 (53)	24.5 (12)	56.8 (25)	43.8 (7)	46.7 (7)
20-29	17.1 (438)	17.4 (147)	15.1 (138)	14.6 (34)	19.3 (38)	29.8 (48)	14.1 (12)	22.4 (11)	9.1 (4)	37.5 (6)	0
30-39	3.8 (96)	1.2 (10)	2.0 (18)	3.4 (8)	11.2 (22)	16.8 (27)	3.5 (3)	16.3 (8)	0	0	0
40-49	0.8 (20)	0.1 (1)	0.2 (2)	0	2.0 (4)	6.2 (10)	0	6.1 (3)	0	0	0
50-59	0.6 (16)	0	0.2 (2)	0	1.5 (3)	6.2 (10)	0	2.0 (1)	0	0	0
60-69	0.4 (9)	0	0	0	0.5 (1)	4.3 (7)	0	4.1 (2)	0	0	0
70-79	0.2 (5)	0	0	0	0	1.9 (3)	0	4.1 (2)	0	0	0
80-89	0.1 (2)	0	0	0	0	0.6 (1)	0	0	0	0	0
90-100	0.2 (6)	0	0	0	0	3.1 (5)	0	2.0 (1)	0	0	0

Table 4.8 **Model B** -- Interval Distribution of the Data: Composite and Domain Indexes,
Composite Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	0.1 (3)	0.04 (1)	0.1 (1)	0.4 (1)	0	0	0	0	0	0	0
10-19	0.04 (1)	0.04 (1)	0	0	0	0	0	0	0	0	0
20-29	0.04 (1)	0.04 (1)	0	0	0	0	0	0	0	0	0
30-39	0.7 (18)	0.9 (8)	0.3 (3)	1.7 (4)	0	1.2 (2)	1.2 (1)	0	0	0	0
40-49	8.2 (210)	5.8 (49)	4.4 (40)	23.2 (54)	9.1 (18)	10.6 (17)	18.8 (16)	18.4 (9)	11.4 (5)	0	13.3 (2)
50-59	36.4 (931)	35.2 (297)	26.3 (240)	54.5 (127)	48.7 (96)	34.2 (55)	57.6 (49)	44.9 (22)	54.5 (24)	75.0 (12)	60.0 (9)
60-69	39.6 (1013)	45.5 (384)	44.8 (409)	18.5 (43)	38.1 (75)	32.9 (53)	17.6 (15)	24.5 (12)	31.8 (14)	25.0 (4)	26.7 (4)
70-79	11.9 (304)	10.3 (87)	19.6 (179)	1.3 (3)	3.6 (7)	12.4 (20)	4.7 (4)	6.1 (3)	2.3 (1)	0	0
80-89	2.4 (62)	1.7 (14)	3.5 (32)	0.4 (1)	05. (1)	6.8 (11)	0	6.1 (3)	0	0	0
90-100	0.5 (13)	0.2 (2)	0.9 (8)	0	0	1.9 (3)	0	0	0	0	0

Poverty Domain Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	1.5 (39)	0.8 (7)	0.4 (4)	8.2 (19)	1.0 (2)	1.2 (2)	3.5 (3)	2.0 (1)	0	0	6.7 (1)
10-19	15.7 (401)	11.0 (93)	6.3 (57)	47.2 (110)	26.9 (53)	17.4 (28)	35.3 (30)	30.6 (15)	15.9 (7)	18.8 (3)	33.3 (5)
20-29	42.1 (1075)	47.2 (398)	33.8 (308)	35.2 (82)	47.7 (94)	49.1 (79)	48.2 (41)	46.9 (23)	68.2 (30)	75.0 (12)	53.3 (8)
30-39	28.7 (733)	30.3 (256)	39.7 (362)	7.3 (17)	21.8 (43)	19.3 (31)	9.4 (8)	14.3 (7)	15.9 (7)	6.3 (1)	6.7 (1)
40-49	9.1 (232)	8.1 (68)	15.1 (138)	1.7 (4)	1.5 (3)	8.7 (14)	2.4 (2)	6.1 (3)	0	0	0
50-59	2.1 (53)	1.8 (15)	3.2 (29)	0.4 (1)	1.0 (2)	3.1 (5)	1.2 (1)	0	0	0	0
60-69	06. (16)	0.6 (5)	1.0 (9)	0	0	1.2 (2)	0	0	0	0	0
70-79	0.2 (5)	0	0.5 (5)	0	0	0	0	0	0	0	0
80-89	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0
90-100	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0

Housing Domain Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	0.04 (1)	0.1 (1)	0	0	0	0	0	0	0	0	0
10-19	0	0	0	0	0	0	0	0	0	0	0
20-29	0.04 (1)	0	0.1 (1)	0	0	0	0	0	0	0	0
30-39	0.1 (3)	0.2 (2)	0	0.4 (1)	0	0	0	0	0	0	0
40-49	0.3 (8)	0.5 (4)	0.3 (3)	0.4 (1)	0	0	0	0	0	0	0
50-59	0.5 (12)	0.8 (7)	0.4 (4)	0	0	0	1.2 (1)	0	0	0	0
60-69	0.9 (24)	1.2 (10)	1.1 (10)	1.3 (3)	0	0	1.2 (1)	0	0	0	0
70-79	5.8 (149)	5.9 (50)	6.4 (58)	4.7 (11)	5.1 (10)	6.2 (10)	5.9 (5)	6.1 (3)	4.5 (2)	0	0
80-89	48.8 (1248)	49.1 (414)	45.2 (412)	54.5 (127)	50.3 (99)	46.0 (74)	56.5 (48)	51.0 (25)	61.4 (27)	68.8 (11)	73.3 (11)
90-100	43.4 (1110)	42.2 (356)	46.5 (424)	38.6 (90)	44.7 (88)	47.8 (77)	35.3 (30)	42.9 (21)	34.1 (15)	31.3 (5)	26.7 (4)

Dependency Domain Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	0.1 (3)	0.4 (3)	0	0	0	0	0	0	0	0	0
10-19	0.4 (11)	0.9 (8)	0.1 (1)	0	0	1.2 (2)	0	0	0	0	0
20-29	1.4 (37)	1.5 (13)	1.1 (10)	2.6 (6)	1.5 (3)	1.2 (2)	1.2 (1)	4.1 (2)	0	0	0
30-39	6.7 (170)	4.6 (39)	7.6 (69)	5.2 (12)	7.1 (14)	15.5 (25)	4.7 (4)	6.13 (3)	4.5 (2)	0	13.3 (2)
40-49	27.0 (689)	25.8 (218)	29.1 (265)	22.3 (52)	27.9 (55)	38.5 (62)	14.1 (12)	36.7 (18)	9.1 (4)	12.5 (2)	6.7 (1)
50-59	44.8 (1145)	44.5 (376)	43.4 (396)	47.2 (110)	46.7 (92)	34.8 (56)	60.0 (51)	38.8 (19)	52.3 (23)	75.0 (12)	66.7 (10)
60-69	14.0 (359)	13.4 (113)	14.6 (133)	18.9 (44)	10.7 (21)	7.5 (12)	12.9 (11)	14.3 (7)	31.8 (14)	12.5 (2)	13.3 (2)
70-79	3.4 (88)	5.5 (46)	2.5 (23)	1.3 (3)	5.1 (10)	1.2 (2)	3.5 (3)	0	2.3 (1)	0	0
80-89	1.6 (41)	2.7 (23)	1.3 (12)	1.7 (4)	0.5 (1)	0	1.2 (1)	0	0	0	0
90-100	0.5 (13)	0.6 (5)	0.3 (3)	0.9 (2)	0.5 (1)	0	2.4 (2)	0	0	0	0

Aboriginal Domain Index: Interval Distributions

Index Intervals	All CTs	Montreal	Toronto	Ottawa	Edmonton	Winnipeg	Halifax	Regina	St. John's	Red Deer	Drum mond-ville
0-9	92.7 (2370)	99.9 (843)	99.8 (910)	98.7 (230)	72.6 (143)	40.4 (65)	100.0 (85)	44.9 (22)	100.0 (44)	81.3 (13)	100.0 (15)
10-19	4.3 (111)	0.1 (1)	0.1 (1	1.3 (3)	18.3 (36)	34.2 (55)	0	24.5 (12)	0	18.8 (3)	0
20-29	1.5 (39)	0	0.1 (1)	0	6.6 (13)	9.3 (15)	0	20.4 (10)	0	0	0
30-39	0.4 (11)	0	0	0	1.5 (3)	4.3 (7)	0	2.0 (1)	0	0	0
40-49	0.3 (8)	0	0	0	0.5 (1)	3.7 (6)	0	2.0 (1)	0	0	0
50-59	0.3 (7)	0	0	0	0.5 (1)	3.1 (5)	0	2.0 (1)	0	0	0
60-69	0.2 (5)	0	0	0	0	3.1 (5)	0	4.1 (2)	0	0	0
70-79	0.1 (3)	0	0	0	0	0.6 (1)	0	0	0	0	0
80-89	0.04 (1)	0	0	0	0	0.6 (1)	0	0	0	0	0
90-100	0.04 (1)	0	0	0	0	0.6 (1)	0	0	0	0	0

Table 4.9 Mean Values for Indicators, Top and Bottom Deciles

City/ Decile (D)	Female Lone	Renters > 30%	Owners > 30%	Segre-gation	Unem-ploymen t	Median Income	LICO	High School	Partici-pation	Mean House	Major Repairs	Depend-ency	Abori-ginal	Bachelor
Pilot/D 1	6.8	22.9	9.6	2.5	3.4	138.1	5.3	10.4	77.7	142.6	2.6	25.0	0	41.9
Pilot/D 10	23.7	50.0	29.0	53.2	10.9	71.8	37.4	39.5	57.7	66.4	12.9	36.8	3.9	7.7
Montreal/D 1	7.4	21.6	9.9	1.3	3.8	141.5	7.6	10.4	76.2	149.2	3.3	22.6	0	40.8
Montreal/D 10	24.9	46.3	30.3	31.6	13.1	70.5	45.0	41.1	56.4	68.4	12.8	36.2	0.9	6.9
Toronto/D 1	6.8	26.4	13.5	6.7	3.3	140.3	4.9	10.3	77.8	141.6	2.0	25.5	0	44.5
Toronto/D 10	21.8	52.7	31.3	69.9	9.1	71.9	31.4	37.3	59.8	66.5	12.7	36.9	1.1	10.6
Ottawa/D 1	6.0	18.8	6.4	3.1	2.9	138.4	3.0	7.5	79.8	141.3	2.2	25.2	0.3	49.6
Ottawa/D 10	22.8	49.6	20.5	31.5	9.0	66.7	34.4	33.9	58.6	56.2	12.4	36.2	2.6	10.3
Edmonton/ D 1	6.2	21.6	9.1	4.6	3.3	130.4	5.8	13.2	78.3	132.8	3.4	25.7	1.4	35.1
Edmonton/D 10	22.2	45.1	21.6	35.5	8.1	78.2	31.6	39.7	62.5	72.1	11.8	36.8	10.0	6.2
Winnipeg/D 1	6.2	16.7	7.5	6.4	3.2	133.4	5.0	15.7	78.4	138.1	3.2	27.5	1.9	32.7
Winnipeg/D 10	27.6	48.9	17.5	49.8	9.6	75.1	40.9	44.7	57.2	48.9	18.1	39.0	23.8	5.6
Halifax/D 1	6.9	27.1	8.9	1.9	4.7	130.0	5.8	9.8	75.7	150.9	4.0	24.4	0.1	46.9
Halifax/D 10	27.9	52.6	20.4	15.7	10.2	76.0	31.5	34.8	56.9	68.2	12.4	35.4	2.1	8.7
Regina/D 1	6.9	16.1	7.1	4.5	3.4	131.0	4.0	14.5	82.0	132.4	1.3	27.0	1.4	32.2
Regina/D 10	27.9	53.5	20.4	22.7	12.7	66.6	36.8	41.0	55.4	57.9	17.3	37.8	16.0	5.0
St. John's/D 1	8.0	25.0	8.6	0.5	8.7	130.3	7.6	12.8	71.8	140.6	2.2	24.6	0	34.3
St. John's/D 10	25.6	56.9	18.7	4.4	16.8	71.6	36.1	38.5	55.2	71.5	11.6	34.4	1.4	6.5
Red Deer/D 1	10.1	27.5	11.3	5.5	3.0	126.0	6.2	18.0	81.7	125.0	2.8	25.7	2.1	18.5
Red Deer/D 10	21.2	48.4	25.1	13.7	7.2	77.7	26.0	34.8	66.4	64.2	11.4	34.5	8.0	6.2
Drum-ville/D 1	4.4	22.1	8.1	0.1	5.3	122.4	6.5	23.0	75.4	118.5	2.7	25.6	0	15.8
Drum-ville/D 10	23.2	46.1	18.4	2.8	13.9	72.5	40.4	47.1	51.0	83.9	10.0	38.5	1.3	4.4

4.7.3 Comparing with Winnipeg Neighbourhood Designations

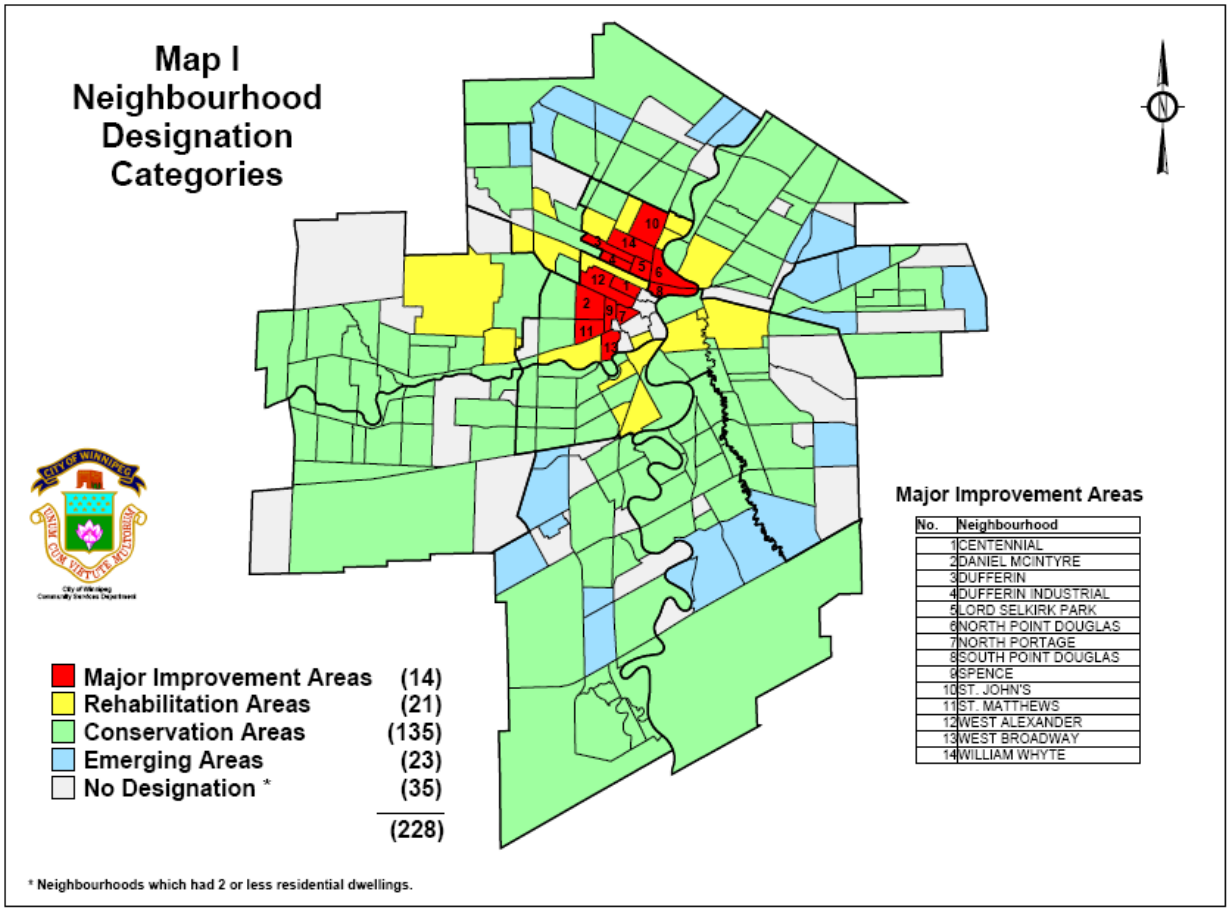
In order to examine the results more closely and to make general comparisons with the Winnipeg Neighbourhood Designation (See section 4.7.3), the composite index for Winnipeg was mapped by individual census tracts (Figures 4.2 and 4.3). It is important to note that while generalizations can be made with reference to the results of the CDI model and that of the City's map (Figure 4.1), it must be noted that the CDI model relied on census tracts while the City uses neighbourhoods. While there are some similarities between these two geographic units, comparisons should be viewed as illustrative and preliminary.

As is seen in Figure 4.1, The City of Winnipeg classified neighbourhoods into four categories with 35 neighbourhoods falling within the two ranks considered to be associated with higher levels of distress: "major improvement" and "rehabilitation areas." The "major improvement" category consists of 14 neighbourhoods that are defined a zone of pronounced and concentrated poverty, marginalization and poor quality housing. Surrounding these inner city are neighbourhoods are "rehabilitation areas", or places in which the effects of decline in the "major improvement" neighbourhoods are having a "spillover" effect . When one excludes the 35 neighbourhoods listed as having no designation, just over 18 percent of Winnipeg neighbourhoods fall within these two categories, with 7.25 percent thought to be clearly in decline (or listed as major improvement) and the remainder being on the cusp of decline.

In order to represent spatially the CDI model results, GIS techniques were employed. The data for the composite index, by census tract, were entered and mapped. The results appear to be reasonably consistent with the City of Winnipeg's classification system. In looking at Models A and B (Figure 4.2 and 4.3), just under 30 CT's were classified as "high distress" uses slightly different scales and variables. In exploring the second ring of distress as denoted by the orange colour on both Models, again some consistency can be seen with the City of Winnipeg's Rehabilitation classification. According to the City of Winnipeg, these would be areas of concern warranting targeted intervention to "stimulate private reinvestment and improve infrastructure" (City of Winnipeg 2000a, p. 1).

A second component of the analysis is the "flagging" suburban distress in Winnipeg. Represented by orange on both maps, reveal some pockets of distress that appear concentrated in public housing projects that are generally associated with contributing to the potential for decline through high levels of poverty. Model A also shows one outlying CT is the eastern part of the city as ranking high (shown in red) on the fringe of the city. Again, it is thought that there is a relationship between this pocket of distress and ageing suburban locations.

Figure 4.1



Source: City of Winnipeg Neighbourhood Designation Report (2000).

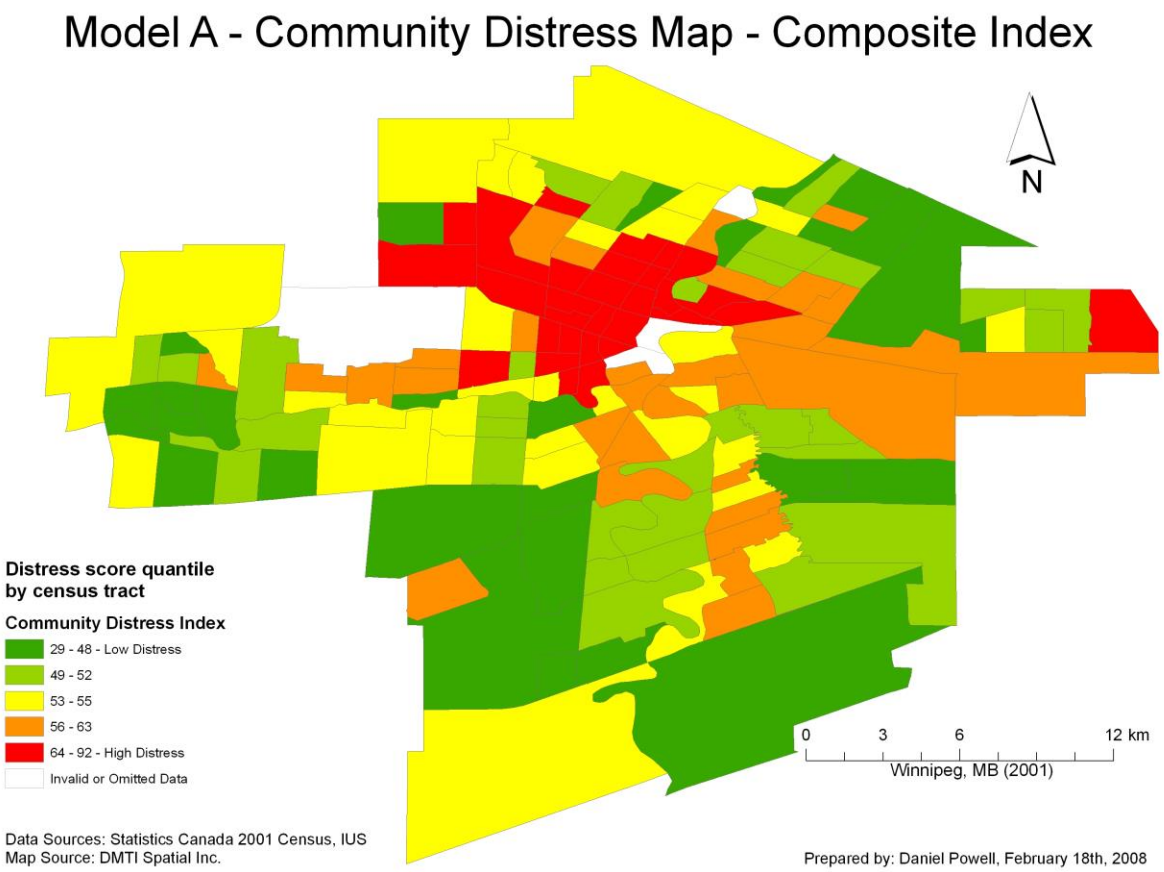

Model A - Community Distress Map - Composite Index
N
Distress score quantile
by census tract
Community Distress Index
29 - 48 - Low Distress
49 - 52
53 - 55
56 - 63
64 - 92 - High Distress
Invalid or Omitted Data
0
3
6
12 km
Winnipeg, MB (2001)
Data Sources: Statistics Canada 2001 Census, IUS
Map Source: DMTI Spatial Inc.
Prepared by: Daniel Powell, February 18th, 2008

Figure 4.2

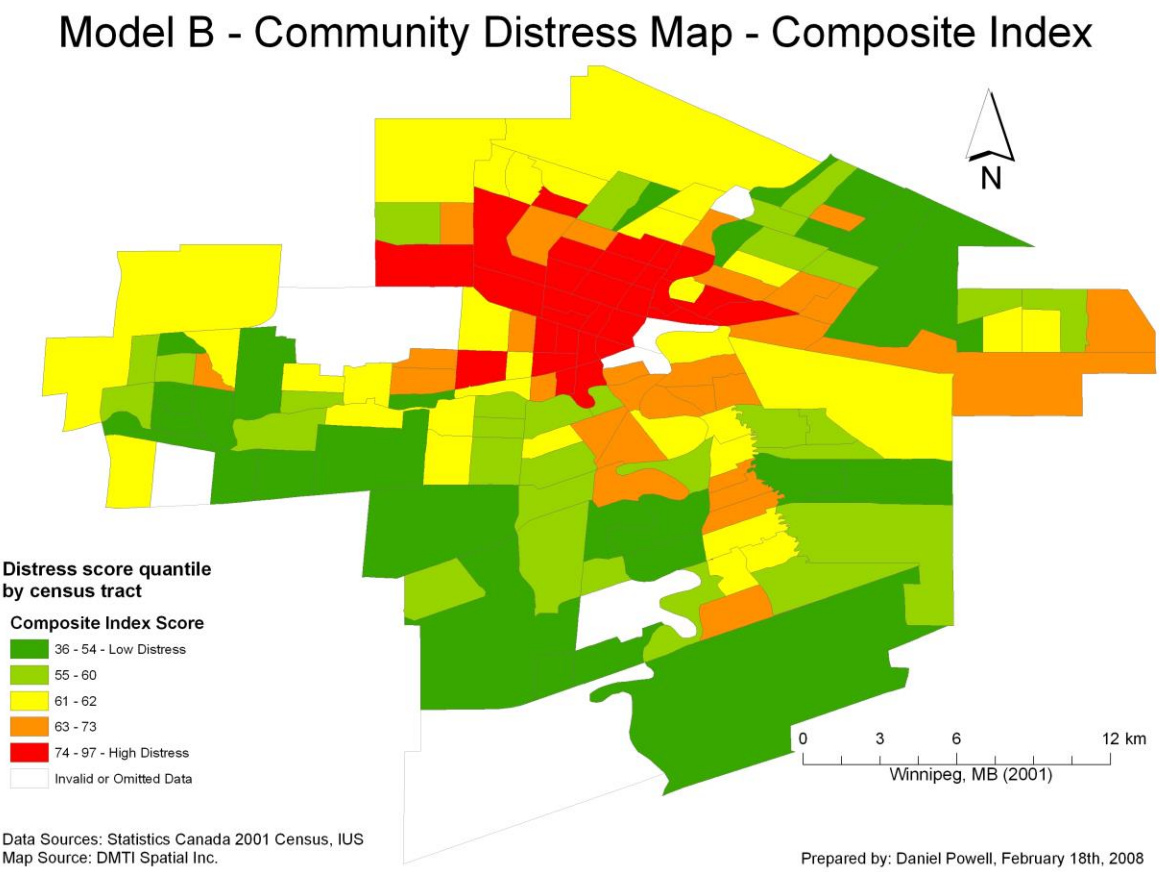

Model B - Community Distress Map - Composite Index
N
Distress score quantile
by census tract
Composite Index Score
36 - 54 - Low Distress
55 - 60
61 - 62
63 - 73
74 - 97 - High Distress
Invalid or Omitted Data
0
3
6
12 km
Winnipeg, MB (2001)
Data Sources: Statistics Canada 2001 Census, IUS
Map Source: DMTI Spatial Inc.
Prepared by: Daniel Powell, February 18th, 2008

Figure 4.3

Overall, the mapping of the CDI by census tract proved useful in explaining the spatial representation of distress. In the case of Winnipeg, there appears to be a clear association between those census tracts that illustrate higher levels of distress according to the CDI model, and the City of Winnipeg's designations. Also, it should be noted that those areas that ranked high in Winnipeg also tended to be concentrated in the inner city. The models also reveal a suburban aspect in that distress was picked up by the CDI in both models, demonstrating that the characteristics of distress are not confined to the inner city and immediate ring surrounding this zone as depicted by the City's approach. Therefore, it is thought that the CDI does present a useful tool in identifying a more robust picture of distress that can detect outlying areas experiencing high levels of poverty.

4.8 Pilot Test: Outcomes and Limitations

The CDI produced two distinct outcomes: the first being the overall ranking of the cities, and secondly the ranking of individual census tracts. Through both measures the pilot test phase confirmed that it is possible to nominally assess distress over a large and diverse geography. While the first part of the analysis produced meaningful possibilities for the general assessment of distress, it is contended that the second assessment – that of ranking by each of the domains -- offers a second and important perspective on the factors thought to contribute to distress.

The pilot test also revealed that there are a number of key limitations, not only to the specifics of the models we employed, but also to the whole project of seeking a nationwide assessment of distress:

1. The overwhelming number of CTs in Toronto and Montreal is thought to have influenced the outcome of the pilot test by reducing the influence of factors in smaller cities and the patterns of distress overall.

2. This suggests that the CDI should be run separately for cities of different sizes -- for Tier One Cities, then Tier Two Cities etc. However, this then reduces the ability to use either model to compare levels of distress amongst all cities in our urban system.

3. Size matters. The model, based as it is on the geography of CTs, is perhaps not the best approach for small cities: Red Deer and Drumondville for example, have only a few CTs each, but the diversity of the population in these CTs may be hidden by the averages or values used for the indicators in the model. In larger cities populations within CTs tend to be more homogenous so indicator averages and values may be more reflective of the nature of the population. Several informants from smaller cities informed us that the CT is not a good geographical basis for planning in their communities.

4. The decisions of the team concerning the weightings of Domains also built in a particular bias. Although the importance of the indicators was well-grounded in research identified in the literature, the default weightings used in the pilot test were assigned on a relatively arbitrary basis (but informed by statistical tests). At the same time, the levels of stress and the patterns or distributions of stress identified within the particular Domains depended a great deal on these weightings, and changing the weighting would have resulted in different patterns. If the team felt, for example, that diversity (female lone parents, major repairs and Aboriginal) should be allocated 40% of the weighting this could significantly change the pattern of distress within cities and the level of distress between cities.

5. Our index does not necessarily advance the approaches used to identify distress much beyond the historical and traditional approaches that are identified in the literature. This is not so much a weakness as a reflection of the fact that the research in this field is both substantial and long-standing, and our objective was to derive our measures from it, not to contribute new ones. Nevertheless, what this research clearly identified is the challenges facing a country with as many diverse urban places as Canada and attempting to define a single model or method is undoubtedly complex.

6. When one is working on a national basis, it is difficult to go beyond the data available from Statistics Canada without significant cost. As a result, the development of measures of distress in this model was determined in large part by the data available. More regionally-based indexes that would be able to take advantage of locally-produced administrative data would have taken into account a wider range of indicators that many communities consider very important in measuring distress. These range from crime statistics to data that measures community capacity and support networks to environmental features of neighbourhoods. Many cities are now collecting and incorporating this data into their planning models.

7. Closely related to this lack of local context is the fact that statistics are relatively faceless. To really be an effective policy and programming tool the model has to be supplemented with a mapping exercise that illustrates visually the location of distressed CTs in a city and the development of important contextual material ranging from land use patterns, transportation issues, barriers that may isolate the area, the nature of commercial and housing disinvestment and a range of other factors. These elements, characteristics and relationships of place are very important in enhancing the distress indexes developed by "putting a face" on rather faceless statistics.

8. The absence of such local data means that the CDI cannot capture local circumstances that might be important in explaining distress or the lack of the same. The model provides comparatives levels but none of the associated place based characteristics and circumstances that are very important in understanding distress and planning for initiatives to address stress. For example, a concentration of public

housing would probably be identified by the model as a locus of distress because of the low incomes, the high proportion of single parents and the high level of ethnic diversity in the CT. However, it would not capture the strength of social networks in the neighbourhood, that there is a high level of social cohesion, and that many organizations that have successfully brought needed services to the area.

This leads to our final point: That the model is necessarily constrained by its focus on *distress*. As a consequence it lacks important sectors of data that measure community strength and viability as well as the capacity to resist neighbourhood decline. Use of the CDI would be complemented by the development and use of an additional model that measures community vitality, well-being and capacity (see Appendix E).

5.0 Conclusions and Recommendations

This report tested a methodology for identifying urban distress on a national scale and determined that the Canadian Distress Index is effective at identifying areas of distress, particularly using indicators of poverty. This may be related to the "one-way" causation of some indicators. For example, the literature and other work in this area clearly illustrate the one-way relationship between poverty, marginalization and levels of distress: as poverty increases or decreases so do levels of distress; increasing proportions of marginalized people also lead to higher levels of distress. With some of the other indicators included in the CDI the association between changes in the indicator and levels of distress is not always one way. For example, the level of distress could increase with increasing dependency ratios (proportion of seniors), but if the seniors are rich, distress could decrease. With increases in housing prices, the level of distress might decrease, but distress could increase with rising house prices if those houses were formerly occupied by low-income households now rendered homeless through displacement.

The inherent complexity of urban conditions does present the researcher and policymaker with the realization that any effort at nationwide index has a number of key limitations and shortcomings. Chief among these must be the recognition that it is difficult to determine cause-and-effect relationships. Efforts to identify what neighbourhood characteristics matter most and to quantify their importance overall have been inconclusive, but two factors that seems to stand out are affluence and education. As seen above, housing characteristics are really just a proxy for income, employment and education, which are in fact the key predictive indicators.

Therefore, policy-makers need to be reasonably modest about what can be known about the scale and causes of neighbourhood effects and recognize there are three types of influences: endogenous (factors external to the neighbourhood and perhaps the city: Labour force re-structuring for example); contextual (often physical and social characteristics of the area: local institutions/agencies, physical barriers that isolate neighbourhoods, etc) and correlated effects (the complex interrelationship of factors/indicators). Such complexity cannot be easily rendered. However, an embedded strength of the CDI model was that the factor analysis was able to take a range of variables, and as a group, present a view of distress that would not be possible by looking at any of the variables on independently. Therefore, the composite view achieved in the models is thought to provide a good indication as to the level and location of distress for a given community.

With respect to geography, an most important conclusion concerning the CDI is that it further work is needed to assess the ability to compare across cities or census tracts of various size. As well, any assessment of distress resulting from the model should be considered as forming a part of an initial assessment. The Canadian Distress Index is therefore a valid tool under certain conditions that has potential to help inform policy makers about the general characteristics of distress.

To move the process forward the research team offers the following recommendations:

- A spatial representation of the results within each centre would be a valuable tool in identifying the extent to which distress is spatially concentrated. This should take the form of mapping the results and comparing them to locally-derived documents as was demonstrated in pilot test;

- Spatial analysis would also reveal the inequities occurring within centres, for instance displaying (as was the case in Winnipeg), the unique circumstances in inner city areas;

- Exploring the results over a broader timeframe is critical to determining the extent to which distress might be expanding or retracting. This could be done for 1996, 2001 and the forthcoming 2006 Census results;

- Comparing cities across tiers (one, two and three) as was done in this report resulted in too many data problems; results should be compared within each tier, thereby eliminating the potential dominating influence of Toronto and Montreal and the sheer number of census tracts within these centres;

- Running the results for all Canadian CMAs and CAs would be an important next step to help confirm findings or affirm the above point on separating out centres by size of the community or of census tracts themselves;

- More specific attention is needed to understand and measure distress for smaller communities that lack readily available census tract data, and also for rural areas that were not captured in the pilot test phase of this project, as their characteristics are thought to vary substantively from those of urban centres;

- While the two attempted CDI models utilized "default weightings" for each domain, the use of this index for specific policy and program objectives might require calibration of these weightings to better suit these purposes, whatever they may be;

- A local context is necessary to help interpret the results. This might involve the review of more local qualitative data or opinions from local experts to help understand the local contributors to distress;

The default settings and the models utilized in this pilot test did not prove appropriate for use on a nation-wide comparison. Different-sized cities appear to require analysis geared appropriately to their geographic scale. It may, as a consequence, be extremely difficult to develop a model that permits valid comparisons to be made of all cities across Canada at once that takes into account not only urban centres but rural as well. There are too many differences from city to city and as a result too many data problems. A more focused approach and a targeted on-the-ground assessment of local circumstances might be more effective.

In short, the CDI should not be seen as the last word on analyzing distress. It is critical that local confirmation of any results be sought with local informants and experts. The most effective means to undertake this step would be to map the results and then discuss the findings by each of the domains with local experts to clearly understand the various dimensions of distress.

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Appendix A: Neighbourhood Theory Summary

A summary of the theories aimed at explaining neighbourhood change and the basic processes that characterize them.

ECOLOGICAL THEORIES	
Theory, Source	**Processes**
Neoclassical or Bid Rent Theory Alonso 1960, 1964, Pitkin 2001**,** Morrill 1991, Muth 1969 in Lucy and Pshillips 2000	Resident's location decision is a trade-off between land, housing, and transportation costs. Middle- and upper-income can purchase more of land and housing at lower unit costs toward the periphery while affording the transportation costs. Poor occupy smaller and older housing closer to work sites.
Concentric Zones or Invasion/Succession Burgess 1925, Lucy and Phillips 2000, Pitkin 2001	Concentric zone residential pattern in which lower-income people would locate toward the centre and higher-income people would locate toward the edge of metropolitan settlements: the central business district; the industrial sector ; slum housing; working-class housing; higher-status dwellings; and commuter housing
Border or Tipping Model Leven et al., 1976 in Pitkin 2001	Also focuses on the locational decisions of residents, expanding the explanatory variables to social characteristics such as race. The racial transition of a neighbourhood will have an impact on existing residents and increase out-migration; these changes will affect how residents from surrounding areas perceive their own neighbourhoods, especially along the "borders" of the neighbourhoods.
Life-cycle Theory Birch 1971, HUD 1975, Bourne 1982, Metzger 2000	Neighbourhood change is a life cycle ending in inevitable decline.
Vacancy Chain Analysis Hartshorn 1992, Knox 1994 in Lucy and Phillips 2000	When a household moves to a new unit at the periphery, it creates a vacancy, which is filled by another household, which leaves a vacancy at its old address and so on. The building of new housing at the periphery sets in motion vacancy chains reaching far back into the central core. Demand and price decline, which in turn leads to opportunities for the region's poor.
Environmental Determinism Carley, 1990	Focuses on the physical environment as a major determinant of social patterns. It implied a one-way process in which the physical environment is the independent and human behaviour the dependent variable. Control and manipulation of the physical environment had a direct and determinate effect on social behaviour.
Filtering Hoyt 1933, Downs 1981, Lucy and Phillips 2000, Smith 1963, Pitkin 2001, Galster et al. 2003	Housing filters down from the rich to the middle class to the poor as property owners invest less in ageing properties due to rising maintenance costs and move to new housing on the periphery.
Sectoral Model Hoyt 1939	The direction, not the distance, is the key factor in determining the spatial organization of an area. While the growth is still outward, areas growing in the same direction tend to maintain the original socio-economic characteristics of more inner areas.

Multiple Nuclei Model Harris and Ullman 1945	Suggests that a city may have more than one nuclei/centre apart from the CBD from which zones develop. Specialized cells of activity develop according to specific requirements of certain activities, different rent-paying abilities, and the tendency for some kinds of economic activity to cluster together.
Obsolescence and Pull Hypotheses Bourne 1982, Broadway 1995, CMHC 2001	Distress is interpreted as an outcome of a physically and socially declining inner city and an overriding preference for suburban living.

SUBCULTURAL	
Theory, Source	**Processes**
"Broken Windows' Wilson and Kelling 1982	A loss of social control is caused by the gradual growth in 'incivilities': the lack of informal social control through neighbourhood instability and poor services leads to people tolerating broken windows and other minor damage. This leads to neighbourhood decline.
Urban Underclass Wilson 1987, Kasarda 1990, Ley and Smith 1997, Glennerster et al. 1999	Area problems are created by the people who live there. An underclass is people who have a life-style that conflicts with mainstream values and cannot or do not want to help themselves or their children. Existence of underclass creates or helps to drive area decline.
Cycles of Disadvantage Carley, 1990	Recurring cycles of socio-economic disadvantage. Households are locked in these cycles.
Social Area Analysis Shevsky and Bell 1955	The analysis concentrates on the social characteristics of the urban population in attempting to explain land use. "Social areas" clusters of city areas can be defined according to 1) economic status, 2) family status and 3) ethnic composition.
Subcultural Theories Pitkin 2001	Resident confidence, satisfaction, commitment and social networks are important for understanding neighbourhood change. There are many subcultures that vary across neighbourhoods and neighbourhoods can remain stable or even improve if the social structure is strong.
Social Capital Model Temkin and Rohe 1998	The forces of neighbourhood change do not affect every neighbourhood in the same way. The effect of these forces depends on the strength of the social capital in the area.

POLITICAL ECONOMY	
Theory, Source	**Processes**
Structural Change Pitkin 2001	Economic re-structuring and labour force changes impact urban neighbourhoods: employment of neighbourhood residents, social and economic inequality, the built environment, the demographics: uneven impacts of restructuring along racial lines, the social and political life.
Structural Analysis Carley 1990	Focuses on economic turbulence, the operations of multinational corporations, competition between developed countries and underdeveloped countries, and between levels of government, deindustrialization, industrial shift, unemployment and regional disparity.
Jobs and The Spatial Mismatch Hypothesis Wheeler 1990, Orfield 1998	A spatial mismatch between central city residential location and suburban job growth may result in poor labour market outcomes for inner-city neighbourhoods.

Urban Growth Machine Thesis Pitkin 2001	Coalitions of urban elite seek to capture economic power by promoting population growth and real estate development. Growth machines seek to maximize the exchange value of urban space, often leading to land speculation and the encouragement of population growth to drive up property values and their return on rent.
Exploitation Hypothesis Bourne 1982, CMHC 2001	Economic manipulation by interest groups.
Fiscal Crisis Bourne 1982, Broadway 1995, CMHC 2001	Under-funding, declining tax base and concentrated poverty.

Source: Carter and Polevychok. 2006. Understanding Disinvestment and Decline. Canada Research Chair in Urban Change and Adaptation. University of Winnipeg.

APPENDIX B: Measuring Poverty

Low Income Cut-offs (LICOs)

Measures of low income known as low-income cut-offs (LICOs) were first introduced in Canada in 1968 based on 1961 Census income data and 1959 family expenditure patterns. At that time, expenditure patterns indicated that Canadian families spent about 50 percent of their total income on food, shelter and clothing. It was arbitrarily estimated that families spending 70 percent or more of their income (20 percentage points more than the average) on these basic necessities would be in "straitened" circumstances. With this assumption, low-income cut-off points were set for five different sizes of families.

Subsequent to these initial cut-offs, revised low income cut-offs were established based on national family expenditure data from 1969, 1978, 1986 and 1992. These data indicated that Canadian families spent, on average, 42 percent in 1969, 38.5 percent in 1978, 36.2 percent in 1986 and 34.7 percent in 1992 of their total income on basic necessities. Since 1992, data from the expenditure survey have indicated that this proportion has remained fairly stable. By adding the original difference of 20 percentage points to the basic level of expenditure on necessities, new low income cut-offs were set at income levels differentiated by family size and degree of urbanization. Since 1992, these cut-offs have been updated yearly by changes in the consumer price index (Statistics Canada, 2003: 164-65).

There are 35 different LICOs based on a combination of area of residence and household size, summarized in Table 1. In general the threshold is lower in small urban and in rural (non-farm) areas of the country, meaning that individuals and households do not have to earn as much as their urban counterparts to move up to and over the LICO or poverty line. As noted in the definition above, these lower thresholds are a reflection of the total absolute costs for these core expenditure items (food, clothing, and shelter) being less in rural areas than in urban areas.

Table 1: 2005 Low Income Cut-offs for the Incomes of Families Before Tax, Using 1992 Results as a Base

Family size	Size of Area of Residence				
	500,000 or more	100,000 to 499,999	30,000 to 99,999	Small urban regions (less than 30,000)	Rural (farm and non-farm)
1	$20,778	$17,895	$17,784	$16,273	$14,303
2	$25,867	$22,276	$22,139	$20,257	$17,807
3	$31,801	$27,386	$27,217	$24,904	$21,891
4	$38,610	$33,251	$33,046	$30,238	$26,579
5	$43,791	$37,711	$37,480	$34,295	$30,145
6	$49,389	$42,533	$42,271	$38,679	$33,999
7+	$54,987	$47,354	$47,063	$43,063	$37,853

Source: Statistics Canada, Income Statistics Division. 2006d. Low Income Cut-offs for 2005 and Low Income Measures for 2004. Income Research Paper Series. Catalogue no. 750002MIE - No. 0004. Ottawa.

Generally speaking the Canadian Council on Social Development (CCSD) and others feel that the LICOs are an adequate but not perfect measure of poverty (CCSD, 2001). One limitation is that the expenditure inputs used for calculating the thresholds are restricted to food, clothing and shelter, but there may be other expenditure items, which are important to include (and which the MBM attempts to address). The second limitation is that the thresholds are based on size of community but does not take into account the fact that similar size communities in different regions of the country may have very different cost structures especially for housing (e.g., housing costs in Toronto and Vancouver are typically higher than in Montreal; housing costs in northern and more remotecommunities are higher than in rural areas in the south; and so on). Again, thedevelopment of the MBM attempts to take these differences into account.

Low Income Measures (LIMs)

Another measure developed by Statistics Canada and employed by them and others for some reporting exercises, is Low Income Measures (LIMs). These are strictly relative measures of low income, set at 50 percent of adjusted median family income. These measures are categorized according to the number of adults and children present in families, reflecting the economies of scale inherent in family size and composition (HRDC 2003, 4).

For the purpose of making international comparisons, the LIM is the most commonly used low-income measure. The use of the LIM was suggested in a 1989 discussion paper (prepared by Wolfson, Evans, and the OECD, see HRDC 2003, 11) which discussed their concerns about the effectiveness of LICOs. In simple terms, the LIM is a fixed percentage (50 percent) of median adjusted family income, where “adjusted,” indicates that family needs are taken into account. Adjustment for family sizes reflects the fact that a family's needs increase as the number of members increase. Most would agree that a family of five has greater needs than a family of two. Similarly, the LIM allows for the fact that it costs more to feed a family of five adults than a family of two adults and three children (HRDC, 2003, 11).

The LIMs are calculated for three different income scenarios: market income; before-tax income; and after-tax income. They do not require updating using an inflation index because they are calculated using an annual survey of family income. For years prior to 1996, they were calculated by Statistics Canada using the Survey of Consumer Finances (SCF). From 1996 onward, they are calculated using the Survey of Labour and Income Dynamics (SLID). Unlike the low-income cut-offs, which are derived from an expenditure survey and then compared to an income survey, the LIMs are both derived and applied using a single income survey (HRDC 2003, 11). LIMs are also the choice of measure by Statistics Canada when reporting on incomes using annual taxfiler data as part of its Small Area and Administrative Data product line.

Table 2 compares the low-income measures (in Canada before taxes for 2004) for different families. The low-income measure for a single person without any children is $16,253. However, the measure for a single parent with five children is $42,258. See Table 2 for the low-income measures of other family makeups.

Table 2: Low Income Measures in Canada, Before Tax, 2004

	Number of Children					
Number of Adults	**0**	**1**	**2**	**3**	**4**	**5**
1	$16,253	$22,754	$27,630	$32,506	$37,382	$42,258
2	$22,754	$27,630	$32,506	$37,382	$42,258	$47,134
3	$29,255	$34,131	$39,007	$43,883	$48,759	$53,635
4	$35,757	$40,633	$45,508	$50,384	$55,260	$60,136

Source: Income Statistics Division. 2004. Low Income Cutoffs for 2005 and Low Income Measures for 2004. Ottawa: Statistics Canada. (P.29)

LIMs are generally viewed as a useful complement to, but not a replacement for, LICOs. The CCSD (2001) suggests that LIMs are limited by the fact that there may be significant regional differences across the country (the LIMs are applied uniformly on a national basis without regard for regional or urban-rural differences). There is also the limitation that LIMs do not necessarily take into account how recessions lead to an overall reduction of incomes and therefore median incomes.

Market Based Measures (MBMs)

More recently, a new approach has been developed by HRSDC (formerly HRDC). The Market Basket Measure (MBM) was developed to improve upon existing low-income measures. The MBM is intended to incorporate a comprehensive view of low-income trends of families with children. It was first developed in 1997 by the HRDC along with Federal-Provincial Territorial Working Group of officials on Social Development Research and Information. It is meant to complement existing measures of Low-Income Cut-Off (LICO) measures and Post Income Tax Low-Income Measures (LIM-IAT). The MBM is based on a "Market Basket" of typical household expenditure items: food, clothing, footwear, shelter, transportation, personal needs, household needs, furniture, telephone services, moderate reading, recreation, and entertainment. These are calculated for 19 specific communities (the largest urban areas) and for 29 community sizes, including a catchall category called "rural". A variety of data sources are used to assemble the "basket" costs (HRDC, 2003).

Table 3 compares Market Based Measure cut-offs of rural and urban areas in each province in 2002. In the Atlantic Provinces and in Québec the thresholds for rural places and smaller urban centres is generally higher or the same as in the largest urban centres in those provinces. In the other provinces the thresholds in the largest urban centres tend to be higher. Thresholds in rural areas range from a low of just under $24,000 in rural Manitoba and Saskatchewan, to a high of almost $28,000 in rural British Columbia.

Market Basket Measure (MBM) Income Thresholds for Reference Family, by Province and Urban-Rural, 2002

	Largest CMA	Urban 100,000-499,999	Urban 30,000-99,999	Urban <30,000	Rural
Newfoundland & Labrador	$24,452	n/a	n/a	$26,346	$25,824
Prince Edward Island	$26,237	n/a	n/a	$25,217	$24,545
Nova Scotia	$25,477	n/a	$23,979	$26,254	$25,786
New Brunswick	$24,711	n/a	n/a	$25,542	$25,032
Québec	$23,381	$22,667	$22,017	$24,280	$24,076
Ontario	$28,737	$25,116	$23,524	$25,542	$25,446
Manitoba	$23,722	n/a	n/a	$25,171	$23,929
Saskatchewan	$24,358	n/a	$22,293	$24,904	$23,926
Alberta	$26,399	n/a	$25,274	$26,870	$25,700
British Columbia	$28,567	$27,104	$25,615	$27,965	$27,893

Note: reference family is a couple with two children.
Source: Human Resources and Social Development Canada (HRSDC). 2006. Low Income in Canada: 2000-2002 Using the Market Basket Measure. Ottawa.

The main concerns or challenges associated with MBMs, as noted by the CCSD (2001) are that there may be a great deal of subjectivity in what to include and exclude in the "basket" of expenditure items; and that there may be significant change in the price of goods and services from one year to the next which require regular adjustment of the overall MBM to reflect changing economic conditions.

APPENDIX C: Administrative Data

The ability to measure diverse urban needs and deficiencies has been greatly enhanced in recent decades owing to the growing sophistication, distribution and affordability of computer technology and automation. They have made possible the ability of a wide range of social actors to identify and utilize diverse local data sources, and moving beyond reliance on the national census. Kingsley (1998, pp. 3-4) points out that automation has particularly benefited local and regional authorities to gather, organize and make available an unprecedented array of data. Such administrative sources include:

VITAL STATISTICS AGENCIES
Births
Deaths
POLICE DEPARTMENTS
Crimes
Child Abuse/Neglect
Police Calls
PUBLIC ASSISTANCE AGENCIES
AFDC
Food Stamps
General Assistance
Medicaid
WIC
Subsidized Child Care
SCHOOL SYSTEM
Student Enrollment/Performance
Special Education
HOSPITALS, HEALTH AGENCIES
Hospital Admissions
Immunization
TAX ASSESSOR/AUDITOR
Parcel Characteristics
Tax-Delinqent Parcels
Vacant Parcels
BUILDING/PLANNING DEPARTMENTS
Code Violations
Building Permits
Demolitions
PUBLIC HOUSING AUTHORITIES
Public Housing Units
DEVELOPMENT/BUDGET DEPT.
CDBG Expenditures
BUSINESS DIRECTORIES
Employment/Economic Activity

Appendix D: Data breakdown by individual variables and CTs

Table D1 Indicators for 10 Most and 10 Least Distressed Census Tracts by Pilot Study Cities (%)

#	City/CT	Renters > 30%	Owners > 30%	Segregation	Unem-ployment	Median Income	LICO	Female Lone	Major Repairs	Aboriginal	Median House	Bachelor	Dependency	Partici-pation
10 Most Distressed Census Tracts														
1	Montreal/57.00	36.4	100.0	75.9	13.0	51.7	81.5	1.7	9.8	0	0	10.5	52.8	30.3
2	Toronto/341.03	53.7	100.0	83.5	13.6	48.2	61.8	5.8	7.8	0	0	30.5	31.6	57.7
3	Toronto/311.06	60.6	100.0	70.4	11.9	51.9	48.7	3.8	6.1	0.1	0	55.0	25.2	63.6
4	Toronto/260.05	50.4	66.7	81.9	16.5	44.7	60.9	8.3	18.6	2.5	57.5	23.6	35.8	60.5
5	Montreal/60.00	25.2	100.0	58.3	47.4	60.3	74.5	8.1	0	2.1	148.6	7.9	42.0	31.0
6	Toronto/225.02	49.8	100.0	58.8	9.1	60.5	45.6	3.8	11.6	0.8	0	32.8	30.6	59.1
7	Winnipeg/34.00	44.8	24.2	61.3	19.5	53.1	79.0	7.1	13.2	57.8	49.4	3.2	42.6	40.1
8	Toronto/31.00	38.1	0	87.0	21.3	40.7	76.7	7.9	21.4	4.3	0	16.1	34.2	52.4
9	Toronto/249.05	45.5	43.4	87.1	13.7	50.7	42.7	5.1	18.8	1.3	50.7	15.1	33.0	57.1
10	Toronto/312.05	47.1	38.6	92.2	9.8	64.1	48.0	11.8	15.2	5.4	53.0	4.9	36.6	57.0
10 Least Distressed Census Tracts														
10	Montreal/654.00	28.6	20.0	7.5	3.3	195.1	4.3	12.5	5.5	0	414.3	44.7	31.9	68.4
9	Toronto/20.00	0	14.5	12.4	3.8	253.6	3.5	2.5	2.5	1.1	151.1	61.3	26.1	83.5
8	Montreal/353.00	26.7	7.7	11.1	3.5	210.2	3.7	2.8	6.5	0.8	341.8	65.8	34.3	67.2
7	Montreal/360.00	7.4	10.3	8.0	1.9	152.7	3.3	1.1	8.1	0	478.4	62.4	42.7	58.8
6	Toronto/86.00	20.0	6.9	6.6	4.0	205.8	2.2	1.8	15.2	0	359.6	73.5	32.6	69.2
5	Toronto/125.00	27.9	10.3	5.7	3.8	253.3	2.2	1.5	5.9	0	268.1	70.6	33.2	71.3
4	Montreal/355.00	35.9	11.3	9.8	6.5	219.5	8.8	1.4	5.8	0	506.7	65.2	32.6	61.9
3	Montreal/354.00	37.5	8.7	5.3	3.9	246.6	9.1	1.9	8.4	0.3	520.4	70.7	36.1	65.5
2	Montreal 55.02	15.4	6.5	10.8	3.2	365.2	2.4	0	0	0	323.6	51.9	24.4	77.5
1	Montreal/356.00	0	8.3	11.2	2.8	291.9	1.2	1.7	5.7	0	797.5	64.9	31.5	67.8

Table D2 Mean Values for Indicators, Top and Bottom Deciles

City/ Decile (D)	Renters > 30%	Owners > 30%	Segre-gation	Unem-ployment	Median Income	LICO	Female Lone	Major Repairs	Abori-ginal	Median House	Bachelor	Depen-dency	Partici-pation
Pilot/D 1	24.7	12.4	8.0	4.3	165.3	7.4	2.4	5.9	0.5	172.2	38.1	31.6	71.9
Pilot/D 10	46.8	31.0	59.6	10.8	68.7	38.4	5.6	10.2	5.2	75.8	17.3	31.7	61.0
Montreal/D 1	24.2	11.5	7.2	4.1	183.8	7.3	2.4	5.7	0.3	205.9	39.2	31.7	71.7
Montreal/D 10	43.0	35.1	39.2	15.3	74.9	50.4	5.5	10.2	0.6	113.5	16.5	31.0	57.4
Toronto/D 1	29.2	15.1	10.7	4.0	161.5	5.8	2.2	6.1	0.3	178.6	45.5	31.7	70.9
Toronto/D 10	49.3	33.9	73.4	9.8	68.1	35.7	6.0	9.7	1.3	67.7	18.6	31.8	62.1
Ottawa/D 1	17.0	8.9	9.0	4.0	118.9	4.6	2.3	5.6	1.0	91.1	49.6	31.4	72.3
Ottawa/D 10	42.0	22.1	32.3	9.7	50.6	40.8	5.8	10.8	3.0	46.3	20.0	29.6	61.9
Edmonton/ D 1	24.4	10.9	10.0	3.8	119.4	4.8	1.9	5.7	1.9	138.9	28.6	30.7	76.0
Edmonton/D 10	42.4	18.9	33.4	8.4	62.9	35.2	5.6	11.3	13.0	72.0	8.3	28.7	67.2
Winnipeg/D 1	16.3	9.7	10.4	3.6	147.1	4.3	1.9	5.1	2.5	150.2	34.0	31.5	74.8
Winnipeg/D 10	47.3	17.6	55.7	12.9	63.3	53.4	6.6	15.3	41.8	45.8	7.0	36.1	55.9
Halifax/D 1	35.6	10.0	3.8	5.5	105.3	6.7	1.9	5.6	0.4	126.7	40.2	30.3	70.4
Halifax/D 10	48.0	30.8	17.6	10.0	58.0	34.9	7.6	12.0	1.4	68.2	13.9	31.5	63.5
Regina/D 1	25.3	8.6	6.3	4.1	132.5	4.3	1.8	3.8	1.8	72.7	27.2	31.3	74.3
Regina/D 10	57.8	22.3	35.8	15.8	60.8	45.9	6.7	15.9	31.3	26.8	7.8	34.4	56.4
St. John's/D 1	28.7	10.0	1.8	9.6	138.3	6.8	2.0	3.6	0.3	157.5	36.8	29.6	67.8
St. John's/D 10	56.3	22.2	1.4	16.4	70.3	35.9	6.9	10.1	0.5	77.2	10.6	29.4	55.5
Red Deer/D 1	36.7	11.0	7.7	3.5	153.2	6.1	2.9	4.0	3.4	190.3	18.5	68.3	77.0
Red Deer/D 10	41.9	25.3	10.2	3.4	97.3	26.1	4.9	6.2	6.6	100.4	7.3	60.4	74.9
Drum-ville/D 1	22.2	12.1	0.6	5.4	123.6	10.2	3.4	2.9	0.2	103.4	11.0	66.7	73.2
Drum-ville/D 10	46.5	18.7	2.1	14.4	72.5	40.5	5.2	6.8	1.0	96.3	6.2	53.5	51.5

APPENDIX E: Social Capital and Cohesion

Many authors include relationships, norms of reciprocity and trust as being essential components of social capital (Reimer, 2002; Warner et al., 2006; Putnam, 2006; Schuller, 2001; etc.). Matthews (2006) adds that civic engagement and participation also form the basis of social capital. In an editorial prepared for a 2001 edition of ISUMA, Leblanc states that "Social capital is generally defined as the relationships, networks and norms that facilitate collective action." (2001, 6). Schuller states that social capital focuses on networks, the relationships between and within them, and the norms that govern them. Networks, norms and trust allow individuals and institutions to be effective in obtaining common goals. According to Warner et al. (2006) networks link people to other resources and ideas. They foster communication and collaboration. Norms of reciprocity describes the expectations and rules within interactions. There are expectations about how to be treated and how to treat others while interacting and communicating. It can also lead to an equitable distribution of resources within a community.

Warner et al. (2006) also explain how investment in social capital brings a return. Just like economic capital, we "invest" in social capital by participating in groups and activities and networks. This participation brings a "return" in the form of a higher level of connectedness and trust with one another. The building up of this social capital "stock" then becomes as asset that can be "drawn upon" in times of need or times of opportunity. Matthews (2006) explains that there is a certain amount of vulnerability and consequences of risk of being in a social or economic relationship. There is some dispute about whether trust is part of social capital or not. Woolcock (2001) states that trust is an outcome of social capital. However, others argue that you need a certain level of trust in order to engage in a relationship.

According to Reimer (2002) social capital is one type of asset/resource that can be used in various ways to achieve valued outcomes such as economic prosperity, social and political inclusion, environmental stewardship, and health.

There is some dispute in the literature over whether social capital is found within individuals or only at the community or group level. One influential approach top well-being, proposed by Harvard University philosopher Amartya Sen,

> requires the assessment of individual opportunities (capacities) and achievements or successes (functionings) in light of available opportunities. Individual opportunities are shaped by conditions that individuals face personally and within the context of a community. [Yet] the perspective of the implicated self also recognizes that taking part in the life of a community contributes to individual well-being. Implicit in this perspective is that a collective good exists; well-being may be improved by residents working on community projects that, narrowly conceived, are of no benefit to them personally. Individual well-being is increased as a result of an increase in feelings of being a part of a community and by making the community a better place to live (Kusel 1997).

Matthews (2006, 27) concurs, writing that social capital is the "product both of the way economic relations are embedded in social structure, and also on the way that people themselves are embedded in the nexus of social relations that constitute their society." Similarly, Glaeser (2001) states that social capital is a community level variable but it is individuals that choose whether or not to invest in social capital.

Flora & Flora (2004) describe two kinds of social capital – bonding social capital and bridging social capital. Bonding social capital refers to the connections within groups and between people with similar backgrounds (usually within a defined geographic area such as a community or neighbourhood). Bridging social capital refers to connections with other groups and with groups outside of the community. The authors argue that bridging and bonding social capital can reinforce one another. When both are low, "extreme individualization dominates, which is reflected at the community level in social disorganization" (Flora & Flora, 2004, 62). If bonding social capital is high and bridging social capital is low then a community often witnesses conflict between its different groups and between itself other communities. When both are high there is effective community action, or what they call "entrepreneurial social infrastructure". When both bonding and bridging are high, development can occur, local and outside resources are at people's disposal and innovation can take place.

According to Reimer (2002), all human relationships fall within one of four fundamental categories: market, bureaucratic, associative, and communal. Social capacity is embedded in all four relationships and social cohesion is based on them as well. They each have particular norms of behaviour, values, perspectives, and ways of operating.

Market relationships are short and have the aim of facilitating the exchange of goods and services. A high level of trust is needed and those involved must feel free to move in and out of the relationships.

Bureaucratic relationships are "based on a rationalised division of labour and structuring of authority through general principles and rules" (Reimer, 2002, 3). These are rational-legal relationships. Reimer explains that the distribution of resources is based on status positions rather than productivity and that people relate to each other based on their assigned roles. For example, regional government offices correspond with their federal head office in Ottawa. Power and control are assigned to positions rather than people. In this domain it is the organizational structure, rather than the individuals themselves, that creates and maintains social capital.

Associative relationships are based on shared interests where people come together to accomplish goals. They usually have an informal structure and focused objectives, and are typified by groups such as churches, sports clubs, and community volunteer organizations. Associative social capital is high when the interests of everyone in the group are known, everyone's commitments are clear, and there is significant contribution to the objectives and goals by members.

While it is relatively straightforward to measure socio-economic indicators, current practices as they relate to measuring community capacity are rather weak, but consist of the following elements (Hird 2003):

Community Capacity as it Contributes to Well-Being

Individual	• Self-determination (feeling resourceful or helpless in the face of problems to be dealt with; 'agency') • Concern with the locality and/or public issues • Level of volunteering/community activity
Community involvement - horizontal	• Community and voluntary organisations (number/effectiveness/range/ • Connectedness) • Social capital/mutual aid
Community involvement – vertical	• Voting turnout (all opportunities) • Levels of response to consultations • Extent and effectiveness of community representation/leadership/influence
Services and economic development	• Extent and range of contribution to public services • Social economy and assets
Inclusion/diversity/cohesion **Cross cutting**	• **Inclusion**: *extent to which specific neighbourhoods and sections of the local population (by age, gender, income, ethnicity, culture, disability etc) share in the levels achieved by the other criteria* • **Diversity**: *extent to which specific sections of the population feel able to affirm their identity and have specific needs met* • **Cohesion:** *extent to which all sections of the population coexist harmoniously and co-operate in appropriate ways*
Provision/support/empowerment	• Community development provision Community and voluntary sector infrastructure • Support from partnerships, NR and all public services

(Source: Hird 2003)