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**MODELLING QUALITY OF LIFE  
INDICATORS IN CANADA: A  
FEASIBILITY ANALYSIS**

Cette publication est aussi disponible en français sous le titre:  
Modélisation des indicateurs sur la qualité de vie au Canada

# **MODELLING QUALITY OF LIFE INDICATORS IN CANADA: A FEASIBILITY ANALYSIS**

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For :  
The Centre For Future Studies in Housing and Living Environments

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NOTE: Disponible aussi en français sous le titre:  
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## Abstract

The three main purposes of this study were (1) to analyze existing quality of life literature, (2) to develop a comprehensive quality of life model that is appropriate to the municipal level, and (3) to explore the availability of data for the model for various spatial scales and time intervals and to identify needed data that do not currently exist. The report is divided into four major sections. First, the major themes in the literature are summarized and the important issues concerning quality of life are noted. A brief discussion of each major issue forms the basis of the second section. In the third section, two models are discussed, one related to traditional perspectives of quality of life based on objective and subjective indicators, and the other based on recent ideas about sustainable development and healthy cities. The latter is the preferred model and provides a context for identifying appropriate indicators that were selected and the specific measures of these indicators. The fourth section outlines the indicators that were selected and specific measures of these indicators.



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# Executive Summary

## 1. Purpose and Scope

The three main purposes of this study were (1) to analyze existing quality of life literature, (2) to develop a comprehensive quality of life model that is appropriate to the municipal level, and (3) to explore the availability of data for the model for various spatial scales and time intervals and to identify needed data that do not currently exist. The report is divided into four major sections. First, the major themes in the literature are summarized and the important issues concerning quality of life are noted. A brief discussion of each major issue forms the basis of the second section. In the third section two models are discussed, one related to traditional perspectives of quality of life based on objective and subjective indicators, and the other based on recent ideas about sustainable development and healthy cities. The latter is the preferred model and provides a context for identifying appropriate indicators that were selected and specific measures of these indicators. The fourth section outlines the indicators that were selected and specific measures of these indicators.

## 2. Literature Review

The decision to include or exclude materials from the literature review was based on several criteria. These include (1) Currency: emphasis was placed on work done in the 1980s, (2) Canadian Content: an attempt was made to include all major Canadian studies, (3) Spatial Scale: most of the materials are at the urban or intra-urban level, and (4) Substantive Focus: emphasis was placed on studies dealing with quality of place, both objectively and subjectively defined.

## 3. Themes and Important Issues from the Literature

At the most basic level, quality of life research can be divided into objective and subjective indicators. Objective indicators are quantitative measures, usually obtained from the census or local agencies. Subjective indicators are qualitative measures, normally obtained from specially constructed interview studies of a sample of the general population. The development of the literature and many of the key issues in quality of life research relate to the distinction between objective and subjective indicators.

The early 1970s was characterized by the development of objective indicators for a wide variety of themes or domains. For the most part, the goal was to describe social conditions between and/or within cities. The objective indicator studies were much criticized, particularly for not incorporating attitudinal data about the perceptions and evaluation of the domains of life experience, their relationship to one another and their respective contributions to overall quality of life. Usually, data to test these models were obtained from national surveys. Questions also arose concerning the relationships between objective and subjective indicators. Empirical studies generally indicated little association between the two sets of indicators although it is worth noting that the existing studies differ widely in research design and the type of indicators used.

In the 1980s, the research focus in quality of life studies moved in different directions. At the city or metropolitan level, objective indicators reappeared in the form of the "rating places" literature. These studies focus on the relative attractiveness of urban centres and are

targeted most directly at people or firms intending to move. At the intra-urban level, objective indicators have resurfaced in two quite different ways; as neighbourhood level target marketing systems and as a more narrowly focused research programme on the urban "underclass" and indicators of poverty, particularly in the inner-city. Also, during the 1980s, subjective indicators research went off in its own direction and tended to focus on refinements of subjective measures.

In the mid-1980s, the context for quality of life studies changed dramatically. First, there was a general rejection of modelling in the social sciences and a greater emphasis on differences and the unique qualities of local areas. There was also a greater interest in making quality of life research more policy oriented by incorporating quality of life studies more directly into the planning process. The second major shift in the mid-1980s was the emergence of more holistic planning approaches incorporating ideas from quality of life, sustainable environment, and healthy cities perspectives.

In addition to tracking trends in the development of quality of life research, the literature review pointed to a number of important issues that are reviewed in more detail in the report. These include definition, purpose, domains, indicators, the relationship between objective and subjective indicators, the relevance of statistical models, additivity/standardization, spatial scale, and frequency of monitoring. The first half are largely conceptual, the second half are methodological.

#### **4. The Models**

Two models of quality of life were developed in this report. Both were informed by the literature and its development over the past two decades. The first, a Conceptual Framework of Quality of Life, is an integrative statement of ideas drawn from research on objective and subjective indicators. The second model, A Community Oriented Model of the Lived Environment, draws from recent work on sustainable environments and healthy cities and is more closely related to policy issues that are important at the municipal level. The model is deficient, however, in that it does not provide for subjective indicators of economic vitality, social well-being and environmental integrity. The time and expense entailed in collecting information on subjective indicators is probably beyond the capabilities of most municipalities, although the evaluations and satisfactions of local residents remains an important issue.

#### **5. Indicators**

The indicators and measures for operationalizing the Community Oriented Model of the Lived Environment are presented in a series of tables. Tables are included for each of the following sectors: housing, land use, transportation, natural environment, employment and commerce, health, education, recreation, crime and safety, and social welfare. In the tables, the details for each sector are described under three headings: Components of Liveability (economic vitality, social well-being, environmental integrity), Indicators of Liveability and Specific Measures. Indicators of Liveability are the more specific constructs related to each component and Specific Measures are the recommended variables for identifying each Indicator of Liveability. In many cases, the specific data source for each measure is provided.

# 1. Introduction

Quality of life is a term that is often used, both in the popular media and in the more specialized technical literature. It is also a term that is found frequently in the goals and objectives of planning documents at all levels of government. Yet it is a term that is not easily defined and is subject to a variety of interpretations. Indeed, many authors do not define the term specifically. In addition to definitional vagueness, the definitions and interpretations assigned to quality of life have changed over time, thus adding to the uncertainty and confusion about an appropriate meaning for the term. In the early 1970s, for example, emphasis was placed on quantitative objective indicators of quality of life, often measured at the intra-urban level for small units of analysis such as census tracts. By the mid-1970s, the conceptual and methodological deficiencies of objective indicators were recognized and emphasis shifted to more qualitative subjective indicators and evaluation of the relationships between attributes of the objective environment and perceived quality of life. By the mid-1980s, the emphasis shifted again, to an incorporation of quality of life within a broader planning context, particularly with an emphasis on environment and health.

Like many public agencies concerned with planning, housing, and environmental issues, Canada Mortgage and Housing Corporation (CMHC) has an interest in quality of life. Indeed, one of the five long term objectives set out in the Strategic Plan of CMHC is "to promote the orderly and timely development of Canada's urban, rural and remote areas to provide an enhanced quality of life for Canadians through improved living environments." Yet, as recognized by CMHC, the quality of life concept is not well defined (CMHC, 1991). At one level, the objective of improving living environments is fairly clear and can be accomplished through better housing conditions, increased affordability, and a greater supply and wider range of housing. At a broader level, however, the concept is more ambiguous. This is particularly true when the objective is defined as assisting "... society in gaining a better understanding of

factors which improve or decrease the quality of life and living environments." (CMHC, 1991a: 15). Several issues arise, including the various meanings attributed to quality of life, the relative merits of objective and subjective indicators, the relationship between these two types of indicators, the relative importance and reliability of indicators, and the appropriate spatial scale of analysis.

As part of CMHC's efforts to better understand quality of life and its implications for lived environments, the Corporation commissioned The Institute for Social Research (ISR) at York University to undertake a feasibility analysis of modelling quality of life indicators in Canada. The project has three interrelated parts:

- to analyze existing quality of life literature and prepare an annotated bibliography of major studies dealing with quality of life.
- to develop a comprehensive quality of life model that is appropriate to the municipal level and relevant to contemporary issues.
- to explore the availability of data for the model for various spatial scales and time intervals and to identify needed data that do not currently exist.

The subsequent discussion is divided into five sections. First, the nature and limitations of the literature review are described. In addition, major themes in the literature are summarized and the important issues concerning quality of life are noted. A brief discussion of each major issue forms the basis of the second section. In the third section two models are discussed, one related to traditional perspectives on quality of life based on objective and subjective indicators and the other based on recent ideas about sustainable development and healthy cities. The latter is the preferred model and provides a context for identifying appropriate indicators. The fourth section outlines the indicators that were selected and specific

measures of these indicators. Finally, in the last section, we review the models that have been developed and indicate why the preferred model is not perfect. The annotated bibliography has been produced as a separate report to CMHC. The articles and books contained in the annotated bibliography are marked with an asterisk in the References of this report. Indicators and their availability are listed in the Appendix.

## 2. The Literature Review

### 2.1 Organization of the Literature Review

The literature review was undertaken with several goals in mind. These included: gaining a better understanding of how quality of life (QOL) has been conceptualized and how QOL definitions have changed over time; identifying the areas or domains commonly examined and the indicators or measures most often used in each domain; and, reviewing the relationships between objective and subjective indicators found in previous studies. While the review is wide ranging, it is not exhaustive of all QOL research and publications. The items that have been annotated cover a range from the early 1970s to the present and deal with various approaches to quality of life research. The decision to include or exclude materials was guided by several criteria. These include:

- **Currency:** While some of the classic studies of QOL from both objective and subjective perspectives and several works summarizing the methodologies and findings of social indicators and QOL research during the 1970s are included, there is emphasis on work done in the 1980s.
- **Canadian Content:** An attempt has been made to include all major Canadian studies. Classic, major or especially relevant research from the United States and the United Kingdom has also been included but coverage here is not

exhaustive. By and large, models and empirical research for developing countries have been excluded.

- **Spatial Scale:** Studies at the national or international levels were included only if they contained implicit or explicit models relevant for smaller geographic units of analysis. Most of the materials reviewed are at the urban or intra-urban levels of analysis.
- **Substantive Focus:** This criterion relates to CMHC's mandate to enhance QOL through improvements to the living environment. There is a vast literature in the academic journals dealing with the relationships of well-being to value structures, affective and cognitive processes, personal relationships and family relationships. While certainly important for understanding QOL at the individual level, much of this literature has been excluded in favour of works dealing more directly with quality of place, both objectively and subjectively defined.

Each reference was annotated to include five basic pieces of information: the purpose or type of study; temporal and geographic coverage; QOL definition used; types of indicators employed; and, the study's contribution to understanding quality of life. Entries are presented in chronological order, beginning with works published in the 1970s and proceeding to the present. This ordering is valuable for understanding how QOL research has developed and for identifying the major definitional, methodological and measurement issues that must be addressed in attempts to conceptualize QOL indicators.

In preparing the literature review, several sources were examined. These included:

- Articles from 1980 onwards in Social Indicators Research and the major journals of Sociology, Urban Geography and Planning.

- Books in the York University library referenced through an on line search for the categories "quality of life" and "social indicators".
- Canadian and US government publications referenced through an on line search for the categories "quality of life" or "social indicators" or identified by research librarians.
- Studies identified in CMHC's background paper, Quality of Life: Issues and Directions for CMHC, 1991.
- Unpublished material in the ISR archives, particularly concerning the "Social Change in Canada" and "Urban Concerns in Canada" studies.
- Bibliographies from major reviews of QOL and social indicators research.
- An on line search of recent English language periodical material.

## 2.2 Themes and Important Issues from the Literature

At the most basic level, QOL research can be divided into objective and subjective indicators. Objective indicators are quantitative measures, usually obtained from the census or from local agencies such as planning, social service, health, and police departments. Subjective indicators are qualitative measures, normally obtained from specially constructed interview studies of a sample of the general population, and usually involving perceptions, evaluations and satisfactions of urban life. The development of the literature and many of the key issues in QOL research relate to the distinction between objective and subjective indicators.

The early 1970s was characterized by the development of objective indicators for a wide variety of themes or domains. The domains differed in number and type between studies but frequently included measures of economic well-being, environmental conditions, social welfare, housing, and public order. Following an extensive review of the existing literature, Smith



(1973) suggested seven major domains that should be included in studies of objective social indicators. These were:

1. Income, wealth and employment (income and wealth, employment status, income supplements)
2. The living environment (housing, the neighbourhood, the physical environment)
3. Health (physical and mental health)
4. Education (achievement, duration, quality)
5. Social order (personal pathologies, family breakdown, crime and delinquency, public order and safety)
6. Social belonging (democratic participation, criminal justice, segregation)
7. Recreation and leisure (recreation facilities, culture and the arts; leisure available)

Typically, in these studies, data were collected from the census and local agencies for spatial units such as metropolitan areas or census tracts within metropolitan areas. For the most part, the objective was to describe social conditions between and/or within cities. In most cases, it was also hoped that the results would be used by policy makers, although few guidelines were given. Many of these studies were also characterized by a concern with methodological issues such as the weighting of variables, scaling of data, and the validity of summing data for individual domains to obtain a single QOL measure for each metropolitan area or census tract (e.g., Dickinson, Gray, and Smith, 1972; Bederman, 1974; Liu, 1976).

Most studies of objective indicators have been undertaken for metropolitan areas in the United States. There are, however, four major Canadian examples of objective indicator studies. The first is Palys' (1973) attempted replication of Flax's (1973) study of United States cities for ten Canadian metropolitan areas. Palys was remarkably successful in replicating many of Flax's measures but the main strength of his work is a criticism of the conceptual and measurement

inadequacies of many objective variables. Two other studies by Shulman and Bond (1978) and Shulman, Bond and Nelson (1980), are social indicator studies of census metropolitan areas and medium-sized municipalities respectively. Both are characterized by the compilation and use of a considerable amount of non-census data but neither have been repeated since. The most recent study, by the Peat Marwick Consulting Group (1988), was commissioned by the Regional Municipality of Hamilton-Wentworth and incorporates a wide variety of indicators including amount of green space, availability of community, medical, commercial and cultural facilities, road quality, pollution, and family stability.

The objective social indicator studies have been much criticized, often by researchers employing this approach. Criticisms include the lack of social theory to guide the selection of indicators, the non-representativeness of variables, low or poor accuracy of measurement, and the lack of suitable data at the local level. As Smith (1972) notes in his study of Tampa, Florida "...A great deal of effort is required to go beyond census data, converting local agency records into a suitable form, and in some cases the task was too great." In particular, however, these studies were criticized for not incorporating attitudinal data about the perceptions and evaluations residents have of their city and its neighbourhoods.

By the mid-1970s, emphasis shifted to work on the subjective elements of QOL, particularly an evaluation of the domains of life experience, their relationship to one another and their respective contributions to overall QOL. The classic studies are by Andrews and Withey (1976) and Campbell, Converse and Rogers (1976). In the latter, a model is presented whereby a person's evaluation of a particular attribute within a domain depends on his/her perception of the attribute in relationship to internal standards of comparison, expectations and aspirations. In turn, the perception of an attribute is dependent on, but distinct from the objective environment. It is also assumed that all stages in the process will be affected by

personal background characteristics such as age, gender, ethnicity and socioeconomic status.

For the most part, data to test these models were obtained from national surveys.

The Campbell, Converse and Rogers methodology was adapted to the Canadian context in the "Quality of Life in Canada Project" conducted in the late 1970s and early 1980s by the Institute for Behavioral Research (now ISR) at York University (Institute for Social Research,

1984). This study involved three national surveys dealing with subjective well-being and perceived evaluations of objective life conditions. At the same time, the "Survey of Urban Concerns" project was undertaken by the Institute for Behavioral Research (Atkinson, 1979).

The aim was to assess residents' response to policy issues of particular importance in urban areas and to determine those aspects of the urban environment which affect policy preferences and social potential. Over 11,000 respondents from all metropolitan areas in Canada, stratified by zone (Inner City, Mature Suburbs, New Suburbs, and in the largest centres, Exurbs), were surveyed about items such as evaluation of city, evaluation of neighbourhood, public transportation usage and travel to work, perceptions of crime, energy use and conservation, and housing preferences.

Although subjective indicators measure "...the state of the community through the eyes of those who live there" and therefore are likely to "...provide a more accurate assessment of the quality of life", they have also been criticized (Lyon, 1987). According to Knox (1976), individuals and communities may evaluate domains in different terms, different people may place different meaning on words such as satisfaction and people may give what they think are the right replies to questions. Furthermore, surveys are costly, and if less expensive and more readily available objective indicators can act as suitable surrogate measures for subjective indicators there is little value in carrying out expensive surveys.

This practical consideration, as well as conceptual interest, led a number of researchers to explore the relationships between objective and subjective indicators. For example, Kuz

(1978), in an often quoted study, compared objective and subjective indicators for 77 urban centres in Southern Manitoba for 1971. Objective domains included housing, education, income, employment, health, leisure, social security and community infrastructures. Subjective domains included community involvement, community interaction and alienation and community leadership. The results indicated little association between the two types of indicators. In a more comprehensive study, Greer-Wootten and Velidis (1983) explored the relationships between objective and subjective indicators for a sample of households in the Toronto area. Subjective data were obtained from the 1981 "Quality of Life in Canada Project" and objective data were derived from a 1983 survey of the observed conditions of dwellings and neighbourhoods for households who had been interviewed in 1981. A variety of regression models that attempted to explain variations in housing satisfaction produced rather weak results. The authors concluded that there is need for both objective and subjective indicators, information about these should be collected simultaneously, and there is need for better indicators.

In the 1980s, the research focus in objective and subjective indicators moved in different directions. At the city or metropolitan level of analysis, objective indicators reappeared in the form of the "rating places" literature. The most widely known is Boyer and Savageau's Places Rated Almanac (1981 and 1985) although there are others such as Scott (1990) and Marlin (1992) for the United States and Green and Champion (1988) and Findlay, Morris and Rogerson (1988) in Britain. These studies focus on the relative attractiveness of urban centres and are targeted most directly at people or firms intending to move. The indicators are usually wide-ranging. Examples include measures of climate, arts and culture, education, recreation, accessibility to other parts of the country, health care, and economic opportunity. Like earlier studies based on objective indicators, the "rating places" literature has been much criticized (Landis and Sawicki, 1988). Specific concerns, especially of the United States studies, include

inappropriate concepts, indicator reliability, scaling issues and double counting, the exclusion of policy relevant indicators, and the use of metropolitan wide averages as proxies for community or neighbourhood measures.

At the intra-metropolitan level of analysis, objective indicators have resurfaced in two quite different ways; as neighbourhood level target marketing systems and as a more narrowly focused research programme concerning the urban "underclass". In the United States, target marketing systems (e.g., Weiss, 1988) group Zip Code postal zones by census and other characteristics. The primary objective is to assist retailers in marketing their products. Similar lifestyle marketing systems have been developed for Canada by commercial firms such as Composearch Market and Social Research Limited (Jones and Simmons, 1987:321-323).

The "underclass" is an American term, first used by Myrdal (1962), and recently revived by Wilson (1987), to describe the spatial isolation of the black poor and jobless in many United States inner cities. Wilson's work has inspired a host of new research on poverty including attempts to describe the inner-city ghetto using indicators such as female headed households, unemployment, welfare dependence and school dropouts (Hughes, 1989). Given the relative absence of large areas of residential abandonment and welfare dependency in Canadian inner cities, it is hardly surprising that this research has not had an impact in Canada. Indeed, the interest in this country seems to be more on the rejuvenation of the inner city, particularly in metropolitan areas with high technology service based economies (e.g., Ley, 1992). Of some note, however, is Davies and Murdie's (1991) finding, using a joint analysis of census data for all census tracts in Canadian metropolitan areas, of the relatively high concentrations of impoverishment in old working class areas near the downtowns of the Quebec centres and Saint John, New Brunswick.

Also, during the 1980s, subjective indicators research went off in its own direction and tended to focus on refinements of subjective measures. This research is illustrated by many of

the articles in the journal, Social Indicators Research, during the 1980s. In spite of pleas for more subjective appraisals of the urban condition, the cost of large scale questionnaire studies no doubt limited the use of surveys. There are, however, two notable Canadian examples, a 1990 survey of urban issues and attitudes in the Greater Vancouver Region (Hardwick, Torchinsky and Fallick, 1991) and the Angus Reid 1991 QOL study of 4,000 residents in eight Canadian metropolitan areas (Reid, 1991; Patterson, 1992).

In the mid-1980s, the context for QOL studies changed dramatically. First, there was a general rejection of modelling in the social sciences and a greater emphasis on differences and the unique qualities of local areas. There was also a greater interest in making QOL research more policy oriented by incorporating QOL studies more directly into the planning process. For example, Lötscher (1981, 1985) extended the traditional QOL models into a more planning oriented framework by adding the activities of decision makers to the model. Following a study of QOL in Montreal, Toronto, Calgary, and Vancouver, he concluded that "...the activities of decision-makers have to be included in the analysis of urban quality of life, unless the aim is solely to give a static picture of the conditions of life at a particular point in time." (Lötscher, 1985). Lyon (1987), in a book concerning community studies, noted that "...while local indicators are closely related to concerns with the quality of life, they are insufficient for a satisfactory analysis without: (1) subjective indicators based on community perceptions and (2) an understanding of the local political conditions that must be dealt with to improve the quality of life. For example, if we learn that poverty is much worse in our community than in other communities, it is also important to learn if the community is aware of the problem and if those in power are willing to address the problem." Myers (1987, 1988) extended this approach and suggested a specific QOL methodology for planners, referred to as "the community-trend method". The method is based on two premises: (1) QOL is a local experience and (2) people judge community liveability by trends over time in various aspects of local QOL. The method

involves four major stages: (1) identification of indicators by reviewing the professional literature on QOL and consulting local leaders from a wide range of interest groups, (2) collecting and processing objective data, (3) surveying citizen opinions, and (4) writing reports for community dissemination.

The second major shift in the mid-1980s was the emergence of related interests in environment and health. The first of these is focused on the concept of sustainable development, a notion derived particularly from the 1987 World Commission on Environment and Development (Brundtland Commission). CMHC's view of sustainable community development "...implies not only the need to achieve economic objectives and to maintain ecological integrity, but also to consider the importance of a variety of social considerations, such as housing affordability, community equity, and responsiveness to changing demographic and other conditions." (D'Amour, 1991). The Corporation advocates the incorporation of sustainable development principles into the municipal planning process.

The new public health perspective is also related closely to QOL and includes "...interventions to improve lifestyles and social and physical environments." (Mathur, 1989). The idea of a Healthy City was introduced in Toronto in 1984 and formalized as the Canadian Healthy Communities Project in 1988. The Project was jointly organized by the Canadian Health Association, the Canadian Institute of Planners and the Federation of Canadian Municipalities. In the context of the Healthy City idea, Mathur (1989) noted three important challenges for municipalities: (1) reduce inequities amongst socio-economic groups, create an environment free of hazard and pollution, foster greater coping through the reduction of urban stress, enforcement of physical accessibility standards and provision of social supports, (2) encourage public participation that incorporates control and empowerment, and (3) emphasize holistic, multisectoral, and interdepartmental strategies.

These more holistic planning approaches, incorporating ideas from the QOL, sustainable environment, and healthy cities perspectives, have been the foundation of recent planning exercises in Vancouver (e.g., Hardwick, Torchinsky and Fallick, 1991), Toronto (e.g., The Metropolitan Toronto Planning Department, 1991; The Municipality of Metropolitan Toronto, 1992; Office of the Greater Toronto Area, 1992, Royal Commission on the Future of the Toronto Waterfront, 1992) and Montreal (e.g., Gariépy, Domon and Jacobs, 1990). The goal, in all cases, was to take a more policy oriented approach than has traditionally been the case with objective and subjective indicators.

### **3. Major Issues**

In addition to tracking trends in the development of QOL research, the literature review pointed to a number of important issues that deserve more systematic review. These include definition, purpose, domains, indicators, the relationship between objective and subjective indicators, the relevance of statistical models, additivity/standardization, spatial scale, and frequency of monitoring. The first half are largely conceptual, the second half are methodological. Each is discussed in further detail below.

#### **3.1 Definition**

A number of terms have been used to identify QOL. "Quality of life" is the most general term and has been used to describe a wide variety of studies incorporating objective indicators, subjective indicators, or both. "Social indicators" is less frequently used and most often refers to objective indicators, although Andrews and Withey (1976) used the term in their study of perceived well-being. Parallel terms, such as "urban indicators" and "community indicators" usually describe the application of social indicators to more local areas. In a similar context,



Smith (1973) popularized the term "territorial social indicators" to refer to the application of social indicators at a sub-national level (e.g., urban or intra-urban). There is a further issue, however, of whether territorial indicators are really measures of the quantity and/or quality of place rather than quality of life. Cutter (1985), for example, defines quality of life as "...an individual's happiness or satisfaction with life and environment including needs and desires, aspirations, lifestyle preferences, and other tangible and intangible factors..." and quality of place as "...the measurement of the conditions of place, how these conditions are experienced, and the relative importance of each of these to the individual." Finally, recent planning studies have used terms such as the "liveable metropolis" to describe more holistic approaches to QOL that incorporate ideas from the sustainable development and healthy cities movements. QOL is still a useful general term, but it is important to note that a number of different conceptual ideas and approaches are embedded within the term.

### 3.2 Purpose

What is the ultimate purpose of QOL research? What is it going to be used for?

There appear to be at least three possibilities in the literature that relate to urban and regional issues: (a) The "rating places" literature that attempts to rate communities according to their attractiveness for business, industry, and as places to live, (b) the "territorial indicators" literature that focuses on the identification and reduction of deprivation at the intra-urban level of analysis, and (c) the "liveable" metropolis approach which has a more specific planning orientation and often stresses the uniqueness of individual municipalities. All of these approaches were discussed in detail when reviewing the development of the QOL literature. The important point is that QOL studies can have a variety of purposes, each of which entails a different approach.

### 3.3 Domains

What are the important domains? Can they be prioritized? There is relatively little theoretical work in this area, especially related to the urban and regional context. Where lists of domains exist, they usually derive from syntheses of the literature (e.g., Smith, 1973; Beesley and Russwurm, 1989). There is general consensus about the inclusion of major domains such as recreation and leisure, education, health, the living environment, and social order, although Findlay, Rogerson and Morris (1988) have noted: "There are many lists but little agreement on the range of indicators or how indicators should be selected."

There have also been a number of attempts, particularly in national studies, to determine which domains are most important in accounting for overall life satisfaction. The problem in prioritizing domains from this research is twofold. First, the level of predictability of overall life satisfaction using satisfaction with individual domains as predictor variables is often weak and, second, the important variables are often not related to community structure. For example, in a study of QOL in 13 comprehensively planned new communities in the United States, Zehner (1977) found that economic security, family life, personal strengths, friendship, and quality of environment were rated by respondents as the most important contributors to QOL. In the same study, standard of living, use of leisure time, and family life were found to be the most important predictors for overall life satisfaction. Dwelling was 7th, neighbourhood 9th and community 10th.

More recently, the focus in the liveable metropolis literature has been on identifying urban issues that are most important in the local environment at a particular point in time. For example, in a study of Austin, Texas (Myers, 1987) crime, water quality, cost of living, jobs, schools, and traffic were ranked most important when respondents were asked to weight the importance of factors. Interestingly, these were also viewed as the factors most contributing to what respondents identified as a declining QOL in Austin. This suggests that citizens may

prioritize QOL domains on the basis of those factors that are viewed most negatively at the time and raises doubts about the ability to define a set of indicators that are consistently most important.

### 3.4 Indicators

Are social indicators primarily imperfect surrogates for more abstract ideas about QOL? Can we really measure these abstract ideas given the nature of available data? It is generally recognized that objective indicators are surrogate measures or indirect indicators of QOL. According to Carley (1981) and Beesley and Russwurm (1989), objective indicators can be viewed as inputs (e.g., number of beds per capita), throughputs (e.g., doctors caseloads) or intermediate outputs (e.g., life expectancy) while subjective measures (e.g., healthy population) are final outputs. In general, studies using objective indicators have very little theoretical basis (especially the "rating places" literature). In the rare instances where a strong theoretical basis exists (e.g., Liu, 1976), the QOL model developed was so rigorous that it was difficult to operationalize using existing data. For the most part, QOL studies using objective indicators depend on the availability of data and the subjective evaluation of the researcher. Much discussion concerns the unreliability, difficulty of interpretation, lack of saliency and simplistic nature of objective indicators (e.g., Palys, 1973).

### 3.5 Relationship Between Objective and Subjective Indicators

Are objective indicators satisfactory surrogate measures for subjective indicators? As noted earlier, objective indicators are usually less expensive and more readily available than subjective indicators. If there is a close correspondence between the two types of indicators

there would be no need to undertake the expensive surveys that are necessary to obtain subjective indicators of QOL.

The general consensus from empirical studies that have attempted to measure the association between objective and subjective indicators is that the two types of indicators are not closely related. It should be noted, however, that the existing studies differ widely in research design and the type of indicators used. For example, Kuz (1978) used a broad range of objective indicators and a very narrow range of subjective indicators to identify QOL in 77 Southern Manitoba centres. Under the circumstances, it is not surprising that there was a weak correlation between the two types of indicators. Similarly, Wish (1986) found a weak correlation between objective and subjective indicators for a sample of 60 metropolitan areas in the United States. However, the objective indicators, drawn from the Places Rated Almanac, were for metropolitan areas whereas the subjective indicators, obtained from the Annual Housing Survey, dealt with opinions about the dwelling and neighbourhood services and were, therefore, much more localized. Again, the weak correlation between the two types of indicators is not surprising.

More carefully constructed studies of the relationships between objective and subjective indicators have produced mixed results. In their study of residential QOL in the Toronto area, Greer-Wootten and Velidis (1983) found a discrepancy between objective measures of residential quality and subjective measures of residential satisfaction. Quality was associated with location (city, suburb, fringe) whereas satisfaction was not. Also, in a regression analysis, objective measures of residential quality accounted for only 10.8% of the variance in overall housing satisfaction. In contrast, Knox and MacLaren (1978) for a study of Dundee, Scotland, generally found positive and statistically significant (although in some cases not particularly high) correlations between objective and subjective scores, both for individuals and neighbourhood types. However, there were some contradictions for correlations within neighbourhood types

for each domain. In neighbourhoods dominated by the elderly, subjective scores considerably exceeded expectations based on objective measures, whereas subjective scores in areas characterized by young families were lower than expected. These discrepancies point to the need for carefully constructed studies disaggregated by social groups and/or neighbourhood types. This is one of the few studies in which objective and subjective indicators were drawn from the same survey. For example, information was collected about the objective state of the respondent's health (e.g., disabling illness in the past 6 months, visits to a general practitioner due to illness in the last 6 months) and the respondent's satisfaction with his/her health (self-anchoring scale from 0 to 10).

Given the weak associations between objective and subjective indicators, and recognizing the strengths and weaknesses of each approach, most researchers have suggested using both sets of indicators (e.g., Greer-Wootten and Velidis, 1983; Cutter, 1985; Long, 1987; Myers, 1987). Sometimes, however, the suggestion is qualified. For example, Knox and MacLaran (1978) concluded that "...for the purposes of generally describing or evaluating ecological disparities in well-being, conventional "hard" data are as good a surrogate as any. Having said this, however, it is plain that even a crude consideration of values and perceptions can considerably enhance our appreciation of the nature and extent of these disparities." There is also disagreement about the spatial scale at which subjective indicators are most appropriate. Knox and MacLaren's results imply a need for studies at the neighbourhood level. Pacione (1986) also suggests that although subjective indicators are important, they are most realistically applied to a targeted group at the local spatial level. In contrast, however, Cutter (1985) argues that "...quality of life is a broader concept and has its most appropriate application at the inter-city level, or larger scale."

### 3.6 The Relevance of Statistical Models

Most attempts to model QOL using regression analysis have produced disappointing results. This is true whether the attempt was to predict variation in overall life satisfaction using satisfaction with individual domains (e.g., leisure, health, education) as the independent variables or to predict variations in subjective indicators using objective measures as the predictor variables. It is also true for analyses of both individuals and places (e.g., cities and census tracts).

Several questions can be raised, all related to why the models have not produced very encouraging results. Is it because of missing variables? Or, are the variables that are available measuring different things? Or, are the data not adequate to fully test the models? Does the problem relate to the specification of the models? For example, it may be inappropriate to assume a linear relationship between the variables. A more complex non-linear relationship may be more appropriate. There are no clear answers to these questions but given the weak findings there would appear to be little advantage in pursuing the formal regression modelling approach in QOL studies. These are complex issues dealing with the idiosyncrasies of individual perceptions and behaviour. There is simply too much "noise" and likely too many intervening variables to justify the development of a predictive model using regression analysis.

### 3.7 Additivity/Standardization

A number of methodological issues have been raised in the literature, particularly concerning objective indicators. One set of questions relates to the appropriateness of developing summary indexes. For example, is it appropriate to add measures together to produce an overall QOL index? If not, can the variables from individual domains be added together to form a series of indexes? Or, must variables be treated individually when reporting

the results? In some studies (e.g., Dickinson, Gray and Smith, 1972) the scores for each criterion within a domain were summed to provide a summary score for each domain and the summary scores then summed to form an overall QOL score. The problem about this procedure is twofold. First, there may be little theoretical rationale for the domains and, second, some variables may be statistically independent of each other while others are highly correlated and therefore redundant. One way of dealing with this problem is to factor analyze the data to obtain relatively independent dimensions of QOL. This solves a methodological problem, but the results from a factor analysis are often difficult for the layperson to understand. This raises a broader question of the appropriate trade-off between sophistication of technique and ease of interpretation.

A second set of questions concerns the need to standardize data using standard scores (z scores) or some other standardization technique (e.g., factor analysis) and the usefulness of weighting variables. Standardization is necessary if measures based on different scales (e.g., average income and percent single parent families) are included in the same analysis and added together to form a summary index. In spite of a conceptual concern about different measures, authors such as Bederman (1974) have found little difference empirically in the results using different measures of standardization. On another methodological issue, weighting variables by their perceived importance seems unwise unless there is some reason to do so. Interestingly, Findlay, Morris and Rogerson (1988) used the results of a national questionnaire survey to attach weightings to each objective dimension of QOL in British cities and found little difference in the ranked lists of cities with and without weightings.

### 3.8 Spatial Scale

Quality of life studies have been undertaken at a variety of spatial scales ranging from national to intra-urban. For urban and regional analyses, it is obvious that the national scale is not appropriate and it is unlikely that findings at the national level are very relevant at the city or local levels. In a country as diverse as Canada, QOL will be affected by regional differences. Indeed, the Angus Reid 1991 Urban Canada Study showed considerable differences in QOL between the eight cities covered in the survey. The basic problem is that differences at the local level will be averaged out at the city level, and differences between cities will be further averaged at the national level. Given that data at the census tract level of analysis can always be aggregated to larger areas, including cities, it seems reasonable to collect QOL data at the lowest spatial level possible. The problem is that many relevant objective indicators are not available at the census tract level. For example, a large-sized city may have only a few sites for monitoring air quality. In the case of other domains, such as crime and health, data may be collected by individual occurrences but not aggregated to the census tract level. Without a sophisticated geographic information system, the task of doing so is costly and time-consuming.

Subjective data are also difficult to obtain at the intra-urban level unless the survey has been targeted to a specific group within a particular part of the city. Even though the sample sizes of most national or metropolitan surveys may be fairly large, they do not permit much disaggregation below the metropolitan level. The Angus Reid Urban Canada Survey, for example, was based on a sample of 500 residents in each of eight cities. It is possible to break this survey down to broad areas of the city such as inner city, older suburbs and newer suburbs but not to the census tract level. In large metropolitan areas such as Toronto and Montreal, the result would be fewer than 10 respondents on average per census tract. One way of handling this problem, as illustrated by Hardwick, Torchinsky and Fallick (1991) for Vancouver, is to develop a spatially stratified design that allows disaggregation of the results by larger areas



within the city or permits the development of isopleth maps to show the trend of responses across the city. The sample size, however, in the Vancouver study was over 1,000, or twice the size of the Vancouver component of the Angus Reid survey.

A final question relates to the importance of collecting data for individual municipalities within larger metropolitan areas. This is important because the catchment area for a high order facility such as live theatre or a major league baseball stadium will be considerably larger than a local library. Knowledge about the existence or capacity of a theatre or baseball stadium is probably most relevant at the metropolitan level. On the other hand, there are likely to be considerable differences between municipalities for the provision of services such as school programmes, community health care, and housing. In most instances, intra-metropolitan level differences are important and therefore studies in the "rating places" tradition mask a lot of the important variance within cities.

### 3.9 Frequency of Monitoring

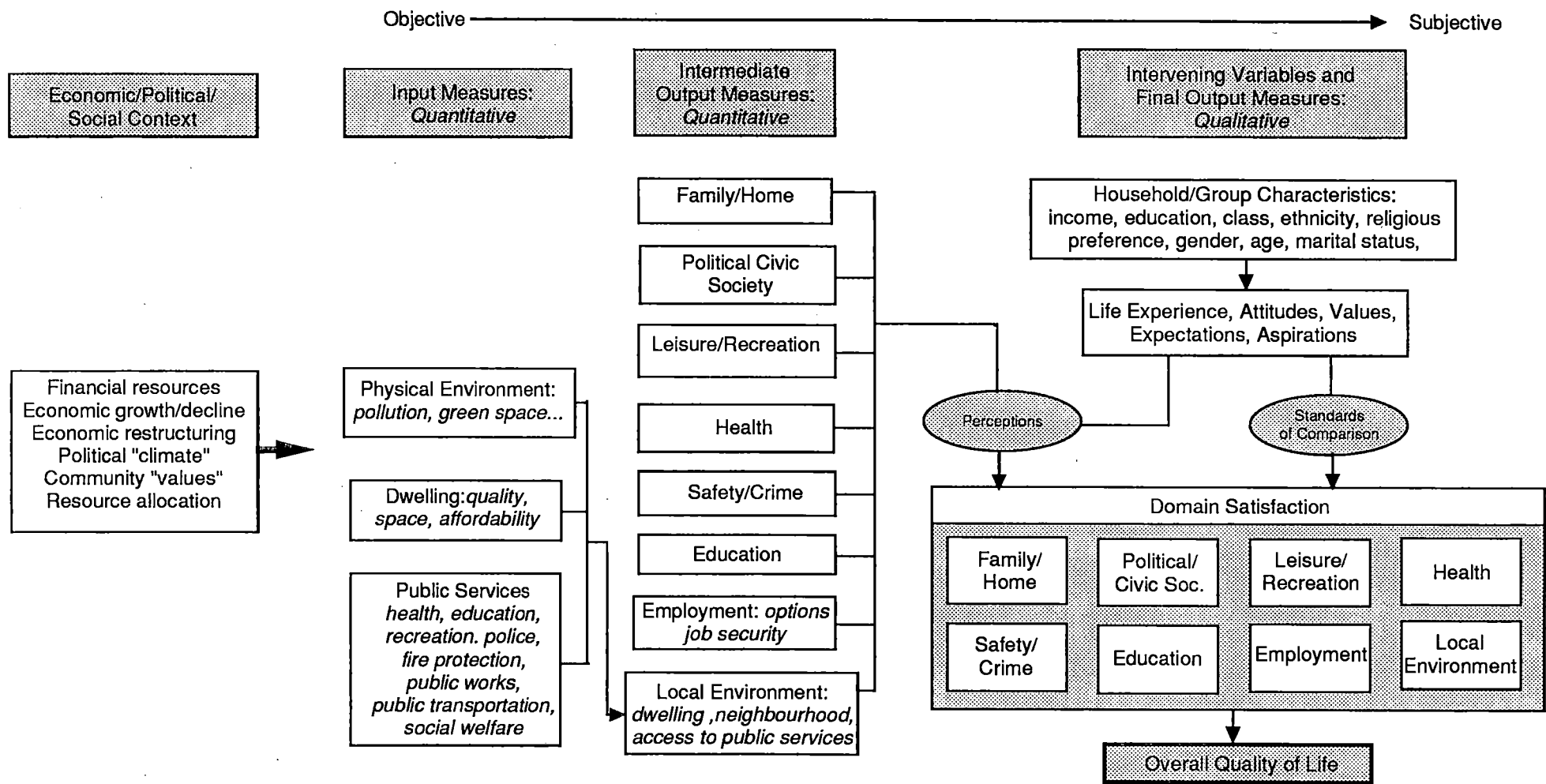
In most instances, QOL studies have been conducted at one point in time without any further follow-up. A notable exception is Hardwick, Torchinsky and Fallick's (1991) survey of issues and attitudes in the Greater Vancouver Region that used a questionnaire and methodology that was comparable to a similar survey in 1973. Most municipalities recommend a review of their official plan every five years. Recent planning exercises such as Toronto's Cityplan'91 and the Metropolitan Toronto Plan Review suggest three to five years. Hancock (1992) suggests a "State of the City" report coinciding with civic elections. The important point, as Myers (1987) notes, is to consider QOL as a local experience that changes over time. Indeed, one of the problems with surveys of community issues is that "... both public opinion in general and the subjects on which this opinion is expressed are subject to change, even rapid change, over time" (Patterson, 1992).

## 4. The Models

The two models described below are informed by the literature that has been reviewed in the previous section and the issues that have been raised and discussed. The first model, A Conceptual Framework of Quality of Life, is based on the research conducted over the last two decades on objective and subjective indicators. The second model, A Community Oriented Model of the Lived Environment, is based on the changing context for QOL studies that occurred in the 1980s and the increased emphasis on a holistic approach to urban planning. The broad basis of the model draws on ideas incorporated in the Metropolitan Toronto Planning Department's 1991 discussion paper, Towards a Liveable Metropolis. Similar ideas are found in the 1992 report from The Office for the Greater Toronto Area, GTA 2021- The Challenge of our Future.

### 4.1 A Conceptual Framework of Quality of Life

Figure 1, A Conceptual Framework of Quality Life, is an integrated model of the major components that are needed to reach an understanding of the overall quality of life. The model begins at the left side of the diagram with the economic, political and social context within which decisions about priorities in the municipality are made and municipal resources are allocated. Municipal spending on environmental clean-up, social services, education, police and a host of other facilities and services will depend, among other things, on the financial resources of the community, whether the tax base is expected to grow or decline, the views of elected officials and the values of the community. The inclusion of this box emphasises the point made by Myers (1987) that QOL is a local experience and that factors that might affect the allocation of resources, and ultimately QOL, are locally based. Conceptually, it is a useful starting point. The empirical evidence, however, concerning the link between local resource allocations and the economic, political and social context is inconclusive (Pinch, 1985).



A Conceptual Framework of Quality of Life

The next two sections of the model deal with input measures and intermediate output measures respectively (Carley, 1981). Both are quantitative and objective in nature. Input measures are objective characteristics of the local environment or facilities available in the municipality. Examples include the rental vacancy rate, the number of doctors per capita, and the number of police officers per capita. Intermediate output measures reflect the outcome or results of the characteristics or facilities available. For example, differences in the rent to income ratio may result from variations in the vacancy rate, with a low vacancy rate resulting in a higher rent to income ratio. Similarly, life expectancy may reflect the number of doctors per capita or variations in crime rate may reflect the number of police officers. Eight major intermediate output measures are listed, corresponding to most of the major domains from the QOL literature. For each major domain there is, potentially, a vast array of input measures. Only a selection of measures that relate to the quality of the local environment are shown in Figure 1. Again, it must be emphasised that this is a conceptual model. There is no strong empirical evidence in the literature of a strong link between input measures and intermediate output measures.

The final section of the model deals with intervening variables and final output measures. The latter are qualitative in nature. Ideas for this section of the model draw heavily from the work of Campbell, Converse and Rogers (1976) and the "Quality of Life Project" conducted by the Institute for Behavioral Research (now, Institute for Social Research) at York University. The major domains at the bottom of this section of the chart are deliberately identified as the same eight headings that are also under intermediate output measures. Satisfaction with individual domains such as health, education, and local environment are presumed to be affected by a number of direct and indirect factors. The first are a variety of household and group characteristics, including income, education, gender, age, marital status, and ethnic background (Inglehart, 1990). The effect of these characteristics on domain

satisfaction is further modified by more personal characteristics such as life experience, attitudes, values, expectations, and aspirations. Domain satisfaction is also affected by standards of comparison. Put in simple terms, this is a comparison of what you have to what you want. Finally, there is a hypothesized relationship between domain satisfaction and perceptions, particularly of intermediate output measures such as dwelling quality and access to public services and job security. As with standards of comparison, these perceptions may be affected by household/group characteristics and more personal characteristics such as life experience and attitudes.

Overall Quality of Life, as identified in the bottom right corner of Figure 1, is assumed to be the outcome of all of these components, both objective and subjective. As Schwab (1992:184) notes, "...Quality of life is the difference between what should be and what is in a community - the difference between goal and appraisal states. Therefore, ... quality of life is defined as the measurement of the conditions of place; how these conditions are experienced and evaluated by individuals, and the relative importance of each of these to individuals. From this perspective, the measurement of quality of life requires the analysis of objective conditions, as well as subjective assessments of these conditions between and within places."

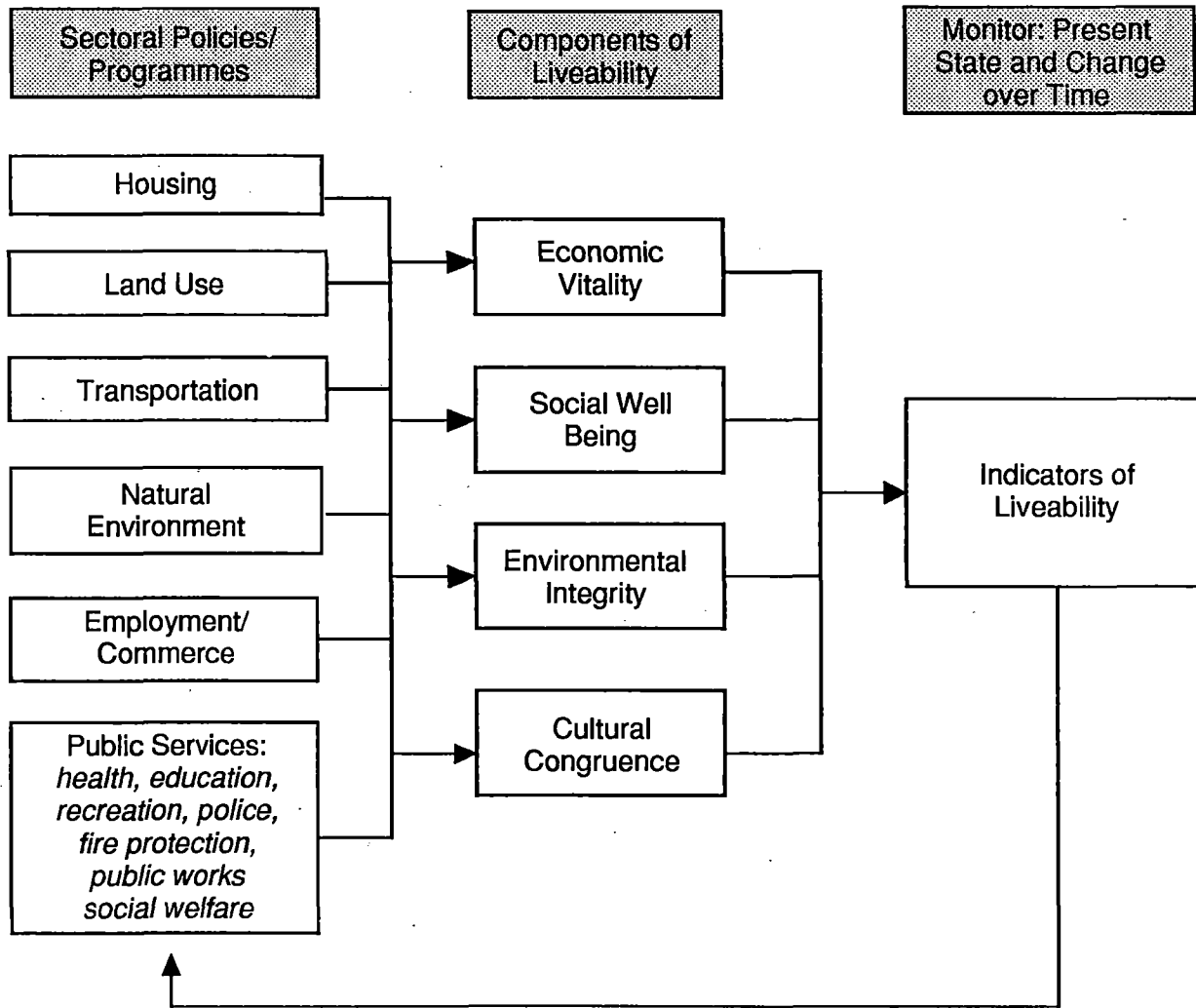
The model is complex and the data demands are extensive. Particularly problematic is the need to obtain all of the information for the section headed "Intervening Variables and Final Output Measures" from a questionnaire survey. For most municipalities, this would be very costly and there is considerable concern about the utility of the results for plan making, policy evaluation and related activities at the municipal level. The potential need for disaggregation of the data by social groups and/or neighbourhoods and the need to repeat such studies at regular intervals would also add considerably to the cost.

## 4.2 A Community Oriented Model of the Lived Environment

The model shown in Figure 2 is more directly related to policy issues that are important at the municipal level and is relevant to contemporary issues. It is our preferred model and the one we recommend to CMHC. As noted earlier, this model incorporates ideas from the sustainable development and new health perspectives. It reflects a more holistic and multisectoral approach to evaluating QOL issues at the local level.

The basic structure of the model draws from the Metropolitan Toronto Planning Department's discussion paper, Towards a Liveable Metropolis. The objective of this document was "...provide a framework for the new Metropolitan Official Plan that reflects the values and aspirations of the citizens of Metropolitan Toronto for a liveable metropolis...The report draws from the conceptual frameworks of "environmentally sustainable development", "healthy communities", and the "ecosystem approach" to define principles for planning a liveable metropolis. It proposes an approach to planning which assumes that socio-economic and environmental impacts and outcomes are fundamentally related."

The liveable metropolis is defined by three interrelated components: economic vitality, social well-being and environmental integrity. Environmental Integrity refers to practices that ensure long-term sustainability of clean air, soil and water as well as a variety of species and their habitats. Economic Vitality is defined as a broadly based economy responsive to changing circumstances, able to attract new investment and providing employment and investment opportunities. Social Well-Being has two components: 1) safety and health as well as equitable access to housing, services, recreational and cultural activities; and, 2) participation in the decision-making processes of the community (Metropolitan Toronto Planning Department, 1991:14). No one of these components should be emphasized at the expense of the others (e.g., economic growth that results in a degradation of the environment and risks to human health). It is suggested that "sectoral" indicators be developed that measure the impact of various



A Community Oriented Model of the Lived Environment

sectors such as housing, employment and commerce, and the physical infrastructure on the major components of liveability (environmental integrity, social well-being and economic vitality). Four major principles are proposed to guide the decision making process: equity, sustainability, shared responsibility, and choice and diversity. Although Towards a Liveable Metropolis is short on details about specific indicators and measures of these indicators, it is an attractive framework for incorporating recent ideas about sustainable development, healthy cities, and the ecosystem approach into a single concept. It is a useful starting point for the development and implementation of a Community Oriented Model of the Lived Environment.

The left column in Figure 2, headed "Sectoral Policies/Programmes", lists most of the sectors that municipal governments have some responsibility for. Most large centres likely have separate departments or boards that deal with these issues but in smaller municipalities the first five (housing, land use, transportation, natural environment and employment/commerce) are more likely to be combined within a single planning department. In developing the list, we have attempted to reflect the reality of municipal government as it is currently structured. Hancock (1992) makes the interesting and provocative comment that the current organization of municipal administrations into departments such as planning, health, parks, and police is not relevant to the challenges facing cities today. Instead, he envisages multidisciplinary groups dealing with issues such as social justice, environmental quality, human development, energy and resource conservation, and mobility/accessibility. Despite the possible attractiveness of this idea to some observers, it is not likely that civic administrations will be reorganized along these lines in the near future.

The second major heading, "Components of Liveability", indicates the major dimensions by which each sectoral policy or programme should be evaluated. The first three (economic vitality, social well-being, and environmental integrity) come from Towards a Liveable Metropolis. The fourth component, cultural congruence, has been added for theoretical



completeness. Cultural congruence is the degree to which things match societal norms and expectations. These can be expressed in the form of standards or norms that are often established by governments responding to societal needs. Examples are found in areas such as social welfare, public health, environmental protection, and housing. In the area of housing, they often relate to technical norms such as crowding, floor area and sunlight. For example, CMHC (1991b) has developed the concept of "core housing need" to identify households "...unable to obtain unsubsidized market housing meeting suitability and adequacy norms without spending 30 per cent or more of their income on rent". The lower the core need, the greater the cultural congruence. The cultural congruence component is included in the model but not in the discussion of indicators because of difficulties in defining the component and finding suitable measures, particularly at the municipal level.

The third segment of the model involves the identification of indicators and specific measures of the components of liveability for each of the sectoral policies and programmes. The details for individual sectors are provided in the next section of the report. Not all sectoral policies and programmes will be related to all components. Housing, for example, is clearly related to all components while the various public services relate primarily to social well-being and only indirectly to economic vitality and environmental integrity. Similarly, the natural environment relates primarily to environmental integrity rather than economic vitality or social well-being.

The return arrow to the Sectoral Policies/Programmes segment of the model is a reminder that the components of liveability for the various sectors should not only be identified for one point in time but also monitored over time. Monitoring should occur both at regular intervals and when changes are proposed to sectoral policies and programmes.

The model does not provide for subjective indicators of economic vitality, social well-being or environmental integrity. This limits the model in two respects. First, without timely

information about what citizens perceive to be priority issues for their communities, planners and policy makers may institute programs that do not fully address local needs. Second, monitoring that does not take into account subjective assessments of conditions and/or changes will not be as relevant as evaluations that do include an attitudinal or perceptual component. While these problems might be resolved by adopting an approach similar to Myers' community-trend method (1987;1988), the time and expense required would be beyond the capabilities of most municipalities. Modifications to the Community Oriented Model of the Lived Environment would entail convening local representatives from a wide range of interest groups to identify the domains and indicators relevant to them; collecting and processing the required objective measures; surveying the community about their evaluations and satisfactions; and then disseminating trend data reports for further community discussion and input.

## 5. Indicators

The indicators and specific measures for operationalizing the Community Oriented Model of the Lived Environment are presented in a series of tables (Tables 1 to 10). The information for each sector (housing, land use, transportation etc.) is given in a separate table. The details for Housing, the first major sector in Figure 2, are provided both visually (Figure 3) and in tabular form (Table 1). For the remaining sectors, the details are provided in table form only. The list of indicators in the Appendix presents detailed information about the specific measures in each sector. Within each sector, the data source, geographical level and frequency of each measure are given.

The indicators and specific measures for operationalizing the Community Oriented Model of the Lived Environment were arrived at on the basis of several considerations and through various sources. First, all indicators used in the major studies reviewed were listed by domain resulting in almost 400 separate measures. Second, indicators and measures suggested

in panel discussions with academics versed in major domains were added to the list. Third, these indicators were culled to avoid repetition and to maximize conceptual fit with the model. Fourth, the availability of the indicators and measures was examined.

The selection process was particularly constrained by considerations of availability as the following examples illustrate. With respect to the Natural Environment, the number of waterways protected by conservation areas or the percentage of flood plains that are undeveloped land would be useful measures of conservation. However, such data are not currently available except through extensive calculations based on maps. Because it seems unlikely that municipalities would have the resources to collect the information, these measures were excluded. In the area of Housing, the core need index is a sophisticated measure that combines affordability, suitability and adequacy. This index would be preferable to single measures of each indicator. However, the data required to implement the index are presently available only at the provincial level. Thus, other measures of affordability had to be selected. Data may not be available on a time series basis. Some measures relating to Transportation, such as the percentage of those working outside their district of residence, are important contextual variables for interpreting public transportation usage. However, since these contextual data are not collected over time, they were excluded.

The exclusion of measures that are not available at the municipal level means that the model is practical and ready for use by municipalities. However, this utility has a cost. The specific measures selected may be relatively unsophisticated representations of the major indicators.

While the Components of Livability and Indicators for each domain may be treated as complete, the measures are by no means definitive. The measures listed in the Appendix are highly selective and other measures are possible. Individual municipalities may well find

different measures, more relevant to their local conditions, better proxies for the indicators in the model.

For the most part, the details in Tables 1 to 10 and the Appendix are self explanatory. However, some general guidelines are given for interpreting the Tables and the Appendix and a brief discussion is presented for each sector. In the Tables, the details for each sector are described under three headings: Components of Liveability, Indicators of Liveability and Specific Measures. As indicated in the previous section, the Components of Liveability (economic vitality, social well-being, environmental integrity) indicate the major dimensions by which each sector should be evaluated. Indicators of Liveability are more specific constructs related to each component and Specific Measures are the recommended variables for identifying each Indicator of Liveability. Details for each sector are given below.

## 5.1 Housing

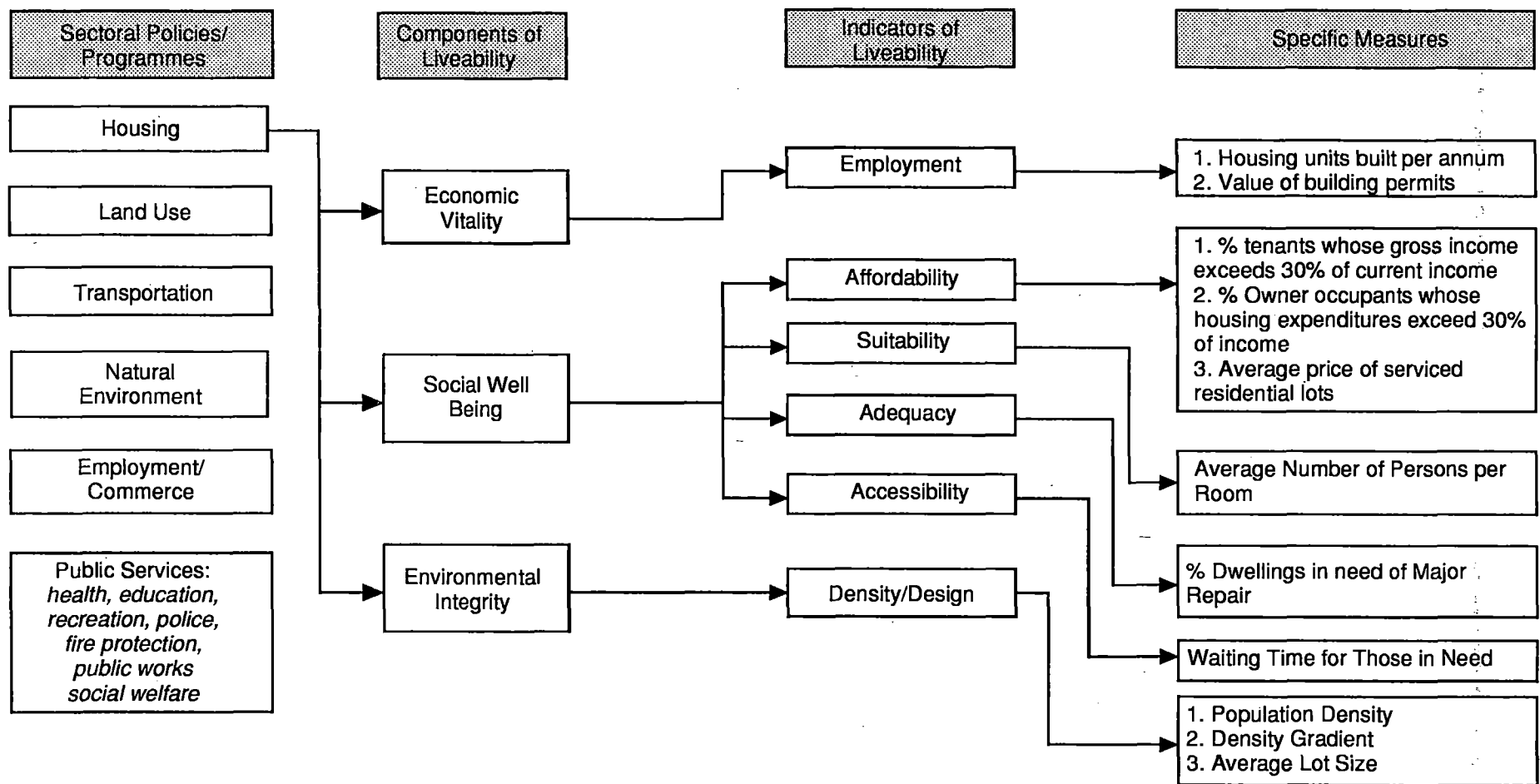
Table 1: Housing: Indicators and Specific Measures

COMPONENT	INDICATORS	SPECIFIC MEASURES
Economic Vitality	Employment	<ol style="list-style-type: none"> <li>1. Housing units built per annum</li> <li>2. Value of building permits</li> </ol>
Social Well-Being	Affordability	<ol style="list-style-type: none"> <li>1. % Tenants whose gross rent exceeds 30% of current income</li> <li>2. % Owner occupants whose housing expenditures exceed 30% of income</li> <li>3. Average price of serviced residential lots</li> </ol>
	Suitability	<ol style="list-style-type: none"> <li>1. Average # of persons per room</li> </ol>
	Adequacy	<ol style="list-style-type: none"> <li>1. % dwellings in need of major repair</li> </ol>
	Accessibility	<ol style="list-style-type: none"> <li>1. Waiting time for those in need</li> </ol>
Environmental Integrity	Density / Design	<ol style="list-style-type: none"> <li>1. Population density</li> <li>2. Density gradient</li> <li>3. Average lot size</li> </ol>

As noted in Table 1 and Figure 3, the prime indicator for economic vitality is employment. Housing has always been recognized as an important producer of jobs, both directly in the construction industry and indirectly in various other manufacturing (e.g., furniture, appliances) and service (e.g., real estate, legal, financial) industries. Two variables have been selected to measure this indicator: housing units built per annum and the value of building permits. The first is a measure of new construction and the latter captures the value of all construction including additions and renovations. These variables should be identified on an annual basis and changes noted over time. They could also be standardized by some measure of city size such as population or dwelling units.

The social well-being component is identified by four indicators: affordability, suitability, adequacy, and accessibility. The first three indicators have traditionally been used to identify housing need in Canada (CMHC, 1991b). The fourth indicator, accessibility, relates to housing availability for the lowest income group in society. The measures suggested are a compromise between those traditionally used in Canada and the availability of data at the municipal level. As noted earlier, core need is a more sophisticated measure that combines affordability, suitability and adequacy into a single index. However, until recently, data required to implement the core need index have only been available at the provincial level. A more extensive 1991 survey will permit extension of this analysis to Canada's largest cities.

Finally, in the housing sector, environmental integrity has been identified by indicators of density and design. These indicators relate to the concern by CMHC and others about the inefficiencies and environmental considerations associated with low density residential development. Specific measures that are readily available at the local level are difficult to obtain. Population density, density gradient and average lot size are suggested as three possibilities. Ideally, the density measures would be for net residential densities rather than gross densities. Net densities, however, require a measure of residential land use for planning areas or census tracts within the city, information that is often not readily available in municipal



Indicators and Specific Measures of Liveability: Housing

offices: Average lot size would be most usefully obtained for new residential subdivisions and compared with the average size of lots approved at previous points in time.

## 5.2 Land Use

Details for the land use sector are given in Table 2. Indicators for the economic vitality component of land use include availability and affordability. Measures related to availability reflect the fact that commercial and industrial firms or developers are particularly concerned about the amount of vacant serviced land available for development. From an economic perspective, all developers are concerned about the average time of approval for building permits. The affordability measures relate particularly to the cost of serviced land. These include the average cost of serviced lots and the average lot levy. Most of this information should be available at the local level in municipal offices or from local real estate boards.

The social well-being component of land use is identified by proximity, availability and variety. Proximity is indexed by measures concerning distance to park space or green space and percent households within 1 km. of a playground, elementary school and local services. The latter is a norm drawn from the land use planning literature (e.g., Leung, 1989). Availability is identified by the number and hectares of park and recreation areas per 1,000 population. The concept of variety draws heavily from ideas first made popular by Jane Jacobs in her well known critique of conventional land use planning (1961). As measures of this indicator, the following are suggested: average block length, an index of land use mix and the mix of dwelling ages within a local community. Specific ideas for operationalizing these measures are given in Fowler's (1992) application of Jane Jacobs' concepts of physical diversity to a sample of Toronto neighbourhoods.

The environmental integrity component of land use is indicated by density. This is a general notion designed to identify the relative compactness of an urban area. As such, it is

**Table 2: Land Use Indicators and Specific Measures**

COMPONENT	INDICATORS	SPECIFIC MEASURES
Economic Vitality	Availability	<ol style="list-style-type: none"> <li>1. Amount vacant serviced land for commercial and industrial use</li> <li>2. Average time of approval for building permits</li> </ol>
	Affordability	<ol style="list-style-type: none"> <li>1. Average cost of serviced commercial and industrial lots</li> <li>2. Average cost of serviced residential lots</li> <li>3. Average lot levy</li> </ol>
Social Well-Being	Proximity	<ol style="list-style-type: none"> <li>1. Average distance to green/park space</li> <li>2. Spatial differences in distance to green/park space</li> <li>3. % Households within 1 km. of playground, elementary school, local services</li> </ol>
	Availability	<ol style="list-style-type: none"> <li>1. No. and acres of park and recreation areas per capita</li> </ol>
	Variety	<ol style="list-style-type: none"> <li>1. Average block length</li> <li>2. Index of land use mix</li> <li>3. Mix of building ages, dwellings only</li> </ol>
Environmental Integrity	Density	<ol style="list-style-type: none"> <li>1. # Dwellings per hectare</li> </ol>

complementary to the density/design component from housing, but in this case the suggested measure is number of dwellings per hectare. Like population density, number of dwellings ideally should be related to residential land use rather than the total area of a community, planning district or census tract. It can also be argued that the index of land use mix is an appropriate indicator of environmental integrity, as well as social well-being, in that land use mix would promote less commuting and therefore reduce atmospheric pollution.



Most of the land use measures rely heavily on the availability of municipal level data including an up-to-date inventory of land use information at the intra-urban level and a good geographic information system. For many municipalities, this information is not available in an easily accessible form.

### 5.3 Transportation

Businesses in most large sized cities rely heavily on an efficient transportation system to move people and goods swiftly with minimum time delays. Controversy in the past has centred on the best way of doing this. Should the emphasis be primarily on private transportation, public transportation or a balance between the two? As indicated in Table 3, two measures are suggested for measuring the availability of transportation as it relates to economic vitality: percent public expenditure allocated to public transit and expenditure for street maintenance per capita per year. The use of these two measures recognizes the need to consider the vitality of both public and private transportation.

In the context of social well-being, the availability, equity and safety of public transportation is important, particularly for lower income groups. Several measures have been suggested to index these concepts. For availability, distance in travel time to transit and percent kilometres served by public transit are suggested. As a measure of equity, we recommend the availability of transit for the disabled, arguably the least mobile group within the city. As a measure of safety, a variable identifying the number of crimes on public transit should be identified.

Transportation also impacts on the environmental integrity of the city, particularly in the context of energy resource consumption and pollution. Measures related to the availability and use of private and public transportation are suggested: motor vehicle registrations per 1,000 population and percent population using public transit. Indicators showing the extent to which cities promote alternative types of transportation such as the existence of bicycle paths would

**Table 3: Transportation: Indicators and Specific Measures**

COMPONENT	INDICATOR	SPECIFIC MEASURES
Economic Vitality	Availability	1. % Public expenditure allocated to public transit including infrastructure 2. Expenditure for street maintenance per capita per year
	Employment	1. % Population living and working in city
Social Well-Being	Availability	1. Distance or travel time to transit 2. % Street km. served by public transit
	Equity	1. Public transit for disabled
	Safety	1. # Crimes on public transit
Environmental Integrity	Energy Resource Consumption and Pollution	1. Motor vehicle registrations per capita 2. % population using public transit

also be useful. It is also important to note whether the bicycle path networks are completely separated from motor vehicle traffic or not.

## 5.4 Natural Environment

All of the indicators concerning the natural environment relate to environmental integrity. The indicators, as shown in Table 4, include availability, resource consumption and conservation. Availability concerns the incidence of pollutants in an urban centre such as particulate matter, the concentration of atmospheric NO<sub>2</sub>, SO<sub>2</sub> and CO<sub>2</sub>, and water quality. These measures should be available locally or from provincial environment ministries. Resource consumption relates to waste generation and reuse and includes kilos of waste per person per

year, volume of city waste generated by industrial sectors and per-cent city waste recycled and marketed. Conservation concerns the treatment of a city's land and might be measured by the percent of land area retained in a "natural" state. Data for waste reduction and reuse are important but may be relatively difficult to obtain. However, as recycling becomes more popular systematic data should be more readily available. Similarly, data on the city's land area in a "natural" state may not be easily obtained but is an environmentally important and often overlooked aspect of urban land use.

Table 4: Natural Environment: Indicators and Specific Measures

COMPONENT	INDICATOR	SPECIFIC MEASURES
Environmental Integrity	Availability	<ol style="list-style-type: none"> <li>1. Particulate matter suspended in air</li> <li>2. Concentration of atmospheric NO<sub>2</sub>, SO<sub>2</sub> and CO<sub>2</sub></li> <li>3. Water quality</li> </ol>
	Resource Consumption	<ol style="list-style-type: none"> <li>1. Kilos of waste per person per year</li> <li>2. Volume of city waste generated by industrial sectors</li> <li>3. % City waste recycled and marketed</li> </ol>
	Conservation	<ol style="list-style-type: none"> <li>1. % Land area retained in "natural" state</li> </ol>

## 5.5 Employment and Commerce

Not surprisingly, most of the indicators concerning employment and commerce are related to economic vitality (Table 5). These include availability of capital, employment, cost

**Table 5: Employment and Commerce: Indicators and Specific Measures**

COMPONENT	INDICATOR	SPECIFIC MEASURES
Economic Vitality	Availability of Capital	<ol style="list-style-type: none"> <li>1. Federal and provincial investment in municipality</li> <li>2. Household wealth (HIFE)</li> <li>3. Incidence of low income</li> </ol>
	Employment	<ol style="list-style-type: none"> <li>1. Unemployment rate</li> <li>2. Average annual wages/salaries</li> <li>3. Total # job openings in local neighbourhood</li> <li>4. % Available skilled, semi- skilled, unskilled jobs vacant</li> <li>5. % Available clerical-sales, managerial or professional jobs vacant</li> </ol>
	Cost of Living	<ol style="list-style-type: none"> <li>1. Cost of Living Index</li> </ol>
	Level of Business Activity	<ol style="list-style-type: none"> <li>1. Retail sales per employee</li> <li>2. Net change in # of business establishments</li> </ol>
	Variety	<ol style="list-style-type: none"> <li>1. # Retail trade establishments per capita</li> <li>2. Department stores per capita</li> <li>3. Shopping malls per city</li> <li>4. % Labour force age 15+ employed in 8 major sectors</li> </ol>
Social Well-Being	Employment Equity	<ol style="list-style-type: none"> <li>1. Labour force participation rate for minorities, youth, women, men</li> <li>2. % Jobs that are full-time</li> <li>3. % Labour force unionized</li> <li>4. Female unemployment rate</li> <li>5. Male unemployment rate</li> <li>6. Youth unemployment rate age 15-24</li> </ol>
	Income Equality	<ol style="list-style-type: none"> <li>1. Average weekly wages-males</li> <li>2. Average weekly wages-females</li> <li>3. Average professional earnings as ratio of average earnings</li> </ol>

of living, level of business activity, and variety. Three measures are suggested for availability of capital: federal-provincial investment in municipalities, household wealth and the incidence of low income. Unfortunately, like any measure of capital, the first two are relatively difficult to obtain. There are a wide variety of variables related to employment. Five are suggested here including unemployment rate, average annual wages/salaries, total number of job openings, the percent of skilled, semiskilled and unskilled jobs vacant and the percent of clerical, sales, managerial and professional jobs vacant. Both unemployment rates and wages and salaries are relatively easy to obtain for urban centres. Job vacancies, however, are much more problematic. Cost of living is relatively straightforward but is only available for fifteen major Canadian cities plus Yellowknife and Whitehorse. Retail sales per employee and net change in number of business establishments are useful measures of the level of business activity but are only available at the provincial level. A number of variables are suggested for variety of business activity: number of retail trade establishments per capita, department stores per capita, shopping malls per city and the diversity of employment in various sectors. From an economic and job security perspective, a diversified economic base is usually viewed as a positive feature.

Employment and commerce are also related to social well-being by way of two major indicators: employment equity and income equality. Employment equity measures include variables related to labour force participation rates, full-time jobs, unionization, and age and gender based unemployment rates. Income equality is summarized by variables measuring gender differences in wages and income polarization between professional earners and the rest of the labour force.

Unfortunately, simple employment and unemployment rates are difficult to interpret. For example, it would be useful to be able to distinguish between those who wish to work part-time and those who are forced to work part-time. Also, it would be helpful to be able to distinguish between secure and insecure full-time employment. The latter is particularly important in the context of the changes and uncertainties brought about by economic

restructuring. The problem, of course, is that data are not available for these more refined measures and would be extremely difficult to obtain without in-depth surveys.

## 5.6 Public Services

### 5.6.1 Health

The two indicators of health, availability and incidence, are associated exclusively with social well-being (Table 6). Measures of availability include input measures such as the number of hospital beds and the number of physicians per 1,000 population. In contrast, the incidence indicator includes output measures such as infant mortality, age adjusted mortality rates for men and women, suicide rate (mental health), and worker compensation claims. These are conventional health data that relate to the narrowly focused medical model of health rather than the broader socio-economic model. There is also no direct evidence that a certain number of hospitals or physicians on the input side will result in higher levels of wellness or lower mortality rates on the output side.

Table 6: Health: Indicators and Specific Measures

COMPONENT	INDICATOR	SPECIFIC MEASURES
Social Well-Being	Availability	<ol style="list-style-type: none"> <li>1. # Hospital beds per capita</li> <li>2. % Acute and chronic care hospital beds per capita</li> <li>3. # Physicians per capita</li> <li>4. # Community care centres or beds per capita</li> <li>5. # Public health workers per capita</li> </ol>
	Incidence	<ol style="list-style-type: none"> <li>1. Infant mortality rate</li> <li>2. Age adjusted mortality rates for men and women</li> <li>3. Suicide rate</li> <li>4. Worker compensation claims</li> </ol>

## 5.6.2 Education

The four major indicators of education are also related exclusively to social well-being (Table 7). They include quality, availability, variety, and educational attainment. Quality measures include student/teacher ratios, expenditure on education and high school drop out rate. Availability measures are numbers of primary and secondary schools and post secondary institutions. The operating capacity of schools in small boards may give information about whether the community is in decline or growing. However, for larger boards in the metropolitan areas, the number of classrooms, number of portables or number of students

**Table 7: Education: Indicators and Specific Measures**

COMPONENT	INDICATOR	SPECIFIC MEASURES
Social Well-Being	Quality	<ol style="list-style-type: none"> <li>1. Student/teacher ratios: primary, secondary levels</li> <li>2. Expenditure on education by school board</li> <li>3. High school drop out rate</li> </ol>
	Availability	<ol style="list-style-type: none"> <li>1. # Primary, secondary schools</li> <li>2. # Post-secondary institutions</li> </ol>
	Variety	<ol style="list-style-type: none"> <li>1. # School Boards (public, separate) and private schools.</li> <li>2. % and kind of supplementary educational services</li> <li>3. % students in Special Education</li> <li>4. % students in French Immersion</li> </ol>
	Educational Attainment	<ol style="list-style-type: none"> <li>1. % Population 20-34 without high school diploma</li> <li>2. % population age 25+ with university degree</li> <li>3. % population age 25+ with college certificate</li> </ol>

enrolled will have considerable geographic variability and would be less meaningful measures of capacity. Variety of educational facilities is measured by the number of school boards (public and separate) and private schools. Variety of educational experience can be measured using variables such as the number and kind of supplementary educational services, the percentage of students in special education and the percentage of students in French immersion. Finally, educational attainment is measured by the percentage of the adult population with higher levels of educational achievement.

As with health, the impact of inputs (expenditures, availability and variety of programmes) on outputs (educational attainment) is uncertain. A review of a large number of studies in a recent Economic Council of Canada report (Economic Council of Canada, 1992) showed that, for the most part, none of the traditional variables such as teacher/pupil ratio, teacher education, expenditures, and school facilities were significantly related to education-achievement test results.

### 5.6.3 Recreation

Recreation and leisure has traditionally ranked as an important domain in most QOL studies. It is also useful to separate recreation as an organized activity, usually provided by a local municipality (e.g., tennis), from leisure as a broader activity that people experience (e.g., playing bingo, attending a theatre performance). People have also been attracted to a wide variety of recreational and leisure experiences. Thus, it is not surprising to find a diversity of measures associated with the social well-being component of recreation and leisure. In Table 8, these have been categorized as sports, leisure, clubs and other. The specific measures are given as examples of the diverse nature of recreation and leisure activities.



**Table 8: Recreation: Indicators and Specific Measures**

COMPONENT	INDICATOR	SPECIFIC MEASURES
Economic Vitality	Availability	1. per capita expenditure on parks and recreation
Social Well-Being	Availability/ Variety	# per capita
	Sports	1. swimming pools 2. tennis courts 3. arenas, curling rinks, golf courses 4. game seats
	Leisure	1. neighbourhood bars 2. bowling alleys, bingo halls, amusement places 3. theatres & movie theatres 4. restaurants 5. shopping malls by type
	Clubs	1. sports & leisure clubs 2. youth clubs 3. social clubs
	Other	1. library books 2. museums & art galleries 3. symphony, opera & dance companies
Environmental Integrity	Conservation	1. No. and hectares parks and recreation areas per capita

#### 5.6.4 Crime and Safety

Crime and safety relates to two components of liveability, economic vitality and social well-being (Table 9). The two measures related to economic vitality include government expenditures on policing and on fire protection. It is assumed that increased expenditures on

these services will reduce economic losses in the community. Complementary measures of availability also relate to social well-being and personal protection. These variables include population per police officer, the number of fire employees per capita and expenditure on fire protection in the community. In addition to the availability of police and fire services, we also include a measure indexing the variety of safety services available. The variables listed above are all input measures. Another set of variables relate to outputs, including the incidence of traffic accidents, crime rates and fire losses.

Table 9: Crime and Safety: Indicators and Specific Measures

COMPONENT	INDICATOR	SPECIFIC MEASURES
Economic Vitality	Availability	<ol style="list-style-type: none"> <li>1. gov't expenditure on policing</li> <li>2. local gov't expenditure on fire protection per capita</li> </ol>
Social Well-Being	Availability	<ol style="list-style-type: none"> <li>1. population per police officer</li> <li>2. # fire employees per capita</li> <li>3. fire protection classification of community</li> </ol>
	Variety	<ol style="list-style-type: none"> <li>1. #, range and scope of public safety services</li> </ol>
	Incidence	<ol style="list-style-type: none"> <li>1. traffic accidents per capita</li> <li>2. violent crime rate</li> <li>3. property crime rate</li> <li>4. average annual fire losses: dollars per capita</li> </ol>

Data related to public safety, and particularly policing, are fraught with difficulties. As with health and education, there is no evidence that increased resources spent on more police staff will reduce crime. In recent years, this issue has been the focus of particularly strenuous

debate in Toronto. The outputs, as measured by crime data, are also suspect. Crime data are difficult to obtain at the intra-urban level and there is no check on reliability. In addition, there is strong evidence that perception of safety rather than the incidence of crime is a much more important QOL indicator. These data, however, would have to be obtained from carefully constructed questionnaire surveys.

### 5.6.5 Social Welfare

Social welfare is an important public service, particularly in recessionary times. As indicated in Table 10, it relates both to economic vitality and social well-being. In economic terms, persons on welfare are a charge to taxpayers, both individuals and businesses. From a social well-being perspective, the availability and variety of welfare services are important variables affecting those in need. The measures selected reflect both of these issues.

Table 10: Social Welfare: Indicators and Specific Measures

COMPONENT	INDICATOR	SPECIFIC MEASURES
Economic Vitality	Employment	1. average weekly unemployment rate 2. # of welfare cases
Social Well-Being	Availability	1. annual expenditure on welfare 2. # social service agencies per capita
	Variety	1. range & scope of social agencies

## 6. Conclusions

Two models of QOL were developed in this report. Both are informed by the literature and its development over the past two decades. The first, a Conceptual Framework of Quality of Life, is an integrative statement of ideas drawn from research on objective and subjective indicators. The second model, A Community Oriented Model of the Lived Environment, draws from recent work on sustainable environments and healthy cities and is more closely related to policy issues that are important at the municipal level. The basic idea of the model is that the liveable metropolis is defined by three interrelated components: economic vitality, social well-being and environmental integrity.

The Community Oriented Model of the Lived Environment is our preferred model because it reflects contemporary thinking about QOL and is suitable for evaluating policy issues at the local level. It must be emphasized, however, that QOL is subject to a variety of interpretations and no model is perfect. The recommended model, for example, does not incorporate subjective indicators measuring individual satisfactions and perceptions. Yet the academic literature in this field suggests that both objective and subjective measures are needed to satisfactorily measure QOL. By eliminating subjective measures, we are not able to tap directly into individual satisfactions, perceptions and feelings.

As noted in Section 5.6.4, the addition of subjective measures is particularly important for public services such as policing, where the perception of safety may be as important, if not more important, than the incidence of crime. Similarly, the ability to measure satisfaction concerning domains such as health, education and recreation is important for evaluating the effectiveness of services provided by these sectors. Also, for these sectors, perceptions and satisfactions may be as important as more objective outputs, particularly when the links between inputs and outputs are not very predictable or well understood.

The addition of subjective measures would be ideal but we also realize that for most municipalities the collection of these data on a continuing basis would be prohibitively expensive and perhaps not worth the cost given the utility of the results for plan making, policy evaluation and related activities at the municipal level. Scarce resources might be better spent on developing integrated information systems (geographic information systems) that would permit frequent monitoring of variables at the intra-urban level.

It should be noted that we are not advocating the abandonment of public participation in the planning process. Indeed, we recommend planning procedures that help communities define themselves (Myers, 1987). Where possible, we suggest that local municipalities buy into existing omnibus public opinion surveys such as the Toronto Area Survey conducted annually by ISR. We also recognize, however, that not many municipalities have access to regularly scheduled omnibus surveys. Also, the sample sizes of these surveys are usually not large enough to permit disaggregation at the neighbourhood level.

In Tables 1 through 10 and the Appendix a set of specific measures are suggested for each indicator of liveability. Indicators of liveability are constructs related to each component (economic vitality, social well-being, environmental integrity) for each sector of municipal activity (e.g., housing, land use, transportation). Specific measures are the recommended variables for identifying each indicator of liveability. For some sectors (e.g., housing, land use) indicators and measures are defined for all three components. For other sectors (e.g., natural environment, health) indicators are only relevant for one or two components.

In selecting the indicators and related measures a balance has been sought between conceptual thoroughness and availability of information. For some sectors the development of suitable indicators and measures was difficult. This was particularly true for public services such as health, education and crime where the conceptual links between inputs and outputs are not well developed and objective indicators are often difficult to obtain or not very reliable. For

many indicators; data are readily available from a variety of sources, albeit for different spatial scales and time periods. Other indicators have been included for which data are either not currently available or not available at the urban or intra-urban scales of analysis. In many cases, these have been included to raise awareness about a particular issue. It should also be noted that the Appendix is not meant to be a definitive set of measures. This is a highly selective list and other measures are possible.

Finally, the need to develop measures that are consistent over time and space must be stressed. Unfortunately, existing measures do not all adhere to this criterion. Some are available annually, others for five year periods and still others are collected as single studies at only one point in time. Also, some variables are only available by province while others are available at the municipal or census tract levels. The Appendix provides an inventory of the specific location of readily available measures, their temporal and spatial availability and the absence of some variables.

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Note: An asterisk indicates that the reference is included in the annotated bibliography.

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## **Appendix**

### Indicators and Their Availability

This appendix presents detailed information about the indicators and measures itemized in Tables 1 through 10 in the report. Within each sector (housing, land use, transportation etc.) the data source, geographical level and frequency of each measure are given.

Data sources are varied. Often they are self explanatory. For example, "CMHC, Housing Information Monthly". Some data sources may require elaboration for users unfamiliar with the terminology used. The following comments will be helpful as a guide to interpretation.

1. The term "gap" indicates that data for that measure do not currently exist. In some instances, indicators used in past publications, are no longer collected.
2. The names of government departments often differ slightly city by city and province by province. When the data source is a government department or ministry, the formal title may need to be adjusted. Similarly, liquor licensing boards, fire marshall's offices, local transit companies and local housing authorities may all have different names depending on geographical location. It is to be expected that the sophistication of the data base and its ease of access will also vary across Canada. It may not always be easy, quick, or inexpensive to abstract information from such sources.
3. Statistics Canada disseminates a variety of information in many forms. It may collect data but not make them available except through "special tabulations" done on a fee for service basis as requests are made. Census data are available on computer tape and are also published in the form of "profiles" and "catalogues". The tapes are available through major research organizations (such as ISR), at selected libraries and directly from Statistics Canada. Catalogues and profiles are housed in most major public libraries and at universities. Until recently Statistics Canada also published a "Help Wanted Index" containing valuable data on employment. This index is no longer published but in the near future it may be resumed under a different name or disseminated through Canada Employment Centres.
4. Many cities and municipalities, especially smaller ones, publish local business directories. While the information contained can be out of date and incomplete, such directories may be the only valid source of employment and commerce measures at the local level.
5. Boards of Education (School Boards) maintain ongoing information about education for their catchment areas. Unfortunately these data are not aggregated for larger regions nor do board jurisdictions exactly correspond to census tracts. Access to school board data often requires special authorization.

6. The Canadian Directory of Shopping Centres is the only comprehensive source on malls. It is available at major libraries.
7. The Canadian Urban Transit Association publishes municipal data on an annual basis. The Association relies on local transit companies to supply the data for their reports.
8. Both the Insurers Advisory Organization and the organization representing the General Insurance Industry in Canada publish annual statistics relating to fire protection. Both are private organizations and their data are usually available only to their members; membership involves a fee.
9. GIS stands for Geographic Information System and may or may not be available in municipal departments.

**SOCIAL INDICATORS**

MEASURES:	DATA SOURCE:	LEVEL OF DATA:	FREQUENCY
<b>HOUSING:</b>			
New Housing units constructed per annum	CMHC: Canada Housing Statistics or CMHC Housing Information Monthly	Urban Centres of 10,000 or more " " "	Annual Monthly
Value of Building Permits: Average Value per capita p.a.	Statistics Canada, Cat: 64.001 Statistics Canada, Cat: 64.203	Municipal Municipal	Monthly Annual
% Tenants whose gross rent exceeds 30% of current income	Census Profiles	Census Tract	5 Years
% Owner occupiers whose housing expenditures exceed 30% of income.	Census Profiles	Census Tract	5 Years
Average price of serviced residential lots	Planning Department	Municipal	Erratic
Average # of persons/room	Census Profiles	Census Tract	5 Years
% Dwellings in need of major repair	Census Profiles	Census Tract	10 years
Waiting time for those in need; access to subsidized housing	Local housing authority	Municipal	Unknown
Population density - persons per sq. km in residential areas.	Gap		
Density gradient	Gap		
Average lot size	Planning Department	Municipal	Unknown

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>LAND USE:</b>			
Amount vacant serviced land for commercial and industrial use.	Planning Department	Municipal	Annual
Average time for approval of building permits	Planning Departments: Measure time between initial application and the granting of permit.	Municipal	Unknown
Average cost of serviced commercial and industrial lots.	Planning Department or Royal LePage	Municipal	Unknown
Average cost of serviced residential lots	Planning Department or local home building association	Municipal	Unknown
Average lot levy	Planning Department	Municipal	Unknown
Average distance to green space within city.	Gap		
Spatial differences in distance to green/park space	Gap		
% Households within 1 km of playground, elementary school local services.	Gap		
No. and acres of park and recreation areas per capita	Parks and Recreation Dept.	Municipal	Annual
Average block length	Gap		
Index of Land Use Mix	Municipal Planning Dept. (esp. where GIS is available)	Municipal	Unknown
Mix of building ages-dwellings only	Census Profiles	Census Tract	5 years
# Dwellings per hectare	Census Profiles	Census Tract	5 years

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>TRANSPORTATION:</b>			
% Public expenditure allocated to public transit including infrastructure	Canadian Urban Transit Assocn. or local transit company	Municipal	Annual
Expenditure for street maintenance per capita per year	Municipal Public Works Dept.	Municipal	Annual
% Population living and working in city.	Census Profiles	Census Tract	10 years
Distance or travel time to transit	Canadian Urban Transit Assocn. or local transit company.	Municipal	Annual
% Street km. served by public transportation	Canadian Urban Transit Assocn. or local transit company.	Municipal	Annual
Public transit for the disabled	Canadian Urban Transit Assocn. or Local Transit Company.	Municipal	Annual
# Crimes on public transit	Gap		
Motor Vehicle registrations per capita	Statistics Canada Cat: 53.219	Census Divisions Municipalities	Annual
% Population using public transportation	Canadian Urban Transit Assocn. or Local Transit Company	Municipal	Annual
<b>NATURAL ENVIRONMENT:</b>			
Particulate matter suspended in air	Provincial Environment Ministry	Surveillance Region	On-going
Concentration of atmospheric NO <sub>2</sub> , SO <sub>2</sub> , and CO <sub>2</sub> .	Provincial Environment Ministry	Surveillance Region	On-going
Water Quality	Municipal Public Works dept.	Municipal	On-going
Kilos. of waste per person per year	Municipal Waste Manage Department	Municipal	Annual



MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>NATURAL ENVIRONMENT: (cont'd)</b>			
Volume of city waste generated by industrial sectors.	Municipal Waste Management Department, Gap in smaller centres	CMAs	Annual
% City waste recycled and marketed.	Municipal Waste Management Department.	Municipal	Annual
% Land area retained in "natural" state	Municipal Planning Department	Municipal	Annual
<b>EMPLOYMENT AND COMMERCE:</b>			
Federal and provincial investment in Municipality	Gap		
Household wealth	H.I.F.E.	Toronto, Montreal and Vancouver	
Incidence of low income	Census Profiles	Census Tract	5 years
Unemployment rate	Census Profiles Statistics Canada Cat: 71.001 Statistics Canada Cat: 71.001	Census Tract	5 years Monthly Monthly
Average annual wages or salaries	Census Profiles	Census Tract	5 years
Total # job openings in local neighbourhood	Gap		
% Available skilled, semi-skilled, unskilled jobs vacant	Gap		
% Available clerical-sales, managerial or professional jobs vacant	Gap		
Cost of Living Index	Statistics Canada, Cat: 62.010	15 major cities + Yellowknife & Whitehorse	Annual

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>EMPLOYMENT AND COMMERCE:</b> (cont'd)			
Retail Sales per employee	Statistics Canada Cat; 63:005	Province	Annual
Net change in # of business establishments.	Ministry of Consumer and Commercial Relations or local business directories	Province	Annual
# Retail trade establishments per capita	Statistics Canada Cat: 63.005	Province	Monthly
Department stores per capita	Statistics Canada Cat: 63.210	Province	Monthly
Shopping malls per city	Canadian Directory of Shopping Centres. Vols 1 & 2	Municipal	Annual
<b>% LABOUR FORCE AGE 15+ EMPLOYED IN 8 MAJOR SECTORS:</b>			
In primary industries (ABC & D)	Census Profiles	Census Tract	5 years
In manufacturing (E)	Census Profiles	Census Tract	5 years
In construction (F)	Census Profiles	Census Tract	5 years
In trade industries (I & J)	Census Profiles	Census Tract	5 years
In transportation, storage, communication & other utilities (G & H).	Census Profiles	Census Tract	5 years
In finance, insurance & real estate (K & L).	Census Profiles	Census Tract	5 years
In government service industries (N)	Census Profiles	Census Tract	5 years
In other service industries (MOPQ & R)	Census Profiles	Census Tract	5 years

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>EMPLOYMENT AND COMMERCE:</b> (cont'd)			
Labour force participation rate for minorities	Gap		
Labour force participation rate for persons 15 - 24 years.	Census Profiles	Census Tract	5 years
Female labour force participation rate for persons 15 - 24 years.	Census Profiles	Census Tract	5 years
Female labour force participation rate for persons 15 and over.	Census Profiles	Census Tract	5 years
Male labour force participation rate for persons 15 - 24 years.	Census Profiles	Census Tract	5 years
Male labour force participation rate for persons 15 or over.	Census Profiles	Census Tract	5 years
% Jobs that are full time.	Statistics Canada Cat: 71.001	Province	Monthly
% Labour force unionized	Statistics Canada Cat: 71.202	Province	Annual
Female unemployment rate	Census Profiles Statistics Canada Cat: 71.001	Census Profiles Province	5 years Monthly
Male unemployment rate	Census Profiles Statistics Canada Cat: 71.001	Census Tract Province	5 years Monthly
Youth unemployment rate age 15-24.	Census Profiles Statistics Canada Cat: 71.001	Census Tract Province	5 years Monthly
Average weekly wage - males	Census Profiles	Census Tract	5 years
Average weekly wage - females	Census Profiles	Census Tract	5 years
Average Professional earnings as ratio of average earnings.	Statistics Canada: Special Tabulation	Census Tract	

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>HEALTH:</b>			
# Hospital beds per capita	Statistics Canada Cat: 82.003S6	Individual Hospital	Annual
% Acute and chronic care hospital beds per capita	Gap		
# Physicians per capita	Provincial Medical Associations	Province	Annual
# Community care centres or beds per capita	Gap		
# Public health workers per capita	Gap		
Infant mortality rate	Statistics Canada, Cat: 82.003S15	Province	Annual
Age adjusted mortality rates for men and women	Statistics Canada, Cat: 82.003S15	Province	Annual
Suicide rate	Statistics Canada, Cat: 82003S11	Province	Annual
Worker Compensation Claims	Provincial Worker Compensation Boards annual reports	Province	Annual
<b>EDUCATION:</b>			
Student/teacher ratios: primary, secondary levels	Board of Education	Board region	Annual
Expenditure on education by school board	Board of Education	Board region	Annual
High school drop-out rate	Provincial Secondary School Teachers Federations	Province	Annual
# Primary, secondary schools	Board of Education	Board Region	Annual
# Post secondary institutions	Provincial Ministry of Education	Municipality	Annual
# School boards (public and separate) private schools	Provincial Ministry of Education	Municipality	Annual

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>EDUCATION: (cont'd)</b>			
% and kind supplementary educational services	Board of Education	School Board Region	Annual
% Students in Special Education	Board of Education	School Board Region	Annual
% Students in French Immersion	School Board	School Board Region	Annual
% Population 20 - 34 without high school diploma	Census Profiles	Census Tract	5 years
% Population age 25+ with University Degree	Census Profiles	Census Tract	5 years
% Population age 25+ with college certificate	Census Profiles	Census Tract	5 years
<b>RECREATION:</b>			
Per capita expenditure on parks and recreation.	Municipal Parks and Recreation	Municipal	Annual
Swimming pools/capita	Municipal Parks and Recreation	Municipal	Annual
Tennis courts/capita	Municipal Parks and Recreation	Municipal	Annual
# Arenas, curling rinks, golf courses/capita	Parks and Recreation Dept. or Local business directories	Municipal	Annual
# Game seats/capita	Fire Marshall's Office or Parks and Rec. Depts.	Municipal	Annual
Neighbourhood bars/capita	Provincial Liquor Licensing Boards	Municipal	Annual
# Bowling alleys and amusement places	Local Business Directories	Municipal	Annual
# Bingo halls	Lotteries Department, Provincial Ministry of Consumer and Commercial Relations	Municipal	Annual

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>RECREATION: (cont'd)</b>			
# Theatres & movie theatres per capita	Local Business Directories	Municipal	Annual
# Restaurants	Municipal Licensing Department	Municipal	Annual
# Shopping malls by type	Canadian Directory of Shopping Centres Vols 1 & 2	Municipal	Annual
# Sports and leisure clubs/capita	Parks and Recreation Dept.	Municipal	Annual
# Youth clubs/pop. 16 - 19 years	Parks and Recreation Dept. or Gap.	Municipal	Annual
# Social clubs/capita	Gap		
# Library books/capita	Statistics Canada Cat: 87.205	Province, Territory and CMAs	Annual
# Museums & art galleries/capita	Statistics Canada Cat: 87.207	Province & CMAs	Annual
# Symphony orchestras, opera and dance companies	Statistics Canada Cat: 87.209	Province	Annual
# and hectares parks & recreation areas/capita	Municipal Parks & Recreation Provincial Parks Department	Municipal Province	Annual Annual
<b>CRIME AND SAFETY:</b>			
Government expenditure on policing per capita.	Statistics Canada, Cat: 85.002 Vol. 10, No. 18	Province	Annual
Local Government expenditure on fire protection per capita	Municipal Fire Departments	Municipal	Annual
# Police officers per capita	Statistics Canada, Cat: 85.002 Vol. 10 No. 18	Province	Annual
# Fire employees per capita	Municipal Fire Departments	Municipal	Annual

MEASURE:	SOURCE:	LEVEL:	FREQUENCY:
<b>CRIME AND SAFETY: (cont'd)</b>			
Fire Protection Classification of community	Insurers Advisory Organization: Fire protection Underwriting Bulletin.	Municipal	
# Range and scope of public safety services	Municipal Offices or police depts.	Municipal	Annual
Traffic Accidents per capita	Statistics Canada Cat: 85.002	Province	Annual
Violent Crime Rate	Statistics Canada, Cat: 85.205	Province	Annual
Property Crime Rate	Statistics Canada, Cat: 85.205	Province	Annual
Average annual fire losses: dollar per capita.	Facts of the General Insurance Industry in Canada, or Provincial Fire Marshalls' Reports	Urban Centre or township	Annual
<b>SOCIAL WELFARE:</b>			
Average weekly unemployment rate.	Statistics Canada, Cat: 73.202S	Province & CMA	Annual
# Welfare cases	Provincial Ministries of Community and Social Services Municipal Social Services Dept.	Province Municipal	Annual Annual
Annual expenditure on welfare	Provincial Ministries of Community and Social Services Municipal Social Services Dept.	Province Municipal	Annual Annual
# Social service agencies per capita	Municipal Social Services Dept.	Municipal	Annual
# Range and scope of social agencies in city	Municipal Social Services Dept.	Municipal	Annual