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SOCIAL WELFARE IN ONTARIO: AN
EXPERIMENT IN PARSIMONY

UNIVERSITY/UNIVERSITÉ

CARLETON UNIVERSITY

DEGREE FOR WHICH THESIS WAS PRESENTED/
GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE

M.A.

YEAR THIS DEGREE CONFERRED/ANNÉE D'OBTENTION DE CE DEGRÉ

1981

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SOCIAL WELL-BEING IN ONTARIO: AN
EXPERIMENT IN PARSIMONY

by

Ruqiyah Islam

A Thesis submitted to the Faculty of Graduate
Studies in Partial Fulfillment of the Requirements
for the Degree of Master of Arts

Department of Geography

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Ottawa, Canada

January, 1981

The undersigned recommend to the Faculty of
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IN PARSIMONY"

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ABSTRACT

One problem in measuring social well-being is the use of more data than is actually necessary. Attoh (1980) has studied 'spatial variations in social well-being in Ontario' by using 68 variables. A principal components analysis was used to identify basic dimensions in the data. Component scores revealed spatial variations in the different aspects. This study builds on Attoh's study and investigates whether or not the same outcome can be achieved when data input is much reduced. Forty-one of the original 68 variables are retained. A principal components analysis is used to identify basic dimensions in the new data set. Comparison of component structures and spatial patterns reveals that in both instances similarities are largely maintained. This is also found to be true for overall social well-being studied by using the hierarchical grouping technique. The importance of parsimony in data use is emphasized for simplicity and elegance as well as a better utilization of society's scarce resources.

ACKNOWLEDGEMENTS

The author is greatly indebted to her supervisor, Professor David Bennett under whose constant guidance and assistance this work has been accomplished. She is grateful to her teachers in the department for their help in various ways. The support from the R.A. Mackay fund is gratefully acknowledged. Thanks are extended to her friends, Riva and Andrea in particular, who have helped her in various ways and made her stay in Ottawa pleasant. Finally, thanks are extended to Janet Wilson for the typing of the thesis.

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CHAPTER I

INTRODUCTION

1.1 A RATIONALE FOR ELIMINATING VARIABLES

In the study of social well-being, the nature, type and number of variables to be used has remained a challenging question. The general complaint has been that adequate data to measure social conditions are not available. Since much current research is still devoted to indicator identification, it may seem anachronistic to begin talking about the need for reducing variables. The problem however, is that data availability has already led to the use of much information than is actually necessary. Regarding the recent social indicator movement and the development of social indicators, Olson (1969, 337) quotes one U.S. congressman to have already argued that "we may be producing more statistics than we can digest", and that "Federal output of statistics may soon leave us inundated in a sea of paper and ink: Drewnowski (1972, 78) notes:

"what has been created so far is an incoherent maze of variables, the definitions of which are muddled, quantification procedures questionable, and practical uses if any doubtful. There is no doubt that many of them may prove quite useful, but they are lost among others which are useless. What is badly needed is the establishment of some ordering principles."

These statements are equally true of the development of social indicators in Canada.

Problems due to the use of too much information may arise in many ways. Generally speaking, it may be that if one breaks the question of 'what is happening' into a large number of separate questions, one will have failed to aggregate or make any progress toward an overall conception of the situation. A more modest, yet more comprehensive data set, is therefore, always to be preferred. Also, in science the criterion of efficiency or elegance is important. That is, if one achieves the same explanation more simply, it is to be preferred all other things being equal. Many indicators that may be used, may not be equally useful. There is thus, the need for using value judgements to identify the better from the worse, and use only the most important variables. There may be overlapping information in a data set resulting in duplication and double counting. Not all such information need be used.

In any research it must be remembered that the development of indicators and the collection and processing of data is an enormously expensive and time consuming affair. Thus, the smaller the data set used (while adequate information is retained), the less time consuming and expensive it will be. Research on reducing the number of variables in a study is, therefore, important as our search for newer and more appropriate variables continues.

1.2 OBJECTIVE OF THE STUDY:

The objective of this study is to reduce the number of variables that may be used in a study. As it is firmly within the "cumulative"

tradition of science, to build on past studies rather than to start from a completely different basis, it has been decided to study the case of Ontario, Canada. Social well-being for Ontario has already been studied by using twelve major criteria and sixty-eight variables in Attoh's exploratory analysis in 1980. The overall aim of this study is to build on Attoh's (1980) results, to refine his data set and to see whether or not substantially the same outcome can be achieved from a much reduced input. Thus, in undertaking the analysis, the technical and methodological aspects shall be held constant, making the two analyses (Attoh's and the present one) parallel, and only input data shall be changed. In short, the present study seeks efficiency tempered with maintaining comparability.

Before moving on further into the analysis, an understanding of the concepts of social indicators and social well-being is first considered.

1.3 SOCIAL INDICATORS

The discussion on social indicators focuses mainly on the social indicator movement, and the definition and characteristics of social indicators that has appeared in the works of both geographers and non-geographers. Then it goes on to review the development of the study of social well-being, particularly from the geographical perspective.

1.3.1 The Social Indicator Movement:

Interest in social indicators is a recent phenomenon. In the study of development, the realisation grew gradually that economic

TABLE 1.1

LIST OF CENSUS DIVISIONS FOR THE
PROVINCE OF ONTARIO

1. Algoma	19. Kenora	37. Perth
2. Brant	20. Kent	38. Peterborough
3. Bruce	21. Lambton	39. Prescott
4. Cochrane	22. Lanark	40. Prince Edward
5. Dufferin	23. Leeds	41. Rainy River
6. Dundas	24. Lennox & Addington	42. Renfrew
7. Durham	25. Manitoulin	43. Russell
8. Elgin	26. Middlesex	44. Simcoe
9. Essex	27. Muskoka	45. Stormont
10. Frontenac	28. Niagara	46. Sudbury
11. Glengarry	29. Nipissing	47. Thunder Bay
12. Grenville	30. Norfolk	48. Timiskaming
13. Grey	31. Northumberland	49. Toronto
14. Haldimand	32. Ontario	50. Victoria
15. Haliburton	33. Ottawa-Carleton	51. Waterloo
16. Halton	34. Oxford	52. Wellington
17. Hastings	35. Parry Sound	53. Wentworth
18. Huron	36. Peel	54. York

FIG. 1.1 BASE MAP OF ONTARIO SHOWING CENSUS DIVISIONS

measures or measures such as Gross National Product or Income per capita neither reflected nor explained growing social problems.

Thus, the question arose as to 'what were the indicators that would best reflect the social aspects of life'. Investigations into this area in the United States led to the social indicator movement.

The movement is generally said to have begun in the 1920's when the idea began to take shape that society should produce a quantitative picture of itself and its changes (de Neufville, 1975, 40). In 1929, President Hoover formed a Committee on Social Trends. The report of the Committee 'Recent Social Trends in the United States' was one of the earliest attempts to analyse social factors likely to have a bearing on public policy in the second third of the century. However, very little progress was made in regular social reporting until 1960.

In 1960, President Eisenhower's Commission on National Goals set up a variety of national goals on the social front. In 1962, the Social Science Advisory Committee (to President Kennedy) urged the establishment of a systematic collection of basic behavioural data for the U.S. The National Commission on Technology, Automation and Economic Progress in 1966 called for social accounting, annual social reports to the President, and a full opportunity and social accounting act (Smith, 1973, 53).

Methodological development of social indicators and interest in the concept of social well-being grew remarkably during the later years of the 1960's (Liu, 1976, 7). Between 1959 and 1966, the publication of 'Health, Education and Welfare (HEW) Indicators' and 'HEW Trends'

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represented a small step towards expanding the available social statistics, although the indicators used were rather conventional. Then within a short period came four books on the need for social reporting and the many problems involved -- (i) a NASA sponsored study edited by Bauer (1966), (ii) a short volume by Gross (1966) for the London-based Tavistock Institute, (iii) the results of a Russell Sage Foundation project edited by Sheldon and Moore (1968), and (iv) a reprint of two special issues of the Annals of the American Academy of Political and Social Sciences (Gross, 1969).. Between 1969 and 1973 there was a spate of papers on social indicators by sociologists, political scientists and economists.

The first thrust of the social indicators movement culminated in the publication by HEW of 'Toward a Social Report' in the last days of the Johnson Administration. This represented the first attempt to produce a relatively brief review of the state of the nation on a wide range of social conditions. Congressional interest was reflected in 1971 by the passage of a bill which would promote great improvements in national social reporting in the U.S.

The promise to improve the quality of federal statistics continued in the 1970's. In 1972, a large-scale symposium on the subject, 'The Quality of Life Concept -- A Potential New Tool for Decision Makers', was sponsored by the Environmental Protection Agency which set another significant milestone for quality of life research and the social indicator movement. A year later the Office of Management and Budget published

'Social Indicators, 1973', a book of statistics selected and organised to describe social conditions and trends, the first of its kind to be published by the Federal Government of the U.S. (Liu, 1976, 7).

The social indicator movement in the U.S. has had its parallel in Great Britain. In 1970, the Central Statistical Office in Great Britain surveyed existing data and selected and published in an annual volume, 'Social Trends', the data that seemed most pertinent to the concerns of British society (de Neufville, 1975, 47). The first issue of Social Trends resembles 'Toward a Social Report' in its coverage, though it is more strictly a statistical document than the largely narrative HEW publication (Smith, 1973, 53-54).

France has followed suit with a volume similar (Institut National de la Statistique, 1973) to the British 'Social Trends'. The data presented are largely the by-product statistics of such programs as the 'Supplementary Benefit Scheme' or 'National Health'. de Neufville (1975, 47) notes that insofar as the programs cover a large proportion of the relevant population, they are reasonably indicative of the state of society.

The Canadian response to the social indicator movement and the growing demands for data on quality of life has resulted in the publication of 'Perspectives Canada -- A Compendium of Social Statistics' in 1974. This has been repeated in 1977 and 1980, although there is no

guarantee of regular and continuing publication. 'Perspectives Canada' is more than just a collection of statistics. It is also a set of descriptive essays which rely primarily on statistics to provide a variety of perspectives on the social and economic features of Canadian life. One of the objectives is to allow Canadians a factual basis for forward thinking -- a basis that starts with a description of where the Canadian social system is undergoing alteration or a change in direction. 'Perspectives Canada' is also expected to enable Canadians to at least begin to assess their own well-being in contrast to that of the rest of the country's citizens (Perspectives Canada III, 1980, V).

Ontario is the principal concern in the present study, where it is found that at the provincial level one major source of social data is the annual volume of 'Ontario Statistics -- Social Series'. This series has been published since 1975. 'Ontario Statistics' has previously been published as 'Ontario Statistical Review', since 1964. It was realised by the Government that the 'Statistical Review' series was not fulfilling the demand for social data very well. Following a questionnaire survey of readers opinions, 'Ontario Statistical Review' was expanded and turned into a two volume series. One volume publishes economic data and the other publishes social data. Various Ministries have also been publishing information at different spatial levels of aggregation according to the interests of the Ministries and their jurisdictions.

It is clear from the above discussion that a great many efforts have already been made in producing social indicators. Yet, as the

nature of social problems is extremely complex, even definitions and distinctive characteristics are not generally agreed upon. The next section deals briefly with the definition and characteristics of social indicators.

1.3.2 The Definition and Characteristics of Social Indicators:

There is some general consensus, but agreement as to what exactly constitutes a social indicator is difficult to arrive at. Beginning simply with the term 'indicator', it is found that although it has been very much in use in statistical literature, it has not been defined in a precise manner. Standard dictionaries do not go beyond describing an indicator as 'one that indicates, shows or points'. Rao (1975, 121) notes that the term has obviously a wider connotation than 'index number' which has been defined as:

"a quality which shows by its variations, the changes over time or space of a magnitude which is not susceptible of direct measurement or direct observation in practice. While the index number generally conforms to a set form (or to certain alternative forms), the indicator apparently has no such formulation, although it also often measures indirectly, magnitudes which are not susceptible of direct measurement or observation, and usually connotes more than it represents".

Regarding 'social indicator', it is found that among definitions used for a guideline, one is the definition presented in 'Towards a Social Report' (1969, 97):

"a social indicator as the term is used here, may be defined to be a statistic or direct normative interest which facilitates concise, comprehensive and balanced judgements about the condition of major aspects of a society. It is in all cases a direct measure of welfare and is subject to the

interpretation that, if it changes in the right direction, while other things remain equal, things have gotten better or people are 'better off'. Thus, statistics on the number of doctors or policemen could not be social indicators whereas figures on health or crime could be."

This definition has also been subject to criticisms in several respects in many papers and publications. Sheldon and Freeman (1970, 97-98) point out that the position that indicators must be of 'normative interest' is too restrictive because what is relevant today may not be relevant next year. Again, the requirement that indicators need to be measures of welfare is too confining in that it rules out many variables that may be relevant to an understanding of the indicator. Statistics on the number of doctors or policemen for example, may be significant for an understanding of health and crime rates and changes therein over time. That social indicators must have a direction is also criticised by Sheldon and Freeman, from the point of view that what is good in the minds of some, may not be good in the minds of others.

Social indicators according to Sheldon and Freeman (1970, 97) are "time series that allow comparisons over an extended period which permit one to grasp long term trends as well as unusually sharp fluctuation rates". Andrews (1973, 5) notes: (i) that social indicators should be limited because if one tried to measure all possible aspects of society, one could not understand what the indicators were indicating; and also because a single indicator may sometimes indicate a lot of things -- one does not need to measure everything; (ii) a set of social indicators should be comprehensive in the sense that it

includes indications of society; (iii) the set should be a coherent one, implying that the indicators have some relevance to each other and hang together; (iv) the set should be significant i.e. by being limited, comprehensive and coherent, they may lead to other indicators; (v) the indicators should allow disaggregation or they should allow cross classification by relevant characteristics e.g. by relevant attributes of either persons or the conditions measured and by the conceptual characteristics that surround the measure.

Similar to Andrews idea of coherence is Hoffenberg's (cited from Andrews, 1973, 5) definition that social indicators should be "measures of social system performance". The problem however, is that no consensus has so far been reached regarding social system modeling and an adequate social theory. Sawhill (1969) considers social indicators to be qualitative measures of social conditions designed to guide choices at several levels of decision making. Rao (1975, 122) along with the discussion of other characteristics regarding the meaning of the term 'social indicators' notes that they should be subject to the planning process.

Both the above views are similar to the idea that social indicators should help in setting up goals and priorities; and also in the evaluation of programmes. Sheldon and Freeman (1970, 99) note that these are some of the impossible uses of social indicators. Their view is that indicators are only a set of assembled data. The setting up of

goals and priorities is more the result of national objectives and values than assembled data. With respect to the evaluation of specific programs, they argue that this use of indicators would require one to be able to demonstrate statistically that programmes determine the outcomes measured by the indicators rather than other factors 'causing' the results. So far, evidence of respectable evaluation studies on social programs is very limited.

Kamrani and Christakis (1970, 208) refer to social indicators as "some crude measure of overall well-being, or a good quality of life". They represent an attempt to 'describe' with some understanding, the condition of society in terms of particular activities and social groups " ... an aggregate or representative welfare measure, that is, a statistic that measures the extent to which some social goal or general welfare has been achieved". Rao (1975, 123) considers them

"generally derived summary series designed to portray the state and trends in social conditions that are, or are likely to become, the subject of public action or concern. They should yield information on the extent to which existing conditions correspond to generally accepted social goals and the pace at which these objectives are being rendered".

Olson (1969, 339-344) like other authors, notes that social indicators should measure the condition of society or the quality of life within it, and that they should be part of a coherent system. He also adds that social indicators should be studied in groups -- groups which are (i) conceptually homogeneous so that all the phenomena in each group are comparable and can thus be aggregated or represented by a single index or series of numbers; (ii) the set of categories must

be mutually exhaustive, so that together they cover the whole problem; (iii) the categories must be mutually exclusive, so that they do not answer any part of any single question more than once and thus lead to the double counting or over weighting of some aspects of the phenomena under investigation.

According to Liu (1974a, 188), welfare indicators (i) should be sufficiently universal so that the underlying principles would apply to the majority of the people; (ii) should be easily understood and there should be a general consensus with respect to their selection; (iii) should be flexible enough to encompass any life style among individuals at different places and at different points in time; (iv) they should be adaptable to changing social, economic, political and physical conditions in a dynamic society and open to verification according to recognised scientific approaches.

It is obvious from the above definitions and defining characteristics that there is some degree of overlap (although more or less synonymous definitions have not been included here) as well as varying aspects on what different people consider social indicators to be. If however, we try to eliminate overlaps and summarise the main aspects, we find that social indicators ideally should:

- 1) be direct measures of welfare
- 2) be normative
- 3) be comprehensive --- they should cover the most salient and critical aspects
- 4) enable judgements to be made about society (direction)

- 5) time series -- allowing over-time comparisons
- 6) limited -- not measuring all possible aspects
- 7) coherent -- should 'hang together'
- 8) significant -- it leads to other indicators
- 9) disaggregable -- up to relevant social unit
- 10) either input or output indicator
- 11) part of a system -- measures social system performance
- 12) guide to decision-making and subject to the planning process
i.e. it aids the setting up of goals and priorities
- 13) groups of indicators should be conceptually homogeneous
- 14) groups of indicators should be mutually exclusive
- 15) groups of indicators should be mutually exhaustive
- 16) flexible to encompass any life style
- 17) adaptable to changing situations
- 18) universal -- applying to majority of people
- 19) easily understood

Obviously, it is almost impossible that a single indicator possess all the attributes stated above. Individual indicators may, however, be conceived of as possessing one or a few of the defining characteristics. In the case study of Ontario, attributes possessed by indicators available are discussed in Chapter II. In the following section, the concept of territorial social indicators is discussed briefly.

1.3.3 The Concept of Territorial Social Indicators:

The concept of territorial social indicators has been a part of

the social indicator movement for quite some time. The major characteristic is that territorial indicators are spatial expressions of social aspects of a population, and not statements about a population irrespective of the relevant spatial units to which the population belongs. Examples would be indicators for cities, regions, sub-units of a region etc.

Adding space to the social data matrix is by no means easy. It requires careful transformation of indicators into operational terms in relation to the spatial units which they are supposed to represent. All indicators may not be so transformed easily because of the methods of data collection, sampling, changes in territorial unit boundaries etc. Yet the need for adding the space-dimension to social data arises for various reasons.

In the distribution of the benefits and burdens that society has to bestow, there is general agreement that the ultimate unit is the human individual. For convenience, however, various levels of aggregation (i.e. groups or organisations) are considered. The geographers principal concern is the territorial level of aggregation. It is generally considered that the greater the variations in the benefits and burdens between territorial units, so varies the condition of people belonging to those territories and vice versa. In taking a geographic view, whatever the spatial unit considered, disparities between spatial units may be identified. The smaller the spatial units considered, the greater may be the details of problems revealed.

Although the awareness for the development of social indicators at the territorial level of aggregation has always been there, contributions have not been substantial. Most countries have tended to publish almost all of their social statistics only at the national level of aggregation. Gross (1969, 125) calls this situation "aggregatics -- a form of mental acrobatics in which non-spatial, macro-guesstimates are juggled in the air without reaching the ground in any territorial entity smaller than the nation itself." The awareness that such a situation should be changed is recent. As Knox (1975, 11) states:

"Territorial social indicators are merely a geographers perspective on the general social indicators movement; they are a necessary and logical extension of any realistic system of social reporting. People live locally and experience the prosperity, stresses, expectations, and satisfactions of their own locality. National social indicators are aggregates of these conditions and as such may mask important problems at the local level".

In the development of territorial social indicators, Gross made one of the first attempts to stress a national system of social accounts. He also suggested the possibility of social reports for particular states and metropolitan areas in the U.S. Thus, HEW soon initiated research in the same area under the heading of urban indicators. Perle (1970) has also written on local societal indicators. Kamrany and Christakis (1970, 210) have referred to regional indicators constructed to measure the trends within a specific region and compare it with a larger geographic area. Ideally, Kamrany and Christakis refer to an eleven tier hierarchy, starting from the lot through to the region, the country, the continent and the earth. Among geographers, Smith in 1973, performed the most comprehensive treatment of the concept. He

substantiated his study with several case studies of the U.S. Knox in 1974 has studied the case of England and Wales. Among other examples are Liu's 1970 study of Metropolitan areas of the U.S., Lewis' 1960 study of the north-eastern U.S., Knox and Scarth's (1977) study of France, Luszczewicz, 1974 study of Poland. Attah's (1980) study is an extension of the concept in the Canadian scene.

It is obvious from the above that definitions and distinctive characteristics of social indicators are not generally agreed upon. Introducing space to the social data matrix further complicates the problem. An examination of the concept of social well-being shows that just like its representative indicators, the concept of social well-being as a whole poses problems that stand in the way of formulating a single generally agreed upon definition.

1.4 SOCIAL WELL-BEING AS A CONCEPT:

Defining the concept of social well-being is difficult. Problems that stand in the way of a single generally acceptable definition are many and varied, leading to the use of a number of terms, sometimes as synonymous to social well-being and sometimes having different interpretations.

1.4.1 Quality of Life:

Of the many terms in use, perhaps the broadest is 'quality of life' (QOL). What actually is QOL has nowhere been clearly defined. Generally, it is considered to embrace all things contributing to the quality of human existence. For example, QOL is considered by Perloff

(1969) as elements or accounts of comprehensive systems of data . characterised by a balance of inputs and outputs or inflows and outflows or providing the value of the total stock of various times in a total system. The total system would thus, include the total stock of subjective judgements and the varying perceptions of individuals as well as the nature of the good life. Smith (1973, 66) points out that QOL "implies a rather personalised concept ... more appropriately relating to the conditions of society as people view it". Hornback and Shaw (1973) also give the same idea as they state QOL to be a function of the objective conditions appropriate to a selected population and the subjective attitudes toward those conditions held by persons in that population. Dalkey and Rourke (1971) consider QOL to mean a person's sense of well-being, his satisfaction and dissatisfaction with life, or happiness or unhappiness. Wingo and Liu (1973; 1970) in a micro-economic framework, suggest that QOL may be reflected jointly in two dimensions -- (i) the income or wealth which represents command over physical resources and is transferable and (ii) the psychological inputs which are personal, non-transferable and related to the intensity of private, subjective gratifications.

It is clear from these studies that QOL is not a directly observable condition, but is something about which one can judge whether it has increased or decreased with a change in society, from time to time and place to place only if appropriate assumptions are made and rules followed.

Making the appropriate assumptions and following appropriate rules,

however, is not easy. There is the present lack of a generally accepted social model around which to build indicators. There are also methodological difficulties and the shortage of data on many important social conditions. These together account for most of the discrepancies between the conceptual abstraction of well-being and its actual representation through different indicators. In fact, the above problems are considered the major stumbling blocks in the measurement of quality of life. Measurement of abstract aspects such as 'happiness', for example, have been criticised by many. Other than grouping people into happy vs. unhappy on the basis of their responses, happiness is too personal and subjective a phenomenon to be studied by the crude measuring devices presently available (Rossi, 1965). Smith (1977, 31) notes that the idea of trying to measure an abstraction like QOL is anathema to many people, even perhaps an assault on the individual (as in the case of the researcher asking a survey respondent what he valued most in life, to be told only "my privacy"). He also points out that according to some it is "inextricably linked with the traditional Western logic system that is being replaced by a new approach stressing the symbiotic rather than the competitive"; hence "any attempt to classify and quantify QOL factors merely serves to prolong an outdated system, and hence should not be undertaken". (Marugama, cited in Environmental Protection Agency, 1972, 1-37).

To date, measurement of QOL has been mainly dependent upon survey methods. It is as yet considered too early to have a generalised research framework, particularly because QOL includes the subjective

aspect which is so difficult to measure. But the subjective aspect cannot be ignored indefinitely, even in research with a territorial viewpoint. Stagner (1970) has already proposed a set of "psychological urban indicators" that would focus on the frequency and intensity of satisfaction (or dissatisfaction) with aspects of urban life perceived as important by the inhabitants of the city. Andrews and Withey (1976) have studied 'perceptions of well-being' by the survey method. Indeed, the use of massive surveys designed to find out what the people themselves think of the quality of their lives and the criteria or conditions impinging on it may be the only way to avoid introducing the biased values of the academicians and government officials concerned professionally with social indicators.

1.4.2 Social Well-being:

The concept of social well-being is sometimes thought of as the same as QOL. Smith (1973, 66) points out that it may be preferable to regard it as being at the more concrete or specific end of a continuum of abstraction that descends from human happiness through the concept of the quality of life. If there is a significant difference between QOL and social well-being, it is probably because criteria of social well-being depend less on subjective judgement and on the varying perceptions of individuals than does the nature of the good life. This statement however, does not clearly distinguish between the various concepts.

What exactly social well-being does measure is difficult to state. According to Smith (1973, 7) social well-being relates to income in its broadest sense, physical health and state of the mind --

three basic conditions of individual well-being. With these as basic areas to be measured, Smith notes that the concept of social well-being can be made operational, albeit with difficulty, despite the present shortage of available models and measures. Smith points out that from a study of the literature on sociology, social indicators, and social problems, it is possible to make some broad consensual statements about social well-being. Based on this general consensus, it is also possible to formulate an operational definition of social well-being, identify indicators and measure social well-being operationally. Smith's consensual statement on social well-being is:

"In a well society, people will have incomes adequate for their basic needs of food, clothing, shelter, and a 'reasonable' standard of living; people will not live in poverty. The status and dignity of the individual will be respected, and he will be socially and economically mobile. Good quality education and health services will be available to all, and their use will be reflected in a high level of physical and mental health and in an informed populace able to perform their societal roles in a satisfactory manner. People will live in decent houses, in decent neighbourhoods and will enjoy a good quality of physical environment. These will have access to recreational facilities, including culture and the arts, and adequate leisure time in which to enjoy these things. Society will show a low degree of disorganisation, with few personal social pathologies, little deviant behaviour, low crime incidence and high public order and safety. The family will be a stable institution, with few broken homes. Individuals will be able to participate in social, economic and political life and will not be alienated on the basis of race, religion, ethnic origin, or any other cause".

(Smith, 1973, 69)

The problem is that such a statement begs for more questions than it answers. As Smith notes, each of the concepts requires further clarification or reservation. Yet, whatever the theoretical problems,

TABLE 1.2

SMITH'S CRITERIA AND VARIABLES

1. INCOME, WEALTH AND EMPLOYMENT

- i. Income and wealth
  - 1. Per capita annual income (\$) 1968
  - 2. Families with annual income less than \$3,000 (per 1,000) 1959
  - 3. Total bank deposits per capita (\$) 1968
- ii. Employment status
  - 4. Public assistance recipients per 10,000 population 1964
  - 5. Union members per 1,000 non-agricultural employees 1966
  - 6. White collar employees (per 1,000 of total) 1960
- iii. Income supplements
  - 7. Average monthly benefit for retired workers (\$) 1968
  - 8. Average monthly AFDC payments per family (\$) 1968
  - 9. Average monthly aid to the disabled (\$) 1968
  - 10. Average monthly old age assistance (\$) 1968
  - 11. Average weekly state unemployment benefit (\$) 1968

II. THE ENVIRONMENT

- i. Housing
  - 12. Median value of owner-occupied houses (\$) 1960
  - 13. Houses dilapidated or lacking complete plumbing (per 1,000) 1960
  - 14. Index of home equipment 1960

III. HEALTH

- i. Physical health
  - 15. Households with poor diets (per 1,000) 1965
  - 16. Infant deaths per 10,000 live births 1967
  - 17. Tuberculosis deaths per million population 1967
  - 18. Hospital expenses per patient day (\$) 1965
- ii. Access to medical care
  - 19. Hospital beds per 10,000 population 1967
  - 20. Physicians per 10,000 population 1967

TABLE 1.2 (CONT'D)

SMITH'S CRITERIA AND VARIABLES

III. HEALTH

- 21. Dentists per 10,000 population 1967
- 22. Persons covered by hospital health insurance (per 1,000) 1965
- iii. Mental health
  - 23. Residents in mental hospitals etc. per 100,000 population 1966
  - 24. Patient days in mental hospitals per 1,000 population 1965
  - 25. Mental hospital expenditures per patient day (\$) 1965

IV. EDUCATION

- i. Achievement
  - 26. Illiterates per 1,000 population 1960
  - 27. Draftees failing armed services mental test (per 1,000) 1968
- ii. Duration
  - 28. Median school years completed 1960
  - 29. Persons attended college per 1,000 population aged 25 or over 1960
- iii. Level of service
  - 30. Pupils per teacher 1968
  - 31. Public school expenditures per pupil, (\$) 1967

V. SOCIAL ORDER (OR DISORGANIZATION)

- i. Personal pathologies
  - 32. Alcoholics per 10,000 adults 1970
  - 33. Narcotics addicts per 10,000 population 1970
  - 34. Gonorrhea cases per 100,000 population 1970
  - 35. Syphilis cases per million population 1970
  - 36. Suicides per million population 1967

TABLE 1.2 (CONT'D)

ii. Family breakdown

37. Divorces 1966 per 1,000 marriages 1968

38. Husband and wife households (per 1,000 of total) 1966

iii. Crime and safety

39. Crimes of violence per 100,000 population 1969

40. Crimes against property per 10,000 population 1969

41. Motor vehicle accident deaths per million population 1967

VI. SOCIAL BELONGING (ALIENATION AND PARTICIPATION)

1. Democratic participation

42. Eligible voters voting (%) 1970

43. Registered voters per 100 population of voting age 1968

ii. Criminal justice

44. Jail inmates not convicted (%) 1970

45. Population per lawyer 1966

° iii. Racial segregation

46. Negroes in schools at least 95% negro 1968

47. City residential segregation index 1960

Source: Smith (1973, 82-3)

the only pragmatic option appears to be to select variables from among those that are available. These should cover aspects on which there is a large degree of consensus as being those conditions that should be improved within a social system. In the case of the U.S., Smith selects six major criteria indicating social well-being. Each criterion is represented by a set of variables showing the conditions that it measures (Table 1.2).

The notion of a general consensus in determining criteria and variables for social well-being also finds favour with other authors. Knox (1975, 6) defines social well-being as "the satisfaction of needs and wants of the population." This definition too, like Smith's statement of social well-being demands clarification. The first question that arises is what the terms 'needs' and 'wants' mean; then, how should they be measured? Need is considered a relative concept. It does not remain constant all the time. As human consciousness about life style and standard of living changes with societal transformation, so does the consciousness of need. Thus, while some needs may remain fairly constant over time such as food, clothing, shelter etc., other kinds of needs may change. While meeting the basic minimum of needs of human individuals is the first and foremost duty of a society defining the minimum quantities and qualities required which would equate needs will vary according to social norms.

Knox (1975, 6) after Harvey (1973, 101), offers various suggestions whereby need can be determined. One of these is the determination of need

by consultation with experts (physicians, social workers, etc) whose judgement and experience would be relied upon to specify the minima that define need in particular fields. Problems, however, lie in the fact that the observations of experts themselves lack conformity. Besides, the selection of experts for assessing needs may also be faulty. Among other alternatives are the analysis of factors which generate particular categories of need. For example health problems can be related to age, life cycle and local environmental conditions. Occupational characteristics again, may be related to sociological and cultural circumstances, as well as income levels etc. However, one drawback pointed out here is that this approach requires a far more sophisticated understanding of relationships between people as well as institutions than is currently possessed.

To determine market demand, thus considering that consumer behaviour is a direct reflection of need, is another approach. Goods, services and amenities whose provisions do not match market demand are assumed to reflect unfulfilled needs. This procedure however, is only acceptable if it can be assumed that nothing is inhibiting demand or supply (such as low income or imperfect knowledge) of products; need may also be determined through latent demand. This can be done by assessing the 'relative deprivation' of individuals. Relative deprivation refers to the want of some good, service or amenity which they regard as feasible -- i.e. which is available to others, but which is not available to themselves.

It is obvious that each method of determining need has its own

constraints. As Knox (1975, 7) points out, the present level of sophistication in social reporting falls considerably short of measuring levels of satisfaction against specific parameters of need, however defined. Thus, for the time being at least those concerned with well-being must be content with comparative rather than absolute measures. Besides, until one knows more about collective preferences and priorities, such measures must be based on those categories of need and wants that are judged by expert opinion to constitute well-being. Whilst these clearly include the consumer goods and services registered in national accounts, they also extend to a diversity of social and environmental factors as well as provision of health services, housing and welfare benefits..

1.4.3 Level of Living:

In his book 'Social Well-being: A Spatial Perspective', Knox presents his own interpretations of social well-being. Using the term 'level of living', Knox considers it to be, basically the factual circumstances of well-being -- the actual degree of satisfaction of the needs and wants of a person or group of persons. Knox differentiates his concept of 'level of living' from 'standard of living' -- the latter referring to the "circumstances aspired to by an individual or a group of individuals" (Knox, 1976, 23). In attempting to clarify the concept, Knox points out that there are some features that are accepted as integral parts of any definition of level of living. These include the facts: -- (1) that it relates to the actual satisfaction of the needs

TABLE 1.3

KNOX'S CRITERIA AND VARIABLES

Constituent	Aspect	Indicant
A. Housing	Occupancy characteristics	(1) Occupational density
		(2) Overcrowding
		(3) Shared dwellings
		(4) Vacant dwellings
		(5) Small households
		(6) Large households
		(7) Owner-occupied dwellings
		(8) Privately rented unfurnished dwellings
		(9) Local authority rented dwellings
	Quality of housing	(10) Rateable values
		(11) Cold water supplies
		(12) Hot water supplies
		(13) Access to water closet
		(14) Access to fixed bath
		(15) Total new houses
B. Health	Housebuilding	(16) New local authority houses
	Disease	(17) Infant mortality
		(18) Mortality from bronchitis
		(19) Mortality from tuberculosis
		(20) List-Sizes of Principal General Medical Practitioners
C. Education	Extended Education	(21) School dentists

TABLE 1.3 (CONT'D)

KNOX'S CRITERIA AND VARIABLES

Constituent	Aspect	Indicant
	Teaching environment	(22) Adults who left school before the age of 15 (23) Pupils staying on at school (24) Senior school teachers per pupil (25) Junior school teachers per pupil
D. Social Status	Social Status	(26) Professional and managerial workers (27) Manual workers
E. Employment	Use of Labour	(28) Unemployment (29) Economically active population (30) Female activity rate
F. Affluence	Money income	(31) Low personal incomes (32) High personal incomes
	Consumption	(33) Retail trade (34) Car ownership
G. Leisure	Access to facilities	(35) Libraries (36) Cinemas (37) Restaurants (38) Hotels
H. Social Security	Safety	(39) Police services
	Welfare	(40) Welfare accommodation (41) Children's services

TABLE 1.3 (CONT'D)

KNOX'S CRITERIA AND VARIABLES

Constituent	Aspect	Indicant
I. Social Stability	Crime	(42) Indictable offences
	Family stability	(43) Divorce
		(44) Illegitimacy
J. Demographic Structure	Age and life cycle	(45) Age group 0-14
		(46) Age group 15-44
		(47) Age group 60
	Population change and mobility	(48) Natural population change
		(49) Migration balance
K. General Physical Environment	Urbanism	(50) Residence in one area since birth
		(51) Persons per acre
L. Democratic Participation	Democratic Participation	(52) Unopposed seats in local elections
		(53) Size of poll in local elections

Source: Knox (1975, 34)

and wants of the population; (ii) that level of living should be regarded as more than just the equivalent of goods and services relating to those needs, since it is clear that many aspects of leisure and security, for example, cannot be classed as consumers goods or services; and (iii) that it derives from and can be disaggregated into a number of discreet classes of needs and wants which are aspired to by the population as a whole.

Thus, the different aspects that might be covered are diverse. Also, it is not possible to quantify some aspects of level of living (eg. happiness) although they may be no less important. Knox defines level of living in the British context as:

"the level of living of persons resident within a given geographical area is constituted by the over-all composition of housing, health, education, social status, employment, affluence, leisure, social security, and social stability aggregately exhibited in that area, together with those aspects of demographic structure, general physical environment, and democratic participation which may determine the extent to which needs, desires relating to the foregoing constituents of level of living can be or are met."

Based on this definition, Knox identifies twelve major criteria and fifty-three variables for identifying level of living in England and Wales (Table 1.3).

The present study is not concerned with the determination of what Knox has called 'needs' and 'wants'. From the above discussion, it is also obvious that Knox's definition of level of living is not much different from Smith's concept of social well-being. However, the term 'level of living' is not adopted in this study. This is because the term

TABLE 1.4

DREWNOWSKI'S CRITERIA AND VARIABLES

1. Nutrition (food intake)
  - a. Calories intake
  - b. Protein intake
  - c. Per cent of non-starchy calories
2. Clothing (use of clothes)
  - a. Cloth consumption
  - b. Footwear consumption
  - c. Quality of clothing
3. Shelter (occupancy of dwellings)
  - a. Services of dwellings
  - b. Density of occupation
  - c. Independent use of dwellings
4. Health (health services received)
  - a. Access to medical care
  - b. Prevention of infection and parasitic disease
  - c. Proportional mortality ratio
5. Education (education received)
  - a. School enrolment ratio
  - b. School output ratio
  - c. Teacher pupil ratio
6. Leisure (protection from overwork)
  - a. Leisure time
7. Security (security assured)
  - a. Security of the person
  - b. Security of the way of life
8. Social environment (social contacts and recreation)
  - a. Labour relations
  - b. Conditions for social and economic activity
  - c. Information and communications
  - d. Recreation: cultural activities
  - e. Recreation: travel
  - f. Recreation: sport and physical exercise

TABLE 1.4 (CONT'D)

DREWNOWSKI'S CRITERIA AND VARIABLES

9. Physical environment
  - a. Cleanness and quietness
  - b. Public amenities in the neighbourhood
  - c. Beauty of the environment

Source: Drewnowski (1974, Appendix I)

level of living solely to indicate social well-being, is not without confusion. Drewnowski (1974), for example, has used the term 'level of living' with some different interpretations. Drewnowski's approach rests on a distinction between the state of well-being and level of living. By state of well-being, what he refers to is analogous to product or income. At any time, the state is the result of past flows of goods and services consumed by the population in the satisfaction of needs. Increases in human well-being results from the level of flows during the time period in question. The production of goods and services is thus, viewed as the generation of inputs into need satisfaction; the state of well-being is the output. Level of living is defined by another proposed index. Nine components (Table 1.4) are recognised each with their individual indicators. Each element of the level of living feeds into part of the state of well-being. Using Drewnowski's conceptual formulation, Smith (1977, 37), has produced a need satisfaction curve, relating stocks to flows or outputs to inputs in any facet of human rights. The maintenance of a state of well-being at any level is dependent on a specific level of flows, determined by the relevant technical relationships. Thus, 'level of living' refers only to the level of flows or inputs for the satisfaction of human needs at a particular point in time.

For the purposes of the present study, Smith's term 'social well-being' is considered the most appropriate. Smith's general consensual statement on social well-being is also accepted as a major guideline in

conceptualising social well-being. Defining social well-being operationally is not the main problem. For the case of Ontario, Canada, this has already been done in Attoh's exploratory work in 1980. Variable reduction is the central theme. Taking Attoh's study as the case in point, the next chapter argues how far variables used in Attoh's study possess characteristics based on which they may be dropped or retained. Techniques used to analyse the data are also discussed briefly.

CHAPTER II

DATA AND METHODS OF ANALYSIS

2.1 INTRODUCTION

Deciding which criteria should be used in measuring levels of social well-being is difficult. Some of the obvious reasons, such as the complex nature of social well being and the absence of a general model to divert the selection of criteria, have already been mentioned. So far, the general practice has been to look into existing data sources and find both direct and surrogate measures of well-being. Operational definitions have been formulated based on existing data. Attoh's (1980) study is of this nature.

Attoh (1980) studied Ontario at the census division level. After searching the literature on social well-being, twelve major criteria were considered to constitute the operational definition of social well-being. These are: (i) welfare and social security, (ii) housing, (iii) health, (iv) population, (v) ethnicity, (vi) income and wealth, (vii) service availability, (viii) social disorder, (ix) employment, (x) education, (xi) democratic participation and (xii) environmental quality. Each criterion is represented by a group of variables, giving

a data set total of sixty-eight (Table 2.1). Where necessary variables were expressed as ratios to the population of census divisions (eg. occurrence/availability of services per 100,000 persons) and as percentages of a certain total (eg. percent employed in different types of activities). Indices of different kinds were also prepared (eg. population growth index, ethnic diversity index etc.). The variables were then subjected to an orthogonal varimax rotated principal components solution, thus identifying the basic dimensions in the data set. Eight major components were obtained representing different aspects of social well-being. Seven of the components could be named: (i) general socio-economic well-being, (ii) social stability, (iii) general unemployment, (iv) health resource provision, (v) mental health stress, (vi) air quality and (vii) recreational services. One component was considered too difficult to interpret and was not named. Variables highly associated with each component are shown in Table 3.5b. Component scores describe census division performance on each of the dimensions. The scores were later 'summed' to produce a general index of social well-being for the census divisions of Ontario.

Since attaining a more efficient solution by reducing the number of variables used is the main purpose of the present study, variables were selected after a careful re-evaluation of Attoh's 68-variable data set. Table 2.1 shows the twelve major criteria and variables used to represent each criterion in Attoh's (1980) study. Table 2.3 shows criteria and variables retained in formulating a new data set for this analysis. The census division is retained as the territorial unit of

TABLE 2.1

CRITERIA, VARIABLES, "COMPUTER-CODE"
NAMES OF VARIABLES AND SOURCES OF DATA
(ATTOH'S STUDY)

<u>CRITERIA AND VARIABLES</u>	<u>VARIABLE NAMES</u>	<u>SOURCE</u>
<u>I. WELFARE AND SOCIAL SECURITY</u>		
1. Social service expenditure per capita (\$), 1970-71	SOCIAL	1
2. General welfare assistance allowances per capita (\$) March, 1972.	WELFARE	2
3. Family benefit allowances per family (\$)	FAMBEN	2
4. Ordinary expenditures on operation and maintenance of homes for the aged per person 65 years of age and over (\$) March, 1972.	AGEEXP	2
5. Expenditure on child welfare per person between ages 0-14, (\$), March, 1972.	CHILDEXP	2
<u>II. HOUSING</u>		
6. Occupied dwellings with two or more automobiles (%) 1971.	AUTOCAR	3
7. Occupied dwellings with both black and white and colour television (%), 1971.	TV	3
8. Occupied dwellings with cold water only (%), 1971	COLDH2o	4
9. Occupied dwellings with no installed bath or shower (%) 1971.	NOBATH	4
10. Occupied dwellings more than 30 years old (%) 1971	YEARS 30	5
11. Occupied dwellings overcrowded (%) 1971	CROWDED	6
12. Occupied dwellings owned (%) 1971	OWNERS	7
13. Median value of owned houses (\$) 1971	VALUEHSE	8
14. Average monthly cash rent (\$) 1971	RENT	8
15. Average number of rooms per dwelling 1971	ROOMAVE	9

TABLE 2.1 (CONT'D)

<u>CRITERIA AND VARIABLES</u>		<u>VARIABLE NAMES</u>	<u>SOURCE</u>
<u>III. HEALTH</u>			
16.	Live births per 1,000 population, 1971	BR	10
17.	Infant deaths per 1,000 population, 1971	IMR	10
18.	General death rate (death per 1,000 population 1971	GDR	10
19.	Active tuberculosis cases per 100,000 population, 1973	TB	11
20.	Dentists per 100,000 population, 1973	DENTIST	11
21.	Admissions into psychiatric hospitals per 100,000 population, 1971	PSYCH	12
22.	Deaths caused by disease of the circulatory system per 100,000 population, 1971	DRCIRC	10
23.	Deaths caused by all malignant neoplasms per 100,000 population, 1971	DRMALIG	10
24.	Deaths from disease of the respiratory system per 100,000 population, 1971	DRRESP	10
25.	Wolfson's Hospital Health Index, 1972-1973	WOLFSON	13
26.	Population per specialist, 1973	SPECIST	11
27.	Population per doctor, 1973	DOCTOR	11
28.	Number of staffed public, general and allied special hospital beds per 1,000 population, 1974	HOSPBED	13
29.	Expenditures per capita on hospital services by Ontario Ministry of Health (\$), 1974	HOSPEXP	13
30.	OHIP payments per capita for claims for physician services (\$), 1973-1974	OHIP	13
<u>IV. POPULATION</u>			
31.	Sex Ratio (proportion of males to 100 females), 1971	SEXR	14
32.	Child dependency ratio, 1971	CHILDEP	15
33.	Age dependency ratio, 1971	AGEDEP	15
34.	Percentage of population - urban, 1971	URBAN	15
35.	Population growth index, 1966-1971	POPINDEX	15
36.	Average family size, 1971	FAMSIZE	16

TABLE 2.1 (CONT'D)

<u>CRITERIA AND VARIABLES</u>		<u>VARIABLE NAMES</u>	<u>SOURCE</u>
V. <u>ETHNICITY</u>			
37. Ethnic diversity index, 1971		ETHNIC	17
VI. <u>INCOME AND WEALTH</u>			
38. Average family incomes (\$), 1971		INCOME	18
39. Family incomes more than \$15,000 per annum (\$), 1971		INCOME15	18
40. Family incomes less than \$5,000 per annum (\$), 1971		INCOME 5	18
41. Net retail sales and receipts per capita (\$), 1971		RETAIL	19
42. Net sales and receipts from service trade per capita (\$), 1971		SERVICE	20
VII. <u>AVAILABILITY OF SERVICES</u>			
43. Health and welfare workers per 100,000 population, 1971		HEALWELF	21
44. Library staff per 100,000 population, 1971		LIBRARY	22
45. Cinemas per 100,000 population		CINEMA	20
46. Hotels and motels per 100,000 population, 1971		HOTEL	20
47. Restaurants per 100,000 population, 1971		FOOD	20
48. Artistic, literary and recreation workers per 100,000 population		ARTLIT	22
VIII. <u>SOCIAL DISORDER</u>			
49. Suicides per 100,000 population, 1971		SUICIDE	10
50. Percentage of children born to unmarried women out of total births (illegitimate birth rate), 1971		ILLEBORN	10
51. Divorces per 100,000 population (crude divorce rate), 1971		CDR	23
52. Persons charged with indictable offences per 100,000 population (indictable offence rate), 1971		CRIME	24
53. Persons convicted under Narcotics Control Act per 100,000 population, 1971		DOPE	24
54. Juvenile delinquency arrests per 100,000 population, 1971		JUVENILE	20
55. Lawyer and notary offices per 100,000 population, 1971		LAW	25

TABLE 2.1 (CONT'D)

<u>CRITERIA AND VARIABLES</u>		<u>VARIABLE NAME</u>	<u>SOURCE</u>
IX. <u>EMPLOYMENT</u>			
56.	Labour force participation rate, 1971	PARTRATE	26
57.	Percentage of labour force unemployed, 1971	UNEMPLOY	26
58.	Percentage of male labour force unemployed, 1971	MALEUR	26
59.	Percentage of white collar workers, 1971	WHITE	22
X. <u>EDUCATION</u>			
60.	Population five years and over with university degree only (%), 1971	DEGREE	27
61.	Population five years and over with elementary level of education (%), 1971	ELEMENT	27
62.	Population five years and over with vocational and post-secondary, non-university level of schooling (%), 1971	POSTSEC	27
63.	Pupils per teacher (elementary and secondary), 1971	PTRATIO	27 & 22
XI. <u>DEMOCRATIC PARTICIPATION</u>			
64.	Percentage of registered voters who voted in the 1971 General Election, 1971	VOTER	28
XII. <u>ENVIRONMENTAL QUALITY</u>			
65.	Particulate matter pollutant emissions in tons per year (area and point sources), 1974	SUSPART	29
66.	Sulphur oxide pollutant emissions in tons per year (area and point sources), 1974	SO2	29
67.	Nitrogen oxide pollutant emissions in tons per year (area and point sources), 1974	NO2	29
68.	Carbon monoxide pollutant emissions in tons per year (area and point sources), 1974	CO2	29

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observation.

Methods of analysis in the present study are twofold, namely, (i) principal components analysis and (ii) a hierarchical grouping technique. Principal component analysis has been used in the present study for two reasons - first, it is a standard technique that may be used to identify basic dimensionalities in data sets; and second Attoh has already used principal components analysis in his 1980 study. Using the same technique for a reduced version of the 1980 data set (Tables 2.1 and 2.3) will allow direct comparability.

Hierarchical grouping is used here as a technique for regionalisation of the census divisions of Ontario. This method is applied to the component scores of Attoh's (1980) study as well as component scores of the present study. Attoh did not use this technique himself, but used a more subjective, case-specific approach. Complete comparability requires that both his study and this revision use the same methodology, as far as possible. The hierarchical-grouping technique was used so that relative objectivity - or standardisation, at least - could be maintained in pulling together or regionalising the census divisions of Ontario. Application of the technique to both studies enabled comparison of the grouping of census divisions based on the original and reduced versions of the same data set (Tables 2.1 and 2.3).

2.2 BASES FOR REDUCING THE NUMBER OF VARIABLES

Three major bases have been used. These are:

- 1) literature support

- 2) statistical findings of Attoh's study
- 3) publications - the regularity and the ease in obtaining data

Each of these bases is elaborated below:

2.2.1 Literature Support:

The social indicator literature is considered a major basis for reducing variables. An examination of the definitions and defining characteristics enables identification of diverse properties. For the purposes of the present study, the diverse characteristics of social indicators have been identified and are summarised on page 14. The summary reveals how difficult it is for a single indicator to possess all the characteristics that may be expected of it. In reality, therefore, individual indicators possess only one or a few of these attributes.

Characteristics of social indicators which apply to the data set as a whole have been identified. Following a discussion of characteristics considered to be general to the data set as a whole, each variable is studied against properties considered applicable to the variables individually. General characteristics are that an indicator should be

- 1) a relevant and direct measure of welfare, 2) normative, 3) comprehensive-- covers most salient and critical aspects of society, 4) time series -- allowing overtime comparisons, 5) limited - not trying to measure all possible aspects, 6) coherent - should 'hang together', 7) allows disaggregation up to the relevant social/spatial unit, 8) part of a system and measures social system performance, 9) guide to decision making and subject to the planning process i.e. it aids the setting up of

goals and priorities, 10) conceptually homogeneous, 11) mutually exhaustive, 12) flexible to encompass any life style and 13) adaptable to changing situations.

Regarding relevance of variables retained what has been kept in mind is whether variables are relevant and will remain so in the near future only. Long term relevance has not been considered. Not all variables included in the new data set are direct measures of welfare. The new data set is a mixture of direct and indirect measures of welfare. Some ambiguous measures (eg. social welfare expenditure per capita -- page 54) are also included. The data set is not as comprehensive as might be expected. This is because our main objective is to reduce the number of variables. In most cases a variable has not been retained where it has been found replaceable by some other, perhaps more representative variable. Dropping variables 'occupied dwellings with no installed bath or shower (%), 1971' and retaining variable 'family incomes less than \$5,000 per annum (5), 1971' (Tables 2.1 and 2.2), is an example.

As the present analysis is intended to be temporally cross-sectional the requirement that social indicators be in time series has not been strictly adhered to. The disaggregation of variables is a general problem because social indicators have so far been developed mainly at the national level. However, as our present problem is reducing the number of variables from an existing set of indicators available at the required territorial level of disaggregation, this

has not been a problem. The new data set (Table 2.3) is limited and does not measure all possible aspects. Each major criterion may be considered coherent from the viewpoint that variables included measure various properties of the same aspect of social well-being and hence hang together. Groups of variables are not mutually exhaustive because no attempt has been made to measure every possible aspect.

In the absence of established social theory it is difficult to define how far variables are a measure of social system performance. The attempt here is to identify social well-being in Ontario from a reduced version (Table 2.3) of an existing set of data (Table 2.1). Thus, how far variables used are a guide to decision making or are a part of the planning process has not been considered a strong point of reference. Variables selected are in groups that may be considered conceptually homogeneous. Thus each criterion is represented by variables which measure different properties of the same aspect and enable formulation of indices wherever necessary. In fact, some of the measures being used are 'indices' constructed for measuring a criterion as a whole or a part of the criterion. The ethnic diversity and population growth indices are examples (Table 2.3). How far the variables are adaptable to changing situations or are flexible enough to encompass any life style is also difficult to determine. It may, however, be said that the variables used are of a general nature and are not overtly or strictly restricted to any particular society or a particular social situation.

Properties applicable to individual variables are: 1) direction,

- 2) significance, 3) whether they are input or output indicators,
- 4) are mutually exclusive, 5) are easily understood and 6) are universal.

Each variable is evaluated against these properties. Not all variables have each of these characteristics. In the case of direction, for example, the ambiguity of some variables has already been mentioned. The indicators retained are a mixture of input and output measures. Ideally, measures of output should be considered the major indicators of well-being. But measures of output are extremely limited and difficult to find. There is some overlap. The overlap in this case is mainly statistical and not conceptual. Table 2.2 shows selected bases upon which variables may be dropped or retained, and how each variable performs on each of these bases.

2.2.2 Statistical Findings of Attoh's Study:

From the statistical point of view, the data set may be studied in various ways in an attempt to reduce the number of variables for Ontario. As a principal components analysis has been used in Attoh's study, several statistical tables are available. Examination of these tables aids deciding upon whether all the variables that have been used previously are essential, or make sufficient contribution in explaining social well-being in Ontario. The main bases for making such judgements may be:

- 1) the correlation matrix
- 2) the varimax rotated factor matrix
- 3) the skewness of the raw data

TABLE 2.2

SELECTED BASES FOR VARIABLE
ELIMINATION

CRITERIA	VARIABLES	BASES FOR ELIMINATION				
		Variable to be eliminated (X)	Double Counting (✓)	Very high Correlation	Very low loading	Highly skewed data
<u>WELFARE AND SOCIAL</u>	<u>SOCIAL</u>	WELFARE X	✓			
	<u>SECURITY</u>	FAMBEN X	✓	.933 (SOCIAL)		
		AGEEXP X	✓			
		CHILDEXP X	✓		.37 (C ₄)	
<u>HOUSING</u>		AUTOCAR				
		TV X		.849 (RENT)		
		COLD H2O X		.889 (INCOME5)		
		NOBATH X		.822 (INCOME5)		
		YEARS30		.812 (INCOME5)		
		CROWDED				
		OWNERS				
		VALUEHSE X		.928 (RENT), .846 (INCOME5)		
		RENT		.928 (VALUEHSE), .849 (TV), .838 (WHITE), .817 (POSTSEC), .918 (INCOME5)		
		ROOMAVE X				
		BR				
		IMR			-.341 (C ₁)	
		GDR		.907 (DRCIRC), .824 (INCOME5)		
		TB				
<u>HEALTH</u>		DENTIST				
		DOCTOR				
		PSYCH				
		DRCIRC X		.907 (GDR)		
		DRMALIG X				
		DRRESP X				
		WOLFSON X				
		SPECIST X	✓		.261 (C ₁)	180.58%
		HOSPBED				
		HOSPEXP				
		OHIP				
<u>POPULATION</u>		SEX R X				
		CHILDDP			.471 (C ₂)	
		AGEDEP		.924 (GDR)		
		URBAN		.885 (DRCIRC)		
		POPINDEX		.810 (INCOME5)		
		FAMSIZE X			-.424 (C ₅)	
<u>ETHNICITY</u>		ETHNIC		.889 (TV), .918 (RENT)		
<u>INCOME AND WEALTH</u>		INCOME5		.846 (VALUEHSE), .913 (INCOME5)		
		INCOME15 X		.913 (INCOME5)		
		INCOME5		.821 (COLD H2O), .912 (NOBATH)		
		RETAIL		.824 (GDR), .810 (AGEDEP)		
		SERVICE				

TABLE 2.2 (CONT'D)

CRITERIA	VARIABLES	BASES FOR ELIMINATION				
		Variable to be eliminated (X)	Double Counting (✓)	Very high Correlation	Very low loading	Highly Skewed data
<u>AVAILABILITY OF SERVICES</u>	HEALWELF					
	LIBRARY		✓			
	CINEMA	X	✓			
	HOTEL	X	✓			
	FOOD	X	✓			
	ARTLIT					
<u>SOCIAL DISORDER</u>	SUICIDE					
	ILLEBORN					
	CDR					
	CRIME	X			.465(C ₂)	
	DOPE	X			.439(C ₄)	
<u>EMPLOYMENT</u>	LAW	X			.436(C ₈)	
	JUVENILE					
	PARTRATE					
	UNEMPLOY					
	MALEUR					
<u>EDUCATION</u>	WHITE				.838 (RENT)	
	DEGREE				.817 (POSTSEC)	
	POSTSEC					
	ELEMENT					
<u>DEMOCRATIC PARTICIPATION</u>	PTRATIO					
	VOTER					
	SUSPART	X				168.49%
	SO ₂	X			-.444(C ₅)	553.49%
<u>ENVIRONMENTAL QUALITY</u>	NO ₂	X				184.29%
	CO ₂	X				164.47%

NOTE: (i) 'C' indicates 'component'
(ii) Component loadings are from the orthogonal varimax rotated 8-component case of Attoh's study.

2.2.2.1 The Correlation Matrix: The correlation matrix is used to see whether variables have a high degree of statistical overlap; that is whether or not more than one variable is used to measure the same aspect. A very high correlation between two variables may signify that one can be easily replaced by another. For the present analysis a correlation of +.810 has been arbitrarily chosen as high enough to consider one variable to be replaceable by another because any two variables concerned have over 65% or two-thirds of their total variance represented by the other. However, more subjective judgements have been used in aiding decisions. Variables that appear to have only statistical rather than conceptual correlations (eg. the correlations between 'post secondary education' and 'average monthly rent') have not been dropped even if the correlation coefficient is very high, unless there is some other reason to do so.

Judging whether or not a variable should be retained on the basis of a low correlations is difficult; a low correlation could also mean that the variable concerned is singly representative of the phenomenon that is being measured (eg. percentage of registered voters who voted in 1971). Thus a low correlation has been considered to be useful in eliminating variables only when additionally supported by some other cause (ie. very low loading or literature support).

2.2.2.2 The Factor Loading Matrix: The varimax rotated factor matrix (Attoh, 1980), or what is more commonly called the 'factor loading matrix' may also be used as a basis for judging whether a variable should be

retained or not. The factor loading matrix signifies how much of the total variance in the data is explained by a variable in each particular solution. In the present case study, a loading of .470, positive or negative is considered low. One problem here has been that in factor analysis, significance testing for factor loadings is irrelevant (Johnston, 1978, 179). The selection of .470 is arbitrary. Also, in a factor loading matrix the nature and weight of loadings depends largely on the type of rotation specified as well as the number of components that the analyst chooses to have produced. This makes the use of the factor loading matrix a somewhat weaker basis for eliminating variables. Variables have therefore, been dropped from the analysis if they were found eligible to be dropped due to some other reason and also had low loadings indicating that these variables were making little contribution to explaining total variance in Attoh's 8-component solution.

2.2.2.3 The Skewness of the Data: Skewness of the data is given lowest priority as a decision criteria in eliminating variables. It has been argued that normality is one of the assumptions in principal components analysis and that non-normal distributions require transformations. Bennett (1977) however argues that normalisation may make interpretations more complex and shows that normalisation does not bring about any major changes in the results. In the present study means and standard deviations were computed for all variables. The comparison of means and deviations is a rough test of normality. Wherever the standard deviation is close to the corresponding mean the data are considered to be skewed. In eliminating variables, only those that are extremely badly skewed have

been considered eligible to be dropped (see variables on environmental quality, Table 2.2).

2.2.3 Data Sources: Publication Reliability and Regularity:

The ease of obtaining data is a major consideration. Variables from an unreliable or irregularly published source have been considered eligible to be dropped. Census data that were published in both the 1961 and 1971 censuses have been considered regular publications.

2.3 DISCUSSION ON ELIMINATING INDIVIDUAL VARIABLES:

In considering which variables may be retained and which ones should be dropped the major criteria of social well-being used in Attoh's study form the framework. The need for a particular variable and what it signifies, which variables may be left out and why, is elaborated below. Literature support, statistical findings of Attoh's study, and regularity and reliability of publications have all been referred to as necessary.

2.3.1 Welfare and Social Security:

Measurement of welfare and social security is generally considered to be ambiguous. Security assistance may either indicate a large dependent population and hence a weak economy, or a strong economy capable of providing required assistance to its people. Five variables used to study welfare and social security in Attoh's study are shown in Table 2.1. Of the five variables used, one 'social welfare

expenditure' includes all other kinds of welfare expenditures that are accounted for by the four other variables. It also includes all other forms of social welfare assistance expenditures by the federal, provincial and local governments in Ontario. Thus the variable 'social welfare expenditure' is considered to be a most comprehensive measure. In order to avoid double counting of expenditures only the variable 'social welfare expenditure' is retained. One other variable 'family benefit allowances' may also be dropped on the grounds that it is very highly correlated (.933) with 'social welfare expenditure'.

2.3.2 Housing:

Housing as a measure of social well-being is important because it is basic to social and survival needs. Also, housing can be a source of shelter, comfort and social status, a major personal or family asset and an element of family and community life. As Smith (1973, 71) points out, shelter plays a role in the physical, social and psychological development of its occupants by influencing directly or indirectly the physical and mental health of populations and by shaping group attitudes and behaviour.

In Attoh's study, housing is measured by ten variables (Table 2.1). Some housing characteristics are highly correlated with income variables. Although 'occupied dwellings with black and white or colour television' is a measure of household amenities and conveniences, it is found to correlate highly with 'average family income' (Table 2.2). As 'average family income' is in turn highly correlated with some other variables

(Table 2.2), the 'income' variable should be retained while the 'television' variable is dropped. Again, the association between low income and poor housing conditions is clear from the correlation of variables 'occupied dwellings with cold water only' and 'occupied dwellings with no installed bath or shower' with 'family incomes less than \$5000 per annum' (Table 2.2). The two housing indicators are therefore, dropped. Among other housing variables, it is found that 'median value of owned houses' which is a general measure of the quality of housing as reflected by its monetary value, is highly correlated to 'average monthly cash rent' (Table 2.2). This suggests that both rent and value correlate with quality. Thus, 'average monthly cash rent' which is also highly correlated to some other variables, (Table 2.2) is retained while the variable 'median value of owned houses' is dropped. 'Average number of rooms per dwelling' is a measure of living space. However, it is dropped because another variable 'occupied dwellings overcrowded' is a more useful indicator of density of occupation. As 'average number of rooms per dwelling' would indirectly measure the same aspect, it is suggested the more direct measure 'occupied dwellings overcrowded' be retained.

Tenure is measured by 'owner occupied house' and this variable is important enough to be retained. A measure of declining houses is provided by the variable 'dwellings more than 30 years old'. This variable is thus retained.

TABLE 2.3

CRITERIA AND VARIABLES RETAINED
FOR ANALYSIS IN THE PRESENT STUDYI WELFARE AND SOCIAL SECURITY

1. Social service expenditure per capita (\$), 1970-71

II HOUSING

2. Occupied dwellings with two or more automobiles (%), 1971
3. Occupied dwellings more than 30 years old (%), 1971
4. Occupied dwellings overcrowded (%), 1971
5. Occupied dwellings owned (%), 1971
6. Average monthly cash rent

III HEALTH

7. Live births per 1,000 population, 1971
8. Infant deaths per 1,000 population, 1971
9. General death rate (death per 1,000 population 1971)
10. Active tuberculosis cases per 100,000 population, 1973
11. Dentists per 100,000 population, 1973
12. Admissions into psychiatric hospitals per 100,000 population, 1971
13. Population per doctor, 1973
14. Number of staffed public, general and allied special hospital beds per 1,000 population, 1974
15. Expenditures per capita on hospital services by Ontario Ministry of Health (\$), 1974
16. OHIP payments per capita for claims for physician services (\$), 1973-1974.

IV POPULATION

- 17. Child dependency ratio, 1971
- 18. Age dependency ratio, 1971
- 19. Percentage of population urban, 1971
- 20. Population growth index, 1966-1971

V ETHNICITY

- 21. Ethnic diversity index

VI INCOME AND WEALTH

- 22. Average family incomes (\$), 1971
- 23. Family incomes less than \$5,000 per annum (5), 1971
- 24. Net retail sales and receipts per capita (%), 1971
- 25. Net sales and receipts from service trade per capita (\$), 1971

VII AVAILABILITY OF SERVICES

- 26. Health and welfare workers per 100,000 population
- 27. Library staff per 100,000 population, 1971
- 28. Artistic, literary and recreation workers per 100,000 population

VIII SOCIAL DISORDER

- 29. Suicides per 100,000 population, 1971
- 30. Percentage of children born to unmarried women out of total births (illegitimate birth rate), 1971
- 31. Divorces per 100,000 population (crude divorce rate), 1971
- 32. Juvenile delinquency arrests per 100,000 population, 1971

IX EMPLOYMENT

- 33. Labour force participation rate, 1971
- 34. Percentage of labour force unemployed, 1971

- 35. Percentage of male labour force unemployed, 1971
- 36. Percentage of white collar workers, 1971

X EDUCATION

- 37. Population five years and over with university degree only (%), 1971
- 38. Population five years and over with elementary level of education (%), 1971
- 39. Population five years and over with vocational and post-secondary non-university level of schooling (%), 1971
- 40. Pupils per teacher (elementary and secondary), 1971

XI DEMOCRATIC PARTICIPATION

- 41. Percentage of registered voters who voted in the 1971 General Election, 1971

2.3.3 Health:

A healthy population is a major aspect of social well-being. Health is vital in itself and has a bearing on earning capacity and the ability to enjoy the fruits of one's labour. Measurement of the health status of a population, and the provision of health services and activities directed to the improvement of health conditions is important.

'Crude birth rates', 'general death rates', 'infant mortality rates' and 'Wolfson's hospital health index' were selected by Attoh to measure health levels within the population. 'Wolfson's hospital health index' is a measure of the seriousness of ill-health associated (by doctors) with a set of 59 disease categories. The index takes into account only patients being processed by the health care system and does not include untreated illness where no consultation takes place with a physician. This variable is dropped because it does not have a regular publication schedule. It has been computed only once, and whether this will be done again is not known. It is also somewhat difficult to understand; its meaning and interpretation is not simple.

As a measure of health status, several other morbidity and mortality rates were used in Attoh's study (Table 2.1). From these variables 'active tuberculosis cases' is retained as it is directly associated with poor living conditions. The variables 'deaths caused by diseases of the circulatory system', 'deaths caused by all malignant neoplasms' and 'deaths from disease of the respiratory system' are accounted for in an

average form by 'general death rate'. Only the 'general death rate' is retained.

Indicators of access to health care facilities measured by variables 'dentists per 100,000 population', 'population per doctor', 'admissions to psychiatric hospitals', and 'hospital beds per 100,000 persons' (Table 2.2) are retained. Variable 'population per specialist' may be dropped because specialists are also counted as doctors. Thus this is a double counting. The general run-of-the-mill health care is more important to the majority of people than is access to highly specialised expertise. Specialists cluster at major regional hospitals as part of the central place service distributions necessary to provide a sufficient clientele or market.

2.3.4 Population:

Demographic characteristics are related to prevailing social conditions. Attoh used several demographic aspects (Table 2.1). The variables 'sex ratio' and 'family size' are dropped from analysis. An examination of the raw data reveals that the sex ratio is around 1:1 for most census divisions of Ontario. The lack of variation suggests that problems arising from markedly unbalanced sex ratios would be unlikely at the scale used here. This variable is dropped.

Attoh used 'child dependency ratio' and 'age dependency ratio' to measure the dependent population in an area. Both these variables are retained. Type of dependency is an important aspect to measure;

whether it is of a young population or an old population, related social effects or problems will be quite different in nature. 'Family size' would indirectly measure the child dependency ratio, but is not by itself necessarily an indicator of social well-being. It is dropped.

The variables 'percentage of population urban' and 'population growth index' should be retained. There is no statistical evidence of these variables being non-significant in explaining total variance in the data. Urbanisation is largely associated with modernisation of the population -- the urban population may be expected to be more socially aware and also larger urban areas have better and more varied social amenities.

2.3.5 Ethnicity:

The index of ethnic diversity is ambiguous, because it measures indirectly pluralism and cultural contact, as well as potential political and social instability. From both the above viewpoints, a measure of ethnic diversity is important. Besides, Attoh's study shows no statistical evidences suggesting the variable be dropped. This variable is retained.

2.3.6 Income and Wealth:

Measures of income and wealth are important indicators of social well-being. They signify the capacity of individuals to obtain material comforts. In other words, command over material resources largely determines access to services such as health and education, or any other basic necessities of life. Gross (1966, 227) notes that income and

wealth are also important because they can purchase personal power, prestige, and social status.

Income and wealth are represented in Attoh's study by five variables (Table 2.1). The variable 'family incomes more than \$15,000 per annum' correlates highly with variable 'average family income' (Table 2.2). As 'average income' is also representative of some other variables, being highly correlated with them, it is retained and the high income variable is dropped. The variable 'family incomes less than \$5000 per annum' is close to the generally agreed poverty line in Canada in 1971. The correlation matrix reveals that this variable correlates highly with some other variables identifying poor social well-being conditions. This variable is, therefore, retained as an important diagnostic measure.

Variables 'net retail sales and receipts' and 'net sales and receipts from service trade', measuring the extent of economic activities in the census divisions of Ontario are also retained.

2.3.7 Service Availability:

Accessibility to recreational, health and other services is an important aspect of social well-being. Indicators used in Attoh's study to measure service availability aspects are shown in Table 2.1. The variable 'net sales and receipts from service trade' includes all receipts from cinemas, restaurants and hotels. But the 'service trade' variable is a measure of earnings for much more than just receipts from cinemas,

hotels and restaurants. Thus, in order to avoid double counting of the same aspect, the variables 'cinemas per 100,000 population', 'hotels and motels per 100,000 population' and 'restaurants per 100,000 population' are dropped.

2.3.8 Social Disorder:

Social disorder relates to the health or the sickness of the society at large. For measuring social disorder, six variables were used in Attah's study (Table 2.1). Three of these variables 'persons charged with indictable offences', 'persons convicted under the Narcotic Control Act' and 'lawyer and notary offices per 100,000 population' may be dropped. The measure of 'crime' is considered too generalised; it includes minor as well as extremely serious types of crime. The variable 'persons convicted under the Narcotic Controls Acts' may be dropped on grounds that drug offences are notoriously unreliably reported and, furthermore, indicates only convictions for drug offences. The 'lawyer and notary offices per 100,000 persons' variable is basically an urban based measure rather than being a measure for the population as a whole. All three variables again have very low loadings (Table 2.2) in Attah's 8-component solution indicating that their exclusion should not affect solutions derived from the new data set to any great extent.

The variables 'suicides per 100,000 population', 'percentage of children born to unmarried women out of total births', 'divorces per 100,000 population' and 'juvenile delinquency arrests per 100,000

population' are thus retained as the relatively stronger measures of the sickness of society.

2.3.9 Employment:

Some measure of employment is important. Employment provides income which means access to many of the facilities that society provides. It also measures personal status in a society that places high value on economic achievement and self-reliance. It is evident from Attoh's study that it was difficult to find a large number of variables related to employment and employment conditions. Thus only four variables were included. All four variables are retained (Tables 2.2 and 2.3).

2.3.10 Education:

The importance of education to social well-being operates in a number of different ways. Education improves the earning capacity of individuals. As Smith (1973, 71) points out, it bestows status and social mobility to individuals. It also makes a wide range of alternatives available to individuals from which they are able to select the manner in which they wish to arrange their lives. Attoh selected four variables to examine education (Table 2.1). Three of these are 'population five years and over with university degree only', 'population five years and over with elementary level of education' and 'population five years and over with vocational and post-secondary, non-university level of schooling'. Although these variables do not signify the quality of education received, they do at least indicate the

level of education achieved. The variables are well-chosen and may be considered mutually exclusive. From the statistical point of view, only one variable 'population five years and over with vocational and post-secondary, non-university level of schooling' has a very high correlation with 'average monthly cash rent' (Table 2.2). The meaning of this correlation is not clear enough to justify the dropping of one variable and the retaining of the other. The variable 'pupil teacher ratio' is a measure of the level of service received. Thus all four of the education variables are important and are retained.

2.1.11 Democratic Participation:

Democratic participation is an indicator of the extent to which individuals are treated as full members of society with all their rights and privileges. It also indicates the extent to which individuals choose to use their participatory rights. In the previous study only one variable was available to measure democratic participation rates, namely 'percentage of registered voters who voted in the 1971 general election'. This variable has a very low correlation (.326) as its highest correlation with any other variable in the data matrix (Table 2.2). This possibly means that variable 'percentage of registered voters who voted in 1971' individually represents an aspect of social well-being and hence is retained.

2.3.12 Environmental Quality:

Environmental quality relates mainly to aesthetic aspects of the environment as well as water, air and noise pollution. These have

various effects on human well-being particularly related to diseases and mental peace. The concept of environmental quality is broad and relates to a large number of aspects that need to be measured. In Attoh's study, however, only four variables relating to atmospheric pollution are used, as data related to the other aspects of environmental quality are not readily available on an areally compatible basis. Thus, coverage for environmental quality has been extremely narrow. Also these measures are very badly skewed (Table 2.2). Air quality data are also not ubiquitous as pollution mainly derives from 'point emission' sources. The data are also difficult to obtain as they are not regularly published data. All the four measures of environmental quality are dropped from this analysis.

2.4 METHODOLOGY

After dropping variables as shown in Table 2.2, the new data set consists of eleven major criteria and 41 variables of social well-being. These are shown in Table 2.3. Methods of analysis used in this study are now briefly described.

2.4.1 Principal Components Analysis (PCA):

PCA is basically a data summarising technique. It is generally used to identify the 'underlying' or 'basic dimensions' of variance within large matrices of numerical data (Smith, 1973, 12). The original data matrix is of the form 'nxa', where 'n' refers to the units of observation and 'a' refers to variables. When subjected to PCA, the

variables are reduced to produce a much smaller number of composite variables (f) strictly called 'components', often loosely called 'factors'. The composite variables together account for a large share of the original information. Component scores (s) may also be derived. The scores indicate how units of observation (n) perform on the different components or factors (f) that have been obtained. The major value of the technique lies in the fact that it permits re-writing of the original set of variables into a much smaller and more manageable number of significant dimensions.

Resolution of the original variables into components is conceptually fairly simple, although mathematically it is complex. It is based on the patterns of association that are summarised through some coefficients of similarity between all pairs of variables. The coefficient used is usually the Pearsons Product Moment correlation statistic ' r ' (Rees, 1971). At this stage a symmetrical matrix of the association of variables ' axa ' is produced. The next step involves extracting the composite variables using the ' r ' statistic of the correlation matrix and calculating latent roots and vectors subject to the orthogonality constraint (Bennett, 1977, 146). Components formed are, therefore, a collapsing of a number of highly correlated variable vectors into one composite vector. When the first principal component has been derived, repetition of the process continues -- at each step producing one new component by extracting more and more of the residual variance. This process continues until all the components have been derived. The result is a matrix of component loadings of

variables on statistically independent components.

PCA may have either an 'unrotated' or a 'rotated' solution.

Rotation of the principal axes through the vector clusters (representing variables) often extracts more distinct clusters of variables than was initially possible (Rummel, 1967, 466).

Attoh's analysis was started with an unrotated principal components analysis. Means and standard deviations for all 68 variables were computed. The correlation matrix consisted of a 68 X 68 matrix of correlation coefficients. As the unrotated PCA did not produce clear interpretable patterns, the data were subjected to a varimax rotation. Attoh considered an 8-component solution the clearest and best (Table 3.5b).

For the present analysis, means and standard deviations were re-computed. A new correlation matrix consisting of 41 X 41 correlation coefficients was produced. PCA with an unrotated solution was tried first. As this did not produce clear and interpretable patterns (Table 3.2), a rotated solution was attempted. Orthogonal varimax rotations were tried for 3,4,5,6,7 and 8-component solutions. The 7-component and 8-component solutions were found to be more or less the same (Tables 3.4 and 3.5a). The 8-component solution has finally been selected for interpretation because a study of the component structure of both 7 and 8 component solutions reveals that the sixth component identified in the 8-component solution has a better summary

of variables. Besides, as Attoh's analysis is also an 8-component solution, retaining the 8-component solution in the present study would enable a clearer comparison.

The next section introduces the hierarchical grouping technique, which has been used for regionalisation in this study.

2.4.2 The Hierarchical Grouping Technique (H-Groups):

In the study of social well-being, providing a general summary that combines all or particular sets of variables is convenient in understanding overall conditions. It helps obtain general performance levels of places and regionalise them accordingly. The use of standardised mathematical regionalising techniques is recent. A variety of clustering techniques have evolved, and the hierarchical grouping technique is one of these (Johnston, 1968, 575).

The hierarchical grouping technique looks at a series of score profiles of objects, measured over a series of variables. The purpose is to compare the scores and to progressively associate them into groupings in such a way as to minimise the overall estimate of variation within clusters (Sokal, 1966, 108-109). As Veldman (1967, 309) notes, given a set of N objects (persons, places etc.), each measured on K different variables, the optimum grouping that can theoretically be defined for each particular number of groups is 2 to $N-1$. The 1-group and N -groups are thus the limiting cases.

There are many different specific methods by which hierarchical

grouping techniques can be applied to a data set (Everitt, 1974, 7-37). The computer programme used for this study is the one offered by the Scientific Programming Library (SPL) at Carleton University. This is a slightly modified version of the programme developed by Veldman (1967, 314). Four separate applications of the hierarchical grouping technique have been carried out. The 'N' objects in all cases are census divisions of Ontario and the 'K' variables are component scores derived from the application of PCA to two data matrices (original and reduced versions of Attoh's data set). In two cases the 'K' variables are 8-component scores each derived from the principal components solutions undertaken. The two remaining applications are grouping of census divisions based on only the first three component scores of each of the 8-component solutions.

The method used here begins by defining each original object as a 'group'. The 'N' groups (54 in each case in this study) are then reduced in number by a series of step decisions until all N-objects have been classified into one or the other of the final two groups. At each step some pair of groups is combined, thus reducing the number of groups by one.

From the geometric point of view, the method is sensitive to absolute distances among the objects (census divisions) and score profiles (component scores). The programme utilizes total within-group variation as the function to be minimally increased at each step in the process. Grouping of groups, or groups to individuals is

achieved by constructing a new distance matrix between the elements remaining after each step in the analysis (Johnston, 1968, 580).

The first stage of the process is to compute a matrix of potential error terms for each pair of objects. This error index is the sum of the squared differences between corresponding scores in the profiles. The least potential error value between objects (census divisions) is the pair that is grouped. At each step of grouping the potential error matrix is re-computed. The computer output provides a table of incremental error as each step of grouping is carried out.

Although clustering techniques may be considered to be relatively objective, they have limitations. Two of the problems are (i) chaining and (ii) deciding upon the number of groups to be used. Everitt (1974, 61) notes:

"general hierarchical clustering techniques such as the single link method and the median method give rise to a property called chaining, which refers to the tendency of the method to cluster together at a relatively low level objects linked by chains of intermediates."

Thus due to existing intermediates, objects at a relatively greater distance become grouped. These objects could otherwise belong to different groups. Hierarchical techniques have a general disadvantage in that they contain no provision for re-allocation of entities that may have been poorly classified at an early stage in the analysis. In other words, there is no possibility of correcting a poor initial partition.

The problem of deciding upon the number of groups to be used is generally termed the problem of "critical cut-offs". The technique does describe the increasing amount of error at each step; it does not indicate where to stop, nor does it signify the best possible number of groups. The decisions remain essentially subjective. The rule of thumb that is generally followed is that one should stop grouping when the error term tends to rise sharply. This is the rule that has been adhered to in each of the four applications of hierarchical grouping in this study.

CHAPTER III

THE COMPONENTS: INTERPRETATION AND COMPARISONS

3.1 INTRODUCTION:

This chapter describes and explains the structure and spatial pattern of the components. It compares these with Attoh's study. A number of tables and figures are presented. Table 3.1 shows eigenvalues and percentages of variance of the first fifteen unrotated components. Table 3.2 shows the structure of the first eight unrotated components of the present study. Tables 3.3a and 3.3b show eigenvalues and percentages of variance for the first eight rotated components for the present study and Attoh's study respectively. Table 3.4 shows component structure of the first seven rotated components of the present study. Tables 3.5a and 3.5b show component structure of the first eight rotated components of the present study and Attoh's study respectively. Figures 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6 show the changes in category positions of census divisions. Figures 3.1a, 3.2a, 3.3a, 3.4a, 3.5a, 3.6a and 3.7 show the spatial pattern of scores for the present study. Figures 3.1b, 3.2b, 3.3b, 3.4b, 3.5b, and 3.6b show the spatial pattern of scores in Attoh's study.

In preparing the maps a category classification has been adopted.

TABLE 3.1

EIGENVALUES AND PERCENTAGES OF VARIANCE FOR THE
FIRST FIFTEEN UNROTATED COMPONENTS (PRESENT STUDY)

COMPONENT	EIGENVALUE	PERCENTAGE OF VARIANCE	CUMULATIVE PERCENTAGE
1	14.11	34.4	34.4
2	6.08	14.8	49.3
3	4.17	10.2	59.5
4	2.29	5.6	65.0
5*	2.19	<u>5.3</u>	70.4
6	1.77	4.3	74.7
7	1.47	3.6	78.3
8**	<u>1.05</u>	2.6	80.9
9	.99	2.4	83.3
10	.88	2.2	85.5
11	.80	2.0	87.4
12	.70	1.7	89.2
13	.57	1.4	90.6
14	.51	1.2	91.8
15	.46	1.1	92.9

* King's cut-off point

** Kaiser's cut-off point

TABLE 3.2

STRUCTURE OF THE FIRST EIGHT UNROTATED
COMPONENTS (PRESENT STUDY)COMPONENT 1: Explained Variance 34.4%

<u>Highest Loadings</u>		
	RENT	.935
	INCOMEF	.924
	WHITE	.893
	INCOME5	-.887
	ELEMENT	-.871
	POSTSEC	.870
	URBAN	.835
	DEGREE	.834
	PARTRATE	.820
	GDR	-.719
	ARTLIT	.710
	YEARS30	-.701

COMPONENT 2: Explained Variance 14.8%

<u>Highest Loadings</u>		
	CROWDED	.818
	TR	.690
	ETHNIC	.646
	BR	.635
	MALEUR	.599
	JUVENILE	.596
	SOCIAL	.592
	UNEMPLOY	.570
	ILLEBORN	.560
	AGEDEP	-.514

TABLE 3.2 (CONT'D)

COMPONENT 3: Explained Variance 10.2%

<u>Highest Loadings</u>	HOSPBED	.656
	HEALWELF	.623
	HOSPEXP	.611
	CHILDDP	-.571
	PQINDEX	-.484
	GDR	.476
	AGEDEP	.451
	DOCTOR	-.428
	AUTOCAR	-.417

COMPONENT 4: Explained Variance 5.6%

<u>Highest Loadings</u>	MALEUR	-.498
	ETHNIC	.450
	HOSPBED	.446
	UNEMPLOY	-.430
	BR	.429
	PTRATIO	.419
	SOCIAL	-.381
	HOSPEXP	.364
	TR	.335
	PARTRATE	.334

COMPONENT 5: Explained Variance 5.3%

<u>Highest Loadings</u>	UNEMPLOY	-.609
	ILLEBORN	.523
	MALEUR	-.481
	JUVENILE	.404
	VOTER	-.387
	POPINDEX	.376

TABLE 3.2 (CONT'D)

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COMPONENT 6: Explained Variance 4.3%

<u>Highest Loadings</u>	PSYCH	.585
	SUICIDE	.499
	VOTER	.364
	HOSPEXP	-.318
	ILLEBORN	.308
	OHIP	.307

COMPONENT 7: Explained Variance 3.6%

<u>Highest Loadings</u>	PTRATIO	.510
	SERVICE	.466
	PSYCH	-.448
	RETAIL	.327

COMPONENT 8: Explained Variance 2.6%

<u>Highest Loadings</u>	IMR	.466
	ARTLIT	.358
	VOTER	.349
	SUICIDE	-.315
	RETAIL	.312

NOTE: Component loadings have been rounded to three decimal places.

TABLE 3.3a

EIGENVALUES AND PERCENTAGES OF VARIANCE
FOR THE FIRST EIGHT ROTATED COMPONENTS
(PRESENT STUDY)

COMPONENT	EIGENVALUE	PERCENTAGE OF VARIANCE	CUMULATIVE PERCENTAGE
1	11.250	27.44	27.44
2	4.355	10.62	38.08
3	3.377	8.24	46.32
4	3.270	7.98	54.40
5	2.293	5.59	59.99
6	4.618	11.26	70.25
7	2.211	5.39	75.64
8	1.782	4.39	80.03

TABLE 3.3b

EIGENVALUES AND PERCENTAGES OF VARIANCE
FOR THE FIRST EIGHT ROTATED COMPONENTS
(ATTOH'S STUDY)

COMPONENT	EIGENVALUE	PERCENTAGE OF VARIANCE	CUMULATIVE PERCENTAGE
1	19.346	28.45	28.45
2	8.353	12.25	40.73
3	4.679	6.88	47.61
4	5.084	7.48	55.09
5	3.702	5.44	60.53
6	3.528	5.19	65.72
7	3.174	4.67	70.39
8	3.168	4.66	75.05

TABLE 3.4

STRUCTURE OF THE FIRST SEVEN ROTATED
COMPONENTS (PRESENT STUDY)

COMPONENT 1:

<u>Highest Loadings</u>		
	INCOME5	-.951
	INCOMEF	.925
	GDR	-.903
	AGEDEP	-.872
	RENT	.864
	URBAN	.815
	PARTRATE	.725
	WHITE	.715
	YEARS30	-.697
	POSTSEC	.695
	ELEMENT	-.671
	OWNERS	-.618
	AUTOCAR	-.606
	DEGREE	/.605

COMPONENT 2:

<u>Highest Loadings</u>		
	TB	.836
	ILLEBORN	.794
	BR	.720
	CROWDED	.706
	JUVENILE	.701
	ETHNIC	.562
	CHILDDP	.462

TABLE 3.4 (CONT'D)

COMPONENT 3:

<u>Highest Loadings</u>		
MALEUR	.944	
UNEMPLOY	.932	
SOCIAL	.508	
PARTRATE	-.461	
AUTOCAR	-.452	
CROWDED	.441	

COMPONENT 4:

<u>Highest loadings</u>		
HOSPBED	.854	
HOSPEXP	.838	
OHIP	.591	
POPINDEX	-.514	

COMPONENT 5:

<u>Highest Loadings</u>		
SERVICE	.777	
RETAIL	.720	
CDR	.648	
DENTIST	.563	
DOCTOR	-.546	
CHILDDEP	-.571	
POSTSEC	.532	
ELEMENT	-.513	
WHITE	.510	
HEALWELF	.488	
DEGREE	.426	
LIBRARY	.402	

COMPONENT 6:

<u>Highest Loadings</u>	
PTRATIO	-.735
LIBRARY	.612
VOTER	-.594
DEGREE	.497
SOCIAL	.439

COMPONENT 7:

<u>Highest Loadings</u>	
PSYCH	.846
SUICIDE	.640
HEALWELF	.452

Category 1 in each map shows census divisions having a score of '+.5 and over', category 2 shows census divisions '+.5 to +.15', category 3 shows census divisions '+.15 to -.15', category 4 shows census divisions '-.15 to -.5' and category 5 shows census divisions '-.5 and below'. This was done in order to simplify description of census division performances on the different components in the present study; and to maintain comparability with Attoh's study. Attoh used a similar category classification of component scores.

The names used in Attoh's study have been retained when the component structures in the two studies are largely similar. If a component's structure has changed considerably, a new name has been given to it. Interpretation of components that have a similar structure and spatial pattern of performance, has been kept brief because these have already been discussed by Attoh. For components that are considerably different in either or both of structure and spatial pattern, the emphasis is on scores obtained for the present study only. The first eight components together, explain 75.05% of the total variance in Attoh's study. After dropping 27 variables, the first eight components explain 80.03% of the total variance in the present study (Tables 3.3a and 3.3b).

3.2 COMPONENT STRUCTURES: COMPARISONS

3.2.1 Component 1: General Social Well-Being

Component 1 accounts for 27.44% of total variance in the data. The highest loading variables (Table 3.5a) show that this is a general

and broadly defined indicator of social well-being. It reflects different aspects of social well-being such as housing, urbanisation, education, employment, material possessions, dependency and deprivation. The two directional component loadings indicate a distinct component scale; high positive scores would reflect high social well-being and low negative scores would indicate the contrary.

An examination of component structures shows that Attoh had a very similar first component (Table 3.5a and 3.5b). Other than variables dropped from analysis (Table 2.2), all variables that loaded highly in Attoh's Component 1 also load highly in Component 1 of the present analysis. Only one variable 'home ownership' which did not have a very high loading previously has appeared in the first component of the present study. Percentage variance explained by Component 1 in the present analysis (27.44%) is only 1.01% less than percentage variance explained by Component 1 in Attoh's study (28.45%). It must also be remembered that Attoh's Component 1 contained five more high loading variables than does Component 1 of the present study.

As Component 1 of the present study is a general representative of social well-being like Component 1 in Attoh's analysis, the name 'general social well-being' has been retained.

3.2.2 Component 2: Social Stability

This dimension accounts for 10.62% of the original variance in the data. As shown in Table 3.5a, the loadings indicate a clear factor scale that is associated with social deprivation and disorganisation

2

A

characteristics. Each variable indicates some form of social stress. Component 2 is a very clear structure of positive loadings indicating that high positive scores of places on this component would reflect relatively poor and unstable conditions and low negative scores would reflect the opposite characteristics.

Attoh had a very similar second component (Table 3.5b). Both reflect social order/disorder conditions very clearly and the name 'social stability' has been retained. A comparison of component structures (Table 3.5a and 3.5b) shows that only those variables that have been dropped from analysis are the ones that do not reappear with high loadings on Component 2 of the present study.

Component 2 in Attoh's study explains 12.28% of total variance of his data set. Component 2 of the present analysis with six fewer high loading variables, explains only 1.86% less of the total variance in the data.

3.2.3 Component 3: General Unemployment

This component accounts for 8.24% of the total variance in the data (Table 3.5a). It is a product mainly of two high loading unemployment variables -- 'male unemployment' and 'average unemployment'. The positive loading of the variable 'social service expenditure' and the negative loading of the variable 'labour force participation rate' also relate to the unemployment element of this component.

Attoh's Component 3 is very similar. The variables 'average

TABLE 3.5a

STRUCTURE OF THE FIRST EIGHT ROTATED
COMPONENTS (PRESENT STUDY)

COMPONENT 1: General Social Well-Being

Explained Variance 27.44%

<u>Highest Loadings</u>	INCOME5	-.953
	INCOMEF	.931
	GDR	-.900
	RENT	.871
	AGEDEP	-.868
	URBAN	.807
	PARTRATE	.731
	WHITE	.728
	POSTSEC	.709
	YEARS30	-.692
	ELEMENT	-.691
	OWNERS	-.638
	DEGREE	.627
	AUTOCAR	.615

COMPONENT 2: Social Stability

Explained Variance 10.62%

<u>Highest Loadings</u>	TB	.836
	ILLEBORN	.789
	BR	.721
	JUVENILE	.699
	CROWDED	.688
	ETHNIC	.573

TABLE 3.5a (CONT'D)

COMPONENT 3: General Unemployment

Explained Variance 8.24%

<u>Highest Loadings</u>	MALEUR	.946
	UNEMPLOY	.939
	SOCIAL	.500
	PARTRATE	-.445

COMPONENT 4: Health Resource Provision

Explained Variance 7.98%

<u>Highest Loadings</u>	HOSPBED	.855
	HOSPEXP	.847
	OHIP	.599
	POPINDEX	-.513

COMPONENT 5: Explained Variance 5.59%

<u>Highest Loadings</u>	VOTER	-.705
	LIBRARY	.611
	PTRATIO	-.557
	DEGREE	.497

COMPONENT 6: Services

Explained Variance 11.26%

<u>Highest Loadings</u>	RETAIL	.798
	SERVICE	.768
	DOCTOR	.599
	DENTIST	.576
	WHITE	.514
	ARTLIT	.482
	CDR	.470

TABLE 3.5a (CONT'D)

COMPONENT 7: Mental Health-Stress

Explained Variance 5.39%

<u>Highest Loadings</u>	PSYCH	.783
	SUICIDE	.718
	HEALWELF	.492

COMPONENT 8: Social Deprivation

Explained Variance 4.39%

<u>Highest Loadings</u>	IMR	.658
	PTRATIO	-.551
	CDR	-.465
	CHILDDP	.408

NOTE: Component loadings have been rounded to three decimal places.

TABLE 3.5b

STRUCTURE OF THE FIRST EIGHT ROTATED
COMPONENTS (ATTOH'S STUDY)

COMPONENT 1: General Socio-Economic Well-Being

Explained Variance 28.45 %

<u>Highest Loadings</u>	INCOMEF	0.959
	RENT	0.952
	INCOME5	-0.930
	INCOME15	0.909
	VALUEHSE	0.895
	TV	0.883
	WHITE	0.847
	POSTSEC	0.842
	ELEMENT	-0.818
	GDR	-0.799
	URBAN	0.795
	COLDH ₂ O	-0.792
	PARTRATE	0.791
	NOBATH	-0.773
	AGEDEP	-0.763
	YEARS30	0.738
	DEGREE	0.728
	AUTOCAR	0.709
	DRCIRC	-0.704

COMPONENT 2: Social Stability

Explained Variance 12.28%

<u>Highest Loadings</u>	SUSPART	0.878
	TB	0.849

TABLE 3.5b (CONT'D)

AGEEXP	0.842
BR	0.780
CROWDED	0.683
ROOMAVE	-0.679
ILLEBORN	0.652
ETHNIC	0.636
JUVENILE	0.618
CO ₂	0.581
SEXR	0.570
CINEMA	0.557
CHILDDEP	0.472
CRIME	0.466

COMPONENT 3: General Unemployment

Explained Variance 6.88%

<u>Highest Loadings</u>	UNEMPLOY	0.903
	MALEUR	0.885
	WELFARE	0.549
	ROOMAVE	-0.546
	SOCIAL	0.450

COMPONENT 4: Health Resource Provision

Explained Variance 7.48%

<u>Highest Loadings</u>	HOSPEXP	0.866
	HOSPBED	0.838
	WOLFSON	0.708
	OHIP	0.635
	REALWELF	0.493
	DOCTOR	-0.451

TABLE 3.5b (CONT'D)

COMPONENT 5: Mental Health-Stress

Explained Variance 5.44%

<u>Highest Loadings</u>	SUICIDE	0.633
	PSYCH	0.599
	HEALWELF	0.503
	SEXR	0.455

COMPONENT 6: Explained Variance 5.19%

<u>Highest Loadings</u>	PTRATIO	-0.616
	VOTER	-0.581
	SOCIAL	0.578
	LIBRARY	0.533
	FAMBEN	0.501
	WELFARE	0.486

COMPONENT 7: Air Quality

Explained Variance 4.67%

<u>Highest Loadings</u>	NO2	0.724
	CO2	0.667
	CHILDEXP	0.494

COMPONENT 8: Recreational Services

Explained Variance 4.66%

<u>Highest Loadings</u>	SERVICE	0.656
	RETAIL	0.663
	FOOD	0.582
	HOTEL	0.578
	LAW	0.437

NOTE: Component loadings have been rounded to three decimal places.

number of rooms per dwelling' and 'general welfare assistance allowance' were dropped from the present analysis (Tables 3.5a and 3.5b). The name 'general unemployment' has been retained.

3.2.4 Component 4: Health Resource Provision

Component 4 explains 7.98% of the total variance in the data. The variables with the highest loadings (Table 3.5a) are mainly related to accessibility to health care facilities. Attoh's study has a similar Component 4 (Table 3.5b); yet some changes are present. 'Wolfson's hospital health index' has been dropped from analysis. Two of Attoh's high loading variables -- 'health and welfare workers' and 'doctors' are missing while a new variable 'population growth index' loads highly on Component 4 of the present study. However, as the three highest loading variables are the same, the name 'health resource provisions' is found well suited and retained.

3.2.5 Component 5:

This accounts for 5.59% of the total variance in the data. It is however, difficult to interpret and hence, not named. Four variables appear with relatively high loadings. Two of these, 'registered voters' and 'pupil/teacher ratio' have negative loadings. The remaining two - 'library staff' and 'population with university degree' have positive loadings. The association of variables appears to be a mere covariance over the spatial units concerned. Thus, a detailed interpretation of this component is not considered. Attoh's study also had a similar

component (Component 6). This was also considered too difficult to interpret and hence dropped from analysis (Tables 3.5a and 3.5b).

3.2.6 Component 6: Services

Component 6 is the second largest construct in the present analysis. It explains 11.26% of the total variance in the data. Variables associated with the highest loadings indicate a very clear pattern of different professional services that are available (Table 3.5a). The general name 'services' is considered appropriate.

Component 6 of the present study is somewhat similar to Attoh's Component 8, 'recreational services' (Table 3.5b). Three of the five high loading variables, namely 'cinemas', 'hotels and motels' and 'restaurants', have been dropped from analysis. The present analysis thus provides a clearer and stronger 'services' component instead of just 'recreational services'.

3.2.7 Component 7: Mental Health Stress

Component 7 explains 5.39% of total variance in the data. With 'admission to psychiatric hospitals', 'health and welfare workers' and 'suicide' as the highest loading variables, this pattern is clearly related to mental stress and strain. Thus, high positive scores of places on this component would mean poor mental health conditions, low negative scores would mean better mental health conditions. Component 7 of the present study is similar to Component 5 in Attoh's study. Attoh's Component 5 also includes 'sex ratio' which has been dropped from the analysis (Tables 3.5a and 3.5b).

3.2.8 Component 8: Social Deprivation

Component 8 explains 4.29% of total variance in the data. The association of variables for this component indicates deprivation and problems in society. The high loading variables are 'infant mortality rate', 'pupil teacher ratio', 'crude divorce rate' and 'child dependency ratio'. This component is like an 'echo' of a major dimension (Component 2) that has already appeared earlier in the analysis (Table 3.5a). Attoh's study does not have a component that is directly comparable to Component 8 of the present study. Thus, this pattern is unique to the present analysis.

3.3 CENSUS DIVISIONS: COMPARISONS OF PATTERNS

3.3.1 Component 1 (Figs. 3.1, 3.1a and 3.1b):

Census division scores for Component 1 of the present study show some clear geographic concentrations. Almost all census divisions belonging to the 'golden horse shoe' form a single contiguous unit of '+.5 and over' scores. These include Ontario, York, Toronto, Peel, Halton, Wellington, and Niagara census divisions. Among other census divisions in this category are those of the Lake St. Clair areas, Essex, Lambton and Middlesex; the Eastern Ontario census divisions of Ottawa-Carleton and Frontenac; and in Northern Ontario, Algoma, Sudbury and Nipissing census divisions. When compared to Component 1 in Attoh's study it is found that almost all of the above mentioned census divisions also belong to Attoh's category 1. The only exceptions are Brant, Algoma and Nipissing. All of these were in category 2 in

COMPONENT 1: ATTOH'S STUDY

COMPONENT 1: PRESENT STUDY

VARIABLES ASSOCIATED

INCOME5
RENT
INCOME5
INCOME15
VALUEHSE
TV
WHITE
POSTSEC
ELEMENT
GDR
URBAN
COLDH₂O
PARTRATE
NOBATH
AGEDEP
YEARS30
DEGREE
AUTOCAR
DRCIRC

+.50

+.15

-.15

-.50

VARIABLES ASSOCIATED

INCOME5
INCOME5
GDR
RENT
AGEDEP
URBAN
PARTRATE
WHITE
POSTSEC
YEARS30
ELEMENT
OWNERS
DEGREE
AUTOCAR

+.50

+.15

-.15

-.50

Fig. 3.1

Fig. 3.1a CENSUS DIVISION PERFORMANCE ON THE GENERAL SOCIAL WELL-BEING COMPONENT (PRESENT STUDY)

FIG. 3. b CENSUS DIVISION PERFORMANCE ON THE GENERAL SOCIO-ECONOMIC WELL-BEING COMPONENT (ATTOH'S STUDY)

Attoh's Component 1.

Census divisions in category 2 are Thunder Bay and Cochrane in Northern Ontario and Durham in Southern Ontario. This category is a completely different one when compared to category 2 of Attoh's Component 1. Thunder Bay was in category 3, while Cochrane and Durham were in the fourth category.

Census divisions in category 3 of the present study are concentrated in Southern Ontario. The main concentration is in the Central-eastern positions, thus including Lennox & Addington, Peterborough, Hastings, Renfrew, Leeds and Grenville. Simcoe is an isolated case. In South-western Ontario census divisions in this category are Kent, Elgin and Oxford. Category 3 has five census divisions that were also in category 3 of Attoh's Component 1. Peterborough was in category 1, Lennox & Addington and Grenville were in category 4 while Leeds and Simcoe were in category 3 previously. B

Census divisions in category 4 are Rainy River, Kenora and Timiskaming in Northern Ontario; and a scattering throughout Southern Ontario, namely Haldimand, Norfolk, Perth, Dufferin, Northumberland and Stormont. Six out of nine census divisions in category 4 were also in category 4 previously. Among the new census divisions Dufferin has moved from category 3; Rainy River and Timiskaming have moved from category 5.

The worst performing census divisions (category 5) on Component 1.

are two major concentrations mainly around the Georgian Bay and Bruce Peninsula, and in Eastern Ontario. Census divisions included are Manitoulin, Dundas, Parry Sound, Muskoka, Haliburton, Victoria, Bruce, Grey, Huron, Prince Edward, Russell, Prescott, Glengarry and Lanark. Other than Lanark which has moved to category 5 from category 4, all the remaining census divisions were also grouped in category 3 on Attoh's Component 1.

3.3.1.1 Interpretation of Scores: It is clear from the above discussion that the overall performance of census divisions on Component 1 is largely similar to that obtained in Attoh's study. Change in performance is not very significant and census divisions have moved only to the next higher or lower category (except two census divisions - Fig. 3.1). As expected, the best areas remain the highly urbanised and industrially developed census divisions of Ontario (category 1). The Lake St. Clair census divisions concentrate mainly on the automotive and the rapidly expanding petrochemical industry. With the development of huge manufacturing diversity, the 'golden horse shoe' (particularly Toronto) already displays signs of an early maturity (Spelt, 1968). Large administrative centres in Eastern Ontario such as Ottawa-Carleton (Ottawa) and Frontenac (Kingston) are also included in this category. Census divisions in Northern Ontario that are in category 1 are important mining and paper and pulp producers (Marshall, 1972, 65). The South-western Ontario census divisions are also rich agriculturally.

In contrast to category 1 is category 5. As in Attoh's study, the

worst performing census divisions remain concentrated in the Bruce Peninsula -- Georgian Bay areas and in Eastern Ontario. The Bruce -- Georgian Bay areas are characterised by excessively shallow stony soils where agriculture has not been very successful. The Eastern Ontario census divisions are mainly a part of the dairy belt characterised by strikingly low income levels. No significant industrial development has taken place (Spelt, 1968, 384).

Category 2 is unique to Component 1 of the present study. It is an area of relatively high industrial and urban development; but in no way comparable to the urban and industrial development of the category 1 census divisions. In Thunder Bay division for example, Thunder Bay city is the leading settlement of Northern Ontario. Cochrane is an important mining area while Durham in the South with its relatively large concentration of industries is literally an extension of Metropolitan Toronto.

Census divisions in Eastern, South-western and Northern Ontario (category 3 and 4) are areas where industrial development of adjacent areas have not had any significant spread effects. Relatively poor and undeveloped soils along with environmental constraints (short growing season in Northern Ontario) prevail. People are gradually being forced to take up off-farm jobs and farm abandonment tends to prevail (Parson, 1979, 56).

3.3.2 Component 2 (Figs. 3.2, 3.2a and 3.2b):

Census division scores on Component 2 show some changes. However, the change is not very significant as it is mainly to the next higher or lower category. Census divisions with a score of '+.5 and over' and

COMPONENT 2: ATTOH'S STUDY

COMPONENT 2: PRESENT STUDY

Fig. 3.2

FIG. 3.2a CENSUS DIVISION PERFORMANCE ON THE SOCIAL STABILITY COMPONENT (PRESENT STUDY)

indicating low social stability make a single contiguous unit incorporating most of the census divisions in Northern Ontario. These include Kenora, Manitoulin, Rainy River, Thunder Bay, Sudbury, Algoma, Cochrane and Nipissing. Attoh's category 1 of Component 2 included all these census divisions as well as Timiskaming. For the present Component 2, Timiskaming has grouped with category 2 census divisions.

Only two census divisions in category 2 of Component 2 are also found in category 2 of Attoh's Component 2. These are Toronto and Ontario. Kent, Waterloo and Hastings were in Attoh's category 3, while Lanark was in Attoh's category 4.

Of the seven census divisions in category 3 of Component 2, two namely, Simcoe and Bruce were also in category 3 of Attoh's Component 2. Peel and Dufferin were in category 2, Norfolk was in category 4 while Haliburton and Muskoka were in category 5.

Category 4 of Component 2 is a large cluster of seventeen census divisions spread sporadically throughout Southern Ontario. Ten of these (Ottawa-Carleton, Essex, Middlesex, Elgin, Grenville, Durham, Lennox & Addington, Huron, Haldimand and Oxford) were also in category 4 of Attoh's Component 2. Of the rest Parry Sound, Niagara and Frontenac were in category 3 while Stormont, York, Dundas and Wellington were in category 5.

Category 5 is a group of 15 census divisions, also spread sporadically throughout Southern Ontario. Ten of these (Peterborough,

Prince Edward, Russell, Northumberland, Brant, Grey, Prescott, Perth, Glengarry and Victoria) are also found in category 5 of Attoh's Component 2. Wentworth, Lambton, Leeds and Halton were all in category 4 previously while Renfrew was in category 3.

3.3.2.1 Interpretation of Scores: As in Attoh's study, we see that Northern Ontario census divisions, being areas of limited socio-economic opportunity, are the ones that have high (category 5) social instability. In general, the incidence of social instability is lower in Southern Ontario. However, census divisions belonging to the different categories appear in a rather mixed pattern spatially. The fast growing areas of Southern Ontario namely, Toronto, Oxford, Waterloo, Frontenac, Kent and Lanark, have relatively high social instability scores. In the cases of Toronto and Waterloo, it should be noted that these are also areas of rapid growth, large industrial populations, high ethnic diversity and high in migration. These variables often characterize an atmosphere of overall disorganisation:

Average (+.15 to -.15) social stability is particularly the characteristic of South-central Ontario. Like Attoh's Component 2, it is found that rural census divisions or areas that are far below Toronto in city size and industrial development, are in general areas of relatively high social stability.

3.3.3 Component 3 (Figs. 3.3, 3.3a and 3.3b):

Category 1 of Component 3 in the present study stretches throughout Northern Ontario (except Rainy River and Sudbury) and occurs in

CENSUS DIVISION SCORE COMPARISONS -- 3

COMPONENT 3: ATTOH'S STUDY

COMPONENT 3: PRESENT STUDY

Fig. 3.3

Fig. 3.3a CENSUS DIVISION PERFORMANCE ON THE GENERAL UNEMPLOYMENT COMPONENT (PRESENT STUDY)

+ .50
+ .15
- .15
- .50

FIG. 3.3b CENSUS DIVISION PERFORMANCE ON THE GENERAL UNEMPLOYMENT COMPONENT (ATOH'S STUDY)

patches in Southern Ontario. Census divisions included are Cochrane, Timiskaming, Stormont, Prescott, Nipissing, Essex, Algoma, Wentworth, Haliburton, Renfrew, Brant, Niagara, Parry Sound, Peterborough, Prince Edward, Toronto, Muskoka, Thunder Bay and Lambton. In this category Niagara and Lambton were in category 2 while Haliburton, Prince Edward and Toronto were in category 4 of Attoh's Component 3. The remaining census divisions were all in category 1.

Of the five census divisions in category 2, only one (Frontenac) was also in category 2 of Attoh's Component 3. Of the remaining four Russell was in category 1 while Sudbury, Glengarry and Hastings were in category 2.

Category 3 includes census divisions Kent, Simcoe, Ontario, Victoria, Northumberland, Durham and Lennox & Addington. Attoh's Component 3 did not have any census divisions in category 3. Category 3 of the present study is the result of migration of census divisions from categories 1, 2, 4 and 5 of Attoh's Component 3 (Fig. 3.3).

All census divisions in category 4 were also in category 4 in Attoh's study. These include Middlesex, Waterloo, Grenville, Rainy River, Ottawa-Carleton and Leeds. Attoh's Component 3, however, had a much larger fourth category from which census divisions have moved to categories 1, 2 and 3 of the present Component 3.

Category 5 consists of Oxford, Kenora, Elgin, Manitoulin, Norfolk, Grey, Wellington, Halton, Bruce, Peel, York, Lanark, Haldimand, Dundas,

Perth, Huron and Dufferin. Attoh's category 5 included all these census divisions and two more-- Durham and Lennox & Addington which have moved to category 4.

3.3.3.1 Interpretation of Scores: The overall pattern has remained more or less the same. Between category changes appear to be somewhat high. This may to some extent be because Attoh's Component 3 did not have any census divisions with scores between '+.15 and -.15'.

Broadly speaking, high general unemployment characterises both the economically developed and the economically underdeveloped regions of Ontario. The highly urbanised and industrially developed census divisions, e.g. Wentworth, Toronto, Niagara, Brant, Essex and Lambton are all characterised by high general unemployment. The main reason appears to be the in-migration of people of working age to regions of economic opportunity. This may be both from rural areas to urban areas and from smaller urban centres to the larger ones (Marshall, 1972, 70). At the other end is the general unemployment in Northern Ontario and Eastern Ontario. These are areas characterised by limited socio-economic opportunity. Two major economic activities of Northern Ontario are mining and forestry -- neither of which have a significant effect on employment (Ontario Economic Council, 1976, 3). Poor soils and a short growing season also limit large scale agricultural practices in these areas.

As found in Attoh's Component 3, Southern Ontario is an area of low general unemployment. In Western Ontario this area extends from Manitoulin Island and the Bruce Peninsula to Elgin, Norfolk and Haldimand.

In Eastern Ontario are Ottawa-Carleton, Lanark, Grenville, and Dundas. Most of these census divisions show economic growth and are near to large urban centres. Rural census divisions in Western Ontario have a relatively well developed agriculture as the major factors in maintaining low levels of unemployment. Besides unemployment in the agricultural sector is difficult to identify. Thus, even census divisions which do not have either agricultural or industrial development really going for them (Bruce, Grey, Kenora; census divisions in Eastern Ontario) are found to have low levels of unemployment.

An intermediate group extends from Simcoe to Lennox & Addington where economic growth is not taking place very rapidly.

3.3.4. Component 4 (Figs. 3.4, 3.4a and 3.4b):

In category 1 census divisions included are Perth, Frontenac, Wentworth, Thunder Bay, Dundas, Lanark, Stormont, Grey and Rainy River. These were also in category 1 in Attoh's Component 4. Five new census divisions in this category, namely Glengarry, Toronto, Timiskaming, Huron and Ottawa-Carleton have all moved from category 2 of Attoh's Component 4.

Of the 5 census divisions in category 2, only one (Essex) was previously in category 2. Renfrew has moved from category 4 while Kent, Hastings and Middlesex have all moved from category 1 of Attoh's Component 4.

Category 3 covers two major areas -- most of Northern Ontario and a large number of census divisions in South-western Ontario. Census divisions in Northern Ontario are Kenora, Cochrane, Algoma, Nipissing

COMPONENT 4: ATTOH'S STUDY

COMPONENT 4: PRESENT STUDY

Fig. 3.4

Fig. 3.4a CENSUS DIVISION PERFORMANCE ON THE HEALTH RESOURCE PROVISION COMPONENT (PRESENT STUDY)

FIG. 3.4b CENSUS DIVISION PERFORMANCE ON THE HEALTH RESOURCE PROVISION COMPONENT (ATTOH'S STUDY)

and Parry Sound. Those in Southern Ontario are Niagara, Haldimand, Norfolk, Oxford, Lambton, Waterloo, Wellington, Elgin and Peterborough. Of the fourteen census divisions in this category, 5 have moved in from category 1, 4 and 5 of Attoh's Component 4 while the rest have remained the same (Fig. 3.4).

Four out of five census divisions in category 4 can also be found in category 4 of Attoh's Component 4. These are Bruce, Leeds, Durham and Sudbury. Grenville has moved from Attoh's category 5. Attoh's category 4 however, had three more census divisions which have moved to other categories.

Category 5 of Component 4 is very similar to Attoh's category 5. Manitoulin, Prince Edward, Halton, Victoria, Prescott, Lennox & Addington, Russell, Peel, Haliburton, Northumberland and Ontario have all remained in category 5 of Component 4. Dufferin, York and Muskoka have moved in from Attoh's category 3, Brant from Attoh's category 1 and Simcoe from Attoh's category 4 of Component 4.

3.3.4.1 Interpretation of Scores: Scores on Component 4 show somewhat higher between category changes of census divisions. This is probably because the component structure has also changed to some extent (Tables 3.5a and 3.5b). Out of twenty census divisions that have had between category changes, seven have moved more than one category away from their original positions in Attoh's Component 4 (Fig. 3.4). However, similarities may also be observed.

As in Attoh's study, it is found that most of Western Ontario is

better served in health resource provisions. Toronto, Wentworth, Huron, Perth and Grey have the highest scores (category 1) while Essex, Kent and Lambton have above average scores (category 2). A majority of census divisions have average performance. Both Ottawa-Carleton and Kingston-Frontenac which are relatively highly developed areas in Eastern Ontario are well served (category 1). Rural census divisions in Eastern Ontario present a mixed picture. Thus while Lanark, Glengarry, Stormont and Dundas are well served, Russell, Prescott, Grenville and Leeds are not. Most of Central to Northern Ontario performs between average (category 3) and high (category 1). The performance of Rainy River, Sudbury and Timiskaming in category 1 is quite surprising. However, it must be remembered that in these census divisions, population is mainly concentrated in a few large urban centres where centralised provisions for health services is also available.

All of the South-central Ontario census divisions extending from the shores of Lake Ontario to Manitoulin islands (except Toronto and Wentworth) have poor health resource provisions (Fig. 3.4a). Attoh's Component 4 had a mixed picture in this area.

3.3.5 Component 6 (Figs. 3.5, 3.5a and 3.5b):

Component 6 of the present study is compared to Component 8 of Attoh's study. However, as component structures vary considerably, similarities in spatial patterns obtained are relatively fewer. Out of fifty-four census divisions analysed, thirty have had between category changes.

COMPONENT 8: ATTOH'S STUDY

COMPONENT 6: PRESENT STUDY

Fig. 3.5

FIG. 3.5a CENSUS DIVISION PERFORMANCE ON THE SERVICES COMPONENT (PRESENT STUDY)

FIG. 3.5b CENSUS DIVISION PERFORMANCE ON THE RECREATIONAL SERVICES COMPONENT (ATTOH'S STUDY)

Category 1 of Component 6 is the group that has retained maximum similarity. Eight of the fourteen census divisions namely Muskoka, Toronto, Haliburton, Peterborough, Victoria, York, Parry Sound and Simcoe have not changed group affiliation. Frontenac and Wentworth have moved from category 4 while Ottawa-Carleton, Middlesex and Leeds have moved from category 3. Lanark has moved from category 2 of Attoh's Component 8.

Category 2 of Component 6 is mainly a new cluster. Only 2 census divisions Niagara and Kenora were also in Attoh's category 2. Rainy River was in category 1, Halton, Thunder Bay, Grey and Essex were in category 3, while Brant was in category 4 previously.

In category 3 Hastings, Nipissing and Lambton were also in Attoh's third category. Among other census divisions Waterloo was in category 1, Manitoulin, Ontario and Elgin were all in category 4 while Cochrane and Renfrew were in category 5 of Attoh's Component 8.

In category 4, three census divisions (Kent, Northumberland and Stormont) were also in Attoh's category 4. Of the remaining six census divisions, Bruce, Dufferin and Peel were all in category 3 while Oxford, Huron and Perth were in category 5 of Attoh's Component 8.

Category 5 includes Dundas, Durham, Russell, Timiskaming, Grenville, Prince Edward, Glengarry and Lennox & Addington which were also in Attoh's category 5. Three census divisions Prescott, Haldimand, Norfolk and Wellington were in category 4; Algoma was in category 3 while Sudbury

was in category 2 previously.

3.3.5.1 Interpretation of Scores: The performance of York, Wentworth, Toronto and Middlesex is understandable. Together they control huge amounts of business and trade thus creating various types of employment and services. Toronto alone is responsible for about 66% of total Canadian stock sales, 12% of total national sales, 37% of total Canadian life insurance assets etc. and is the leading retail centre of Ontario (Spelt, 1968, 353). Ottawa-Carleton is the seat of government attracting various types of services. The performance of the shield districts (Parry Sound, Muskoka, Haliburton, Victoria and Peterborough) and Frontenac, Lanark and Leeds in Eastern Ontario is outstanding. The shield area and the Eastern Ontario census divisions are important resort districts of Ontario. The rough and rugged topography, the lakes and the scenic beauty of the shield districts, the existence of Smith's Falls in Lanark, historical sites at Kingston have led to the development of tourist activities in these areas. Thus, a large amount of net retail and service trade is also associated.

Niagara, Brant and Essex are important for industrial development and associated business and services. The importance of Niagara Falls (Niagara), Thunder Bay, Kenora and Fort Frances in Rainy River for tourist activities is obvious. Thus, these census divisions also have relatively high performances on the 'services' Component.

Areas in Central-eastern and Eastern Ontario as well as the region

stretching from Bruce Peninsula to Norfolk-Haldimand ranges from average to poor performance. This is because these are mainly agricultural areas.

3.3.6 Component 7 (Figs. 3.6, 3.6a and 3.6b):

Component 7 is similar in structure to Component 5 in Attoh's study. Similarity in the spatial pattern of performance is also clearly observable. Category 1 is spread in the form of blocks throughout Ontario and includes Grenville, Leeds, Prince Edward, Frontenac, Lanark, Timiskaming, Elgin, Middlesex, Victoria, Ontario, Northumberland, Cochrane, Oxford, Thunder Bay, Nipissing and Huron. Huron and Thunder Bay have moved in from category 2 and Cochrane has moved in from category 3 of Attoh's Component 5. The rest of the census divisions have remained in category 1.

In category 2 Simcoe and Hastings were also in Attoh's category 1. Grey and Kenora have moved in from category 1 while Lennox & Addington has moved in from category 3.

The third category has changed considerably. For Component 7 of the present study it includes only two census divisions. Dufferin was also in category 2 of Attoh's Component 5 while Bruce has moved in from category 4. Attoh's category 3 of Component 5 consisted of seven census divisions.

Category 4 consists of thirteen census divisions spread mainly in Southern Ontario. Only four of these (Kent, Lambton, Wellington and

CENSUS DIVISION SCORE COMPARISONS -- 6

COMPONENT 5: ATTOH'S STUDY

COMPONENT 7: PRESENT STUDY

Fig. 3.6

Fig. 3.6a CENSUS DIVISION PERFORMANCE ON THE MENTAL HEALTH STRESS COMPONENT (PRESENT STUDY)

+.50
+.15
-.15
-.50

FIG. 3.6b CENSUS DIVISION PERFORMANCE ON THE MENTAL HEALTH-STRESS COMPONENT (ATTOH'S STUDY)

Essex) were also in category 4 in Attoh's Component 5. Toronto and Haliburton have moved from category 1, Peterborough has moved from category 2, Ottawa-Carleton, Wentworth and Manitoulin from category 3 and Parry Sound, Durham and Dundas from category 5 of Attoh's Component 5.

✓ Of the eighteen census divisions in category 5, twelve namely Waterloo, Perth, Algoma, Peel, Norfolk, Sudbury, Prescott, Rainy River, Russell, Haldimand, York and Glengarry were also in the fifth category in Attoh's Component 5. Brant, Niagara, Halton and Stormont were all in category 4 while Muskoka was in category 3 and Renfrew was in category 2 previously.

3.3.6.1 Interpretation of Scores: As in Attoh's analysis, mental health stress is least conspicuous in the economically developed areas of Ontario. These are also areas that have performed well on the 'general social well-being' component. Thus, the urbanised and industrialised areas of the 'golden horse shoe', the agriculturally and industrially rich Lake St. Clair census divisions, areas adjacent to large urban-industrial centres (Norfolk, Haldimand, Perth, York), large urban and mining areas in Northern Ontario (Thunder Bay city, Thunder Bay, Timmins, Cochrane), all have low mental health stress (category 4 and 5). Rural census divisions at the extreme Eastern end of Ontario (Russell, Prescott, Glengarry, Dundas, Renfrew and Stormont) and the shield districts (Parry Sound, Muskoka, Haliburton, Peterborough) also have a lower incidence of mental health stress.

The Bruce Peninsula area has average to relatively high mental health stress conditions. Highest mental health stress is concentrated mainly in Northern Ontario; and in the form of blocks in Southern

Ontario. These are mainly the socio-economically depressed areas of Ontario. The performance of Middlesex is contradictory.

3.3.7 Component 8 (Fig. 3.7):

As this component does not have a parallel dimension in Attoh's analysis, between category comparisons of change cannot be made. Only the spatial pattern of scores for the present analysis is being described.

Census divisions in category 1 are concentrated mainly in Northern Ontario and include Kenora, Rainy River, Tunder Bay, Cochrane, Timiskaming, Nipissing and Parry Sound. In Southern Ontario it includes Essex, Huron, Perth, Dufferin, Halton, Victoria, Leeds, Russell and Prescott.

Category 2 occurs only in Southern Ontario and includes Middlesex, Grey, York, Peterborough, Ontario, Frontenac, Grenville, Ottawa-Carleton and Glengarry. Category 3 includes Manitoulin, Haldimand, Wellington, Peel, Peterborough and Stormont. Category 4 occurs mainly in Western Ontario and includes Lambton, Elgin, Oxford, Waterloo, Simcoe and Northumberland. Category 5 occurs intermittently all over Ontario. It thus includes Algoma, Sudbury, Bruce, Muskoka, Haliburton, Hastings, Lennox & Addington, Lanark, Dundas, Prince Edward, Durham, Toronto, Niagara, Wentworth, Brant, Norfolk and Kent.

3.3.7.1 Interpretation of Scores:

As mentioned earlier, the social deprivation component is similar in characteristics to the social stability component. Similarity in spatial pattern of performance may

FIG. 3.7 CENSUS DIVISION PERFORMANCE OF THE SOCIAL DEPRIVATION COMPONENT (PRESENT STUDY)

also be observed. However, contradictions are also present.

Like the social stability component, high scores on the social deprivation scale stretch from Kenora in the north to Parry Sound, Nipissing and Renfrew. Algoma and Sudbury, however, have reversed their positions (Figs. 3.2a and 3.7). Southern Ontario in general has a lower incidence of social deprivation.

Unlike the social stability component, however, pockets of high scores (category 1) are also scattered all over Southern Ontario. Both urban and rural census divisions present a mixed picture in scores obtained. This indicates that characteristics such as infant mortality rates, pupil/teacher ratio, crude divorce rates and child dependency ratio are not very much related to general socio-economic well-being in Southern Ontario. For example, the area east of Frontenac has relatively high scores. But Lanark and Dundas have a low score. Stormont on the other hand holds an average position. South-central Ontario and Western Ontario again are mainly areas of low incidence of social deprivation. But the area immediately around Toronto, the area between Middlesex and Grey as well as Kent in the extreme West all have relatively high scores.

3.4 CONCLUSION:

In studying the effects of reducing the number of variables on component structure and spatial patterns of performance it may be observed that:

- (i) With more than one-third of the total number of variables

reduced, it has been possible to obtain simpler and clearer components while component structure has remained largely the same.

- (ii) Some change in component structure is observed. But this is mainly in the case of components that appear later in the analysis and explain lower proportions of the percentage of total variance. Component 6 is the only exception. This component has changed considerably in structure but is the second largest construct in the present analysis.
- (iii) in comparing spatial patterns of performance of components obtained, it is found that overall patterns of performance in Attoh's analysis and the present analysis are largely similar. On each component obtained, the two extremes i.e. census divisions in category 1 and category 5 have been almost identical. Census divisions appearing in the middle categories (2-4) have been more apt to change with a change in data input. However, change has been mainly to the next higher or lower category.

CHAPTER IV

OVERALL SOCIAL WELL-BEING IN ONTARIO

4.1 INTRODUCTION:

The performance of individual census divisions on the different components varies considerably. A generalised picture resulting from the combination of performances on the different components is interesting and allows insights into overall social well-being in Ontario. Hierarchical groupings of census divisions provide some interesting geographic patterns. Fig. 4.1 shows the groups formed based on component scores of the present study. Fig. 4.1a shows the linkage tree and error curve due to grouping. As may be seen from this figure, step 43 is the cut-off point; the percentage of error due to grouping tends to rise very sharply after this. Fig. 4.2 shows groups obtained based on Attoh's component scores. Fig. 4.2a shows the linkage tree and error curve due to grouping based on Attoh's component scores. In this case too, step 43 is the cut-off point. This was done for two reasons; (i) percentage of error rises sharply after step 43 and (ii) an 11-group regionalisation for both the analyses enables better comparability of the two studies.

Both groupings referred to above are based on component scores of all eight rotated components of each of the two studies. From previous

discussions, it is clear that some of the components obtained for the present study varied in structure to those obtained for Attoh's study. But the first three components obtained are very much alike. Thus hierarchical groups were also constructed for the first three components of each of the two studies. This was done to examine whether spatial patterns obtained remain more or less the same when component structures are very similar. Fig. 4.3 shows groups obtained for the present study. Fig. 4.4 shows groups obtained for Attoh's study. Figs. 4.3a and 4.4a show the linkage tree and error curves due to grouping for the two studies respectively. For both cases, step 47 was considered the cut off point as percentage of error rises very sharply after this. Tables 4.2a and 4.2b show performance of individual census divisions (scores and ranks) on the different components.

In each of the above grouping cases, groups formed are referred to by identifying numbers (Tables 4.1a, 4.1b and Tables 4.3a, 4.3b). The purpose is to look at general performance of the groups over the different components. No attempt has been made to place groups on a scale of well-being levels. It may be pointed out here, that the hierarchical grouping technique clusters objects (census divisions) according to their similarity over a number of variables. It does not provide a scale differentiating the better from the worse. Thus, numbers used to refer to groups do not necessarily indicate a hierarchy of performance in overall social well-being.

4.2 CHARACTERISTICS OF GROUPS AND COMPARISONS: THE 8-COMPONENT CASES

Spatial patterns of overall social well-being are discussed below. Comparisons are made with groups obtained from Attoh's component scores.

4.2.1 Group 1: Toronto, Frontenac, Middlesex, Ottawa-Carleton

With Toronto, Frontenac, Middlesex and Ottawa-Carleton grouping together, Group 1 is a cluster of some of the most dynamic and fastest growing areas of Ontario. The census divisions included have several of the largest urban centres of the province, high industrial development, high income levels, high educational levels as well as high occupational status. From a comparison of component scores of this group to those of other groups, it appears that Group 1 rates among the highest levels of social well-being in Ontario. All four census divisions have high ranks on components that indicate overall social well-being. In general social well-being, all four census divisions rank within the top eleven (Table 4.2a). They also have a very high level of services. Middlesex and Ottawa-Carleton have above average health resource provisions while Toronto and Frontenac have very high positions.

On components making negative contributions to social well-being, Group 1 has either average or near average performance. Thus Frontenac, Middlesex and Ottawa-Carleton have a better than average level of social stability. The performance of Toronto is poor. General unemployment is high in Toronto. Middlesex and Ottawa-Carleton occupy relatively better

positions. Mental health and stress is high in Frontenac and Middlesex. Toronto and Ottawa-Carleton have not done too well either. The census divisions have slightly less socially deprived populations than the average. Toronto has better conditions having a very high negative score.

Grouping of Attoh's component scores shows that Group 1 of the present study is split into three Ottawa-Carleton and Toronto form individual units of high social well-being. Both Ottawa-Carleton and Toronto have distinct individual characteristics. Ottawa has a high professional element, being the seat of the Federal government and bureaucracy. Toronto is mainly industry and business oriented. It is more of a world city than just a national city. Middlesex and Frontenac have remained in the same group while Kent, Hastings, Lanark, Dufferin, Wellington and Simcoe join this group (Group 4, Table 4.1b). Thus, overall performance of this group (Group 4, Table 4.1b) appears to be somewhat lower, having some census divisions that have not performed so well overall. From looking at performances on the different components, this group appears to have a generally high level of social well-being (Table 4.2b).

4.2.2 Group 2: Ontario, York, Peel, Halton

With Toronto as the regional core, Group 2 is a crescent around it. It is a cluster of census divisions very closely affected by growth and development in Toronto. Most of the census divisions have a better performance in general social well-being than do census divisions in

TABLE 4.1a

GROUP AFFILIATION OF CENSUS DIVISIONS DUE TO HIERARCHICAL
GROUPING: 8-COMPONENT CASE (PRESENT STUDY)

Group 1:	Toronto
	Frontenac
	Middlesex
	Ottawa-Carleton
Group 2:	Ontario
	York
	Peel
	Halton
Group 3:	Niagara
	Wentworth
	Wellington
	Essex
	Waterloo
	Brant
	Kent
	Lambton
	Algoma
	Sudbury
	Hastings
Group 4:	Norfolk
	Haldimand
	Perth
	Huron
	Grey
	Bruce
	Durham

Group 5: Elgin
Oxford
Simcoe
Leeds
Grenville
Northumberland

Group 6: Nipissing
Temiskaming
Cochrane
Thunder Bay
Rainy River

Group 7: Dufferin
Lanark
Dundas
Manitoulin

Group 8: Kenora

Group 9: Renfrew
Russell
Prescott
Glengarry
Stormont

Group 10: Parry Sound
Muskoka
Haliburton
Victoria
Peterborough

Group 11: Lennox & Addington
Prince Edward

TABLE 4.1b

GROUP AFFILIATION OF CENSUS DIVISIONS DUE TO HIERARCHICAL
GROUPING: 8-COMPONENT CASE (ATTOH'S COMPONENT SCORES)

Group 1:	York
	Peel
	Halton
	Sudbury
Group 2:	Ottawa-Carleton
Group 3:	Toronto
Group 4:	Kent
	Middlesex
	Wellington
	Dufferin
	Simcoe
	Hastings
	Frontenac
	Lanark
Group 5:	Essex
	Lambton
	Nipissing
	Temiskaming
	Cochrane
	Thunder Bay
	Rainy River
	Algoma
	Niagara
	Wentworth
	Brant
	Peterborough
	Renfrew
	Stormont

Group 6:	Glengarry
	Dundas
	Manitoulin Islands
Group 7:	Huron
	Grey
	Bruce
	Durham
	Elgin
	Oxford
	Norfolk
	Haldimand
	Perth
Group 8:	Parry Sound
	Muskoka
	Haliburton
	Waterloo
Group 9:	Prince Edward
	Lennox & Addington
	Grenville
	Leeds
	Northumberland
	Victoria
	Ontario
Group 10:	Russell
	Prescott
Group 11:	Kenora

FIG. 4.1 HIERARCHICAL GROUPING OF CENSUS DIVISIONS: 8-COMPONENT CASE (PRESENT STUDY)

LINKAGE TREE AND ERROR CURVE: 8-COMPONENT CASE
(PRESENT STUDY)

Census Divisions

Fig. 4-1a

Fig. 4.2 HIERARCHICAL GROUPING OF CENSUS DIVISIONS: 8-COMPONENT CASE (ATTOR'S COMPONENT SCORES)

LINKAGE TREE AND ERROR CURVE: 8-COMPONENT CASE
(ATTOH'S COMPONENT SCORES)

Group 1 (Table 4.2a). Group 2 has above average to good performance in services but performance in health resource provisions is very poor. It is mainly a cluster of above average positions in social stability and has high employment levels. With high levels of economic opportunity present and the complexity of too large an urban centre (Toronto) absent, Group 2 has a very low level of mental health stress. It is however, of average to high levels of social deprivation.

Group 2 of the present study is more or less maintained when Attoh's component scores are grouped (Group 1, Table 4.1b) Ontario groups with other census divisions in Eastern Ontario (Group 9). York, Peel and Halton form a group of very high overall social well-being. Sudbury is also included in this group.

4.2.3 Group 3: Niagara, Wentworth, Brant, Waterloo, Wellington, Kent, Essex, Lambton, Algoma, Sudbury, Hastings

As expected, the economically developed 'golden horse shoe' also has a high level of overall social well-being. Aside from Group 2 census divisions, this is also evident from performance of Group 3 census divisions. Niagara, Wentworth, Brant and Waterloo all tend to have relatively high levels of general social well-being. Kent, Essex, Lambton, Frontenac, Algoma and Sudbury, are also included as Group 3 (Fig. 4.1).

Group 3 has mixed performance levels ranging from above average to high scores (Table 4.2a). In general social well-being, all except

two (Hastings and Brant) have high scores. Performance in services is mainly average. Sudbury and Algoma have done very badly in services. In health resource provisions, census divisions are clustered around and either side of the average; however, Wentworth has a very high level of health resource provisions. As is characteristic of the highly urbanised areas of Ontario, populations are relatively unstable. The high instability of the Northern Ontario census divisions is also remarkable. Social deprivation problems are few in most census divisions and mental health stress is relatively low.

Group 3 census divisions also appear as one group when Attoh's component scores are grouped (Group 5, Table 4.1b). Some changes are also noted. Thus, Niagara, Wentworth, Brant, Essex and Lambton all group together. Some census divisions of Northern Ontario are merged with this group at step 43 (Fig. 4.2a). This indicates that the Northern Ontario census divisions are sufficiently different and do not merge until later in the grouping procedure.

4.2.4 Group 4: Norfolk, Haldimand, Perth, Huron, Grey, Bruce, Durham

Group 4 covers the Bruce peninsula-Lake Huron areas and Norfolk-Haldimand in Western Ontario; and only one census division Durham, in South-central Ontario. This is an area of relatively poor performance, particularly on Component 1 and Component 6. All census divisions (except Durham) that have grouped in this cluster have negative scores on general social well-being. In services too, Norfolk, Haldimand, Perth, / Huron and Bruce all have poor performances. Grey is relatively better

while Durham has done very well. In health resource provisions, this group has a mixed picture. Thus, while Perth, Grey and Huron have good performances, Norfolk and Haldimand have not done so well. Bruce and Durham have poor performances. The performance of census divisions of this group are also mixed in the mental health stress and social deprivation aspects. Norfolk, Haldimand and Perth have done quite well and have low mental health stress while the others have not done so well. In social deprivation, Norfolk and Durham have done very well, that is, they are less deprived while the remaining census divisions have average to poor performance. However, all census divisions (except Durham) have very high employment levels. This is because the principal occupation in these census divisions is farming and unemployment is difficult to trace. These census divisions appear to be a result of the cancelling-out of varying performances on the different components, giving an overall average group.

Group 4 census divisions form almost an identical group (Group 7, Table 4.1b) in the grouping of Attoh's component scores. The only changes are census divisions Elgin and Oxford which group with Group 7 of Attoh's component scores and Group 5 of the present study. In fact, the tobacco belt as a whole appears as one group when Attoh's component scores are grouped.

4.2.5 Group 5: Elgin, Oxford, Simcoe, Northumberland, Leeds, Grenville

Group 5 is mainly a rural cluster spread in Southern Ontario. Census divisions are neither very rich agriculturally nor in industrial

development. Overall social well-being appears to be average.

In general social well-being Oxford, Simcoe, Elgin, Leeds and Grenville have average scores while Northumberland falls just below average. In services, Simcoe and Leeds have done well while Elgin, Oxford, Grenville and Northumberland have not. Average to below average performance is the main characteristics in health resource provisions. Being mainly rural and having most of their populations employed in agriculture, level of general unemployment is low. The incidence of social instability is low particularly in Northumberland, Leeds and Oxford. Elgin and Grenville have above average socially stable populations. Simcoe however, has a poor performance in social stability. All census divisions in this group have average mental health stress. Social deprivation level is clustered around either side of the average.

Group 5 census divisions are split into 3 when Attoh's component scores are grouped. Thus Elgin and Oxford merge with Group 7, Simcoe with Group 4 and Leeds and Grenville with Group 9 of Attoh's component scores respectively (Table 4.1b).

4.2.6 Group 6: Nipissing, Timiskaming, Cochrane, Thunder Bay, Rainy River

Northern Ontario tends to have a very clear clustering of census divisions. Group 6 census divisions mainly have above average performance in all three of the positively contributing components of the present study. The performance of Thunder Bay and Timiskaming is remarkable in health resource provisions. The relatively better performance of Northern Ontario census divisions in the different aspects is understandable

because population is mainly concentrated in a few urban centres where the different facilities are available, thus giving the census divisions a better overall appearance. However, on components that contribute negatively to general social well-being, the state of Northern Ontario is poor. All five of the census divisions included in Group 6 have poor performance in social stability. Nipissing, Timiskaming and Cochrane have very high levels of unemployment while the situation in Thunder Bay and Rainy River is somewhat better. All census divisions in this group have very high levels of mental health stress and social deprivation. The only exception is Rainy River which has a very low level of mental health stress.

Group 6 of the present study has merged with Group 5 in the grouping obtained from Attoh's component scores (see page 142). With fairly different and distinct socio-economic characteristics, they remain a separate group in the present study.

4.2.7 Group 7: Dufferin, Lanark, Dundas, Manitoulin

This is mainly a rural and socio-economically lagging cluster. The pattern of performance is such that on components explaining large percentages of the total variance, census divisions have not done very well. On components that explain smaller percentages of total variance, the performance is either very good or mixed.

In general social well-being, Lanark, Dundas and Manitoulin have not done well. The position of Dufferin is somewhat better. In services, Lanark has a relatively better performance while the others

TABLE 4.2a

CENSUS DIVISION SCORES AND RANKS ON THE LEADING COMPONENTS OF
SOCIAL WELL-BEING (PRESENT STUDY).

CENSUS DIVISION	COMPONENT 1	RANK	COMPONENT 2	RANK	COMPONENT 3	RANK	COMPONENT 4	RANK
Algoma	0.736	12	1.016	6	1.201	7	-0.018	31
Brant	0.182	7	-0.669	48	0.774	11	0.576	14
Bruce	-1.183	52	-0.084	20	-1.147	46	-0.189	35
Cochrane	0.355	20	0.906	7	2.354	1	0.249	21
Dufferin	-0.238	34	0.090	17	-1.988	54	-0.578	41
Dundas	-1.303	49	-0.463	35	-1.366	51	0.991	7
Durham	0.185	21	-0.427	33	-0.102	30	-0.251	37
Elgin	-0.065	31	-0.388	31	-0.726	40	0.167	25
Essex	0.641	13	-0.186	26	1.310	6	0.421	17
Frontenac	0.856	11	-0.274	29	0.267	22	2.240	2
Glengarry	-1.337	50	-0.861	53	0.209	24	1.191	4
Grenville	0.036	27	-0.397	32	-0.414	34	-0.439	39
Grey	-0.948	45	-0.736	49	-0.955	43	0.858	11
Haldimand	-0.325	38	-0.481	38	-1.241	50	0.079	30
Haliburton	-2.218	53	-0.101	21	0.899	9	-2.500	53
Halton	2.337	2	-0.619	46	-1.136	45	-1.145	47
Hastings	-0.006	30	0.237	11	0.217	23	0.335	18
Huron	-0.849	42	-0.477	37	-1.829	53	0.685	12
Kenora	-0.244	35	5.326	1	-0.716	39	-0.080	34
Kent	0.033	28	0.247	10	0.033	27	0.429	16
Lambton	0.586	16	-0.539	43	0.513	19	-0.027	33
Lanark	-0.908	44	0.179	13	-1.218	49	0.977	8
Leeds	0.125	23	-0.552	44	-0.479	37	-0.219	36
Lennox and Addington	0.134	22	-0.436	34	-0.127	31	-1.357	50
Manitoulin	-2.409	54	2.435	2	-0.775	41	-0.505	40
Middlesex	1.034	10	-0.263	28	-0.222	32	0.286	20
Muskoka	-1.251	48	-0.139	22	0.564	17	-0.836	45

TABLE 4.2a (CONT'D)

CENSUS DIVISION	COMPONENT 1	RANK	COMPONENT 2	RANK	COMPONENT 3	RANK	COMPONENT 4	RANK
Niagara	0.535	18	-0.232	27	0.770	12	0.233	22
Nipissing	0.552	17	0.572	8	1.385	5	-0.022	32
Norfolk	-0.359	40	0.055	18	-0.890	42	0.226	23
Northumber- land	-0.279	37	-0.612	47	0.028	28	-0.794	44
Ontario	1.324	4	0.170	14	0.148	25	-2.582	54
Ottawa- Carleton	1.461	26	-0.163	23	-0.460	36	0.565	15
Oxford	0.049	26	-0.486	39	-0.642	38	0.153	27
Parry Sound	-1.485	51	-0.166	24	0.681	13	0.067	29
Peel	2.269	1	0.135	16	-1.169	47	-2.005	52
Perth	-0.195	32	-0.796	51	-1.455	52	2.340	1
Peterborough	0.097	24	-0.505	40	0.649	14	0.133	28
Prescott	-0.951	46	-0.743	50	1.785	4	-1.206	49
Prince Edward	-0.707	41	-0.523	41	-0.630	15	-0.989	46
Rainy River	-0.233	33	1.553	3	-0.458	35	0.601	13
Renfrew	0.054	25	-0.845	52	0.889	10	0.294	19
Russell	-0.898	43	-0.565	45	0.456	20	-1.454	51
Simcoe	0.010	29	-0.019	19	-0.009	29	-0.613	42
Stormont	-0.348	39	-0.180	25	1.813	3	0.901	9
Sudbury	1.188	6	1.476	4	0.306	21	-0.354	38
Thunder Bay	0.391	19	1.340	5	0.542	18	1.181	5
Timiskaming	-0.264	36	0.215	12	1.851	2	0.901	10
Toronto	1.065	9	0.302	9	0.600	16	1.175	6
Victoria	-1.219	47	-1.163	54	0.080	26	-1.166	48
Waterloo	1.248	5	0.160	15	-0.382	33	0.153	26
Wellington	0.636	14	-0.467	36	-0.972	44	0.207	24
Wentworth	0.605	15	-0.526	42	1.106	8	1.480	3
York	1.073	8	-0.321	30	-1.179	48	-0.769	43

TABLE 4.2a (CONT'D)

<u>CENSUS DIVISION</u>	<u>COMPONENT 6</u>	<u>RANK</u>	<u>COMPONENT 7</u>	<u>RANK</u>	<u>COMPONENT 8</u>	<u>RANK</u>
Algoma	-0.692	42	-0.698	39	-0.785	44
Brant	0.223	19	-0.681	38	-1.194	53
Bruce	-0.177	32	-0.128	23	-0.509	37
Cochrane	-0.124	30	0.902	12	1.102	7
Dufferin	-0.278	34	0.008	22	1.285	6
Dundas	-0.874	45	-0.447	33	-0.712	41
Durham	-1.333	50	-0.427	32	-1.423	51
Elgin	-0.070	28	1.152	7	-0.291	31
Essex	0.152	22	-0.495	36	-1.255	49
Frontenac	0.677	11	1.543	4	0.258	22
Glengarry	-1.735	53	-2.130	54	0.473	17
Grenville	-1.328	49	2.656	1	0.272	21
Grey	0.424	15	0.385	18	0.238	23
Haldimand	-0.714	44	-1.273	52	0.004	25
Haliburton	-2.093	3	-0.489	35	-1.620	52
Halton	0.354	18	-0.773	43	0.814	10
Hastings	0.004	26	0.346	19	-0.529	38
Huron	-0.332	36	0.582	16	0.888	8
Kenora	0.179	20	0.247	21	0.547	15
Kent	-0.267	33	-0.275	25	-0.922	45
Lambton	-0.146	31	-0.344	28	-0.396	34
Lanark	0.595	13	1.483	5	-0.937	46
Leeds	0.658	12	2.533	2	1.409	5
Lennox & Addington	-1.823	54	0.314	20	-0.608	39
Manitoulin	0.106	25	-0.473	34	-0.072	28
Middlesex	1.296	6	1.106	8	0.286	20
Muskoka	2.629	1	-0.748	41	-0.677	40

TABLE 4.2a (CONT'D)

<u>CENSUS DIVISION</u>	<u>COMPONENT 6</u>	<u>RANK</u>	<u>COMPONENT 7</u>	<u>RANK</u>	<u>COMPONENT 8</u>	<u>RANK</u>
Niagara	0.154	21	-0.716	40	-0.769	42
Nipissing	-0.091	29	0.751	15	0.882	9
Norfolk	-0.888	46	-0.888	46	-1.343	50
Northumberland	-0.300	35	0.929	11	-0.417	36
Ontario	0.003	27	0.989	10	0.461	18
Ottawa- Carleton	1.378	5	-0.409	31	0.307	19
Oxford	-0.405	38	0.866	13	-0.294	32
Parry Sound	1.031	9	-0.351	29	0.781	12
Peel	-0.393	37	-0.843	45	-0.060	27
Perth	-0.415	39	-0.769	42	0.511	16
Peterborough	1.701	4	-0.328	27	-0.016	26
Prescott	-0.703	43	-0.953	49	1.997	2
Prince Edward	-1.499	51	1.987	3	-2.184	54
Rainy River	0.421	16	-0.956	50	1.442	4
Renfrew	0.116	24	-0.890	47	3.323	1
Russell	-0.978	47	-1.133	51	1.607	3
Simcoe	0.687	10	0.456	17	-0.410	35
Stormont	-0.482	40	-0.815	44	-0.118	29
Sudbury	-1.719	52	-0.922	48	-1.017	47
Thunder Bay	0.411	17	0.768	14	0.552	14
Timiskaming	-1.872	48	1.184	6	0.566	13
Toronto	2.207	2	-0.284	26	-1.179	48
Victoria	1.218	7	1.011	9	0.792	11
Waterloo	0.141	23	-0.562	37	-0.357	33
Wellington	-0.536	41	-0.403	30	-0.144	30
Wentworth	0.550	14	-0.223	24	-0.779	43
York	1.208	8	-1.364	53	0.225	24

TABLE 4.2b

CENSUS DIVISION SCORES AND RANKS ON THE LEADING
COMPONENTS OF SOCIAL WELL-BEING

CENSUS DIVISION	COMPONENT 1	RANK	COMPONENT 2	RANK	COMPONENT 3	RANK	COMPONENT 4	RANK
Algoma	0.373	17	1.252	5	0.915	11	-0.079	32
Brant	0.184	19	-0.729	49	0.679	13	0.766	12
Bruce	-1.164	49	-0.097	20	-1.581	48	-0.187	35
Cochrane	-0.446	36	1.571	3	2.471	1	-0.114	33
Dufferin	-0.004	25	0.198	12	-1.562	54	-0.001	28
Dundas	-1.185	50	-0.730	50	-1.417	50	-0.891	11
Durham	-0.167	29	-0.493	38	-0.618	39	-0.404	38
Elgin	-0.048	26	-0.282	31	-0.601	38	-0.098	24
Essex	0.620	11	-0.349	34	0.946	10	0.190	21
Frontenac	0.949	8	-0.033	17	0.380	20	2.447	1
Glengarry	-1.750	53	-0.926	53	0.169	23	0.267	20
Grenville	-0.285	32	-0.242	28	-0.488	35	-1.156	47
Grey	-0.751	42	-0.169	43	-0.822	43	0.917	10
Haldimand	-0.339	35	-0.320	33	-1.455	51	-0.421	40
Haliburton	-1.514	52	-0.655	46	-0.089	24	-1.721	50
Halton	2.573	2	-0.251	29	-0.619	40	0.845	45
Hastings	-0.054	27	0.053	15	0.058	25	0.514	15
Huron	-0.849	44	-0.177	23	-1.549	53	0.463	16
Kenora	-0.499	39	5.51	1	-1.111	45	-0.679	44
Kent	0.030	24	-0.125	22	-0.329	34	0.555	14
Lambton	0.641	10	-0.254	30	0.448	18	-0.0004	29
Lanark	0.490	38	-0.192	24	-1.379	49	1.539	4
Leeds	0.177	20	-0.220	26	-0.201	31	-0.285	37
Lennox and Addington	-0.191	30	-0.292	32	-0.544	37	-1.755	51
Manitoulin	-1.931	54	0.979	8	-1.473	52	-0.530	42
Middlesex	1.196	7	-0.230	27	-0.208	21	0.947	9
Muskoka	-0.756	43	-0.636	45	0.583	14	0.063	27

TABLE 4.2b (CONT'D)

CENSUS DIVISION	COMPONENT 1	RANK	COMPONENT 2	RANK	COMPONENT 3	RANK	COMPONENT 4	RANK
Niagara	0.575	14	-0.098	21	0.479	17	0.123	22
Nipissing	0.157	21	0.748	9	1.408	5	0.038	30
Norfolk	-0.332	34	-0.217	25	-1.231	47	-0.068	31
Northumber- land	-0.208	31	-0.668	47	-0.081	28	-0.905	46
Ontario	1.411	6	0.217	11	0.516	16	-2.131	54
Ottawa- Carleton	1.988	3	-0.492	37	-0.239	32	0.323	18
Oxford	0.036	23	-0.383	35	-0.534	36	0.082	26
Parry Sound	-1.474	51	0.029	16	0.543	15	0.678	13
Peel	2.775	1	0.169	13	0.837	44	-1.925	53
Perth	-0.327	33	-0.578	42	-1.208	46	1.685	2
Peterborough	0.529	15	-0.648	44	1.109	9	1.178	7
Prescott	-1.104	48	-0.736	51	2.253	2	-1.678	49
Prince Edward	-0.866	45	-0.871	52	-0.014	26	-1.553	48
Rainy River	-0.511	40	1.708	2	-0.106	29	1.117	8
Renfrew	-0.131	28	0.084	14	1.220	7	-0.429	41
Russell	0.919	47	-0.708	48	1.231	6	-1.844	52
Simcoe	0.226	18	-0.078	18	-0.128	30	-0.200	36
Stormont	-0.486	37	-0.504	39	1.685	4	1.211	6
Sudbury	0.617	12	1.256	4	-0.077	27	-0.417	39
Thunder Bay	0.071	22	1.228	6	0.772	12	1.644	3
Timiskaming	-0.899	46	0.996	7	1.785	3	0.304	19
Toronto	1.585	5	0.480	10	0.200	22	0.414	17
Victoria	-0.673	41	-1.026	54	0.431	19	-0.581	43
Waterloo	0.869	9	-0.085	19	-0.327	33	-0.172	34
Wellington	0.600	13	-0.512	40	-0.804	42	0.086	25
Wentworth	0.508	16	-0.453	36	1.139	8	1.520	5
York	1.664	4	-0.570	41	-0.666	41	0.099	23

TABLE 4.2b (CONT'D)

<u>CENSUS DIVISION</u>	<u>COMPONENT 5</u>	<u>RANK</u>	<u>COMPONENT 7</u>	<u>RANK</u>	<u>COMPONENT 8</u>	<u>RANK</u>
Algoma	-0.888	45	-0.414	37	0.044	19
Brant	-0.296	33	0.229	17	-0.369	40
Bruce	-0.297	34	0.683	9	0.088	23
Cochrane	-0.119	29	0.034	24	-0.988	47
Dufferin	-0.092	28	-0.969	49	-0.039	20
Dundas	-0.808	43	0.770	7	-0.545	42
Durham	-1.255	51	0.488	10	-1.256	54
Elgin	1.042	8	-0.212	33	-0.359	39
Essex	-0.427	39	0.940	5	-0.036	21
Frontenac	0.929	9	-0.857	47	-0.254	34
Glengarry	-2.273	53	-0.446	11	-1.078	49
Grenville	1.811	3	-0.074	29	-1.098	50
Grey	0.701	12	0.292	15	0.127	15
Haldimand	-0.911	48	-0.059	28	-0.253	33
Haliburton	0.557	15	0.357	14	4.267	1
Halton	-0.319	36	-1.610	54	-0.069	22
Hastings	-0.398	20	-0.307	34	0.145	17
Huron	0.406	19	-0.001	26	-0.776	45
Kenora	0.869	10	0.732	8	0.228	13
Kent	-0.190	31	-0.314	36	-0.153	29
Lambton	-0.301	35	-0.189	32	-0.124	27
Lanark	1.221	6	-0.759	45	0.211	14
Leeds	2.319	1	-0.718	43	-0.143	28
Lennox and Addington	-0.139	30	-0.558	41	-0.955	46
Manitoulin	0.041	25	-0.312	25	-0.208	31
Middlesex	1.265	5	0.087	20	-0.123	16
Muskoka	0.023	26	0.165	18	2.945	2

TABLE 4.2b (CONT'D)

<u>CENSUS DIVISION</u>	<u>COMPONENT 5</u>	<u>RANK</u>	<u>COMPONENT 7</u>	<u>RANK</u>	<u>COMPONENT 8</u>	<u>RANK</u>
Niagara	-0.281	32	0.363	13	0.285	12
Nipissing	0.604	14	-1.297	53	-0.091	24
Norfolk	-1.097	49	0.368	12	-0.354	38
Northumber- land	0.731	11	0.079	21	-0.271	36
Ontario	1.081	7	-0.728	44	-0.233	32
Ottawa- Carleton	0.147	24	1.533	2	-0.108	26
Oxford	0.673	13	-0.101	30	-0.571	43
Parry Sound	-0.621	41	-0.431	38	1.837	4
Peel	-0.907	47	-0.455	39	0.075	18
Perth	-0.609	40	0.119	19	-0.762	44
Peterborough	0.248	22	-1.031	50	0.762	6
Prescott	-0.890	46	0.063	22	-0.259	35
Prince Edward	1.668	4	1.255	3	-1.203	52
Rainy River	-0.797	42	-1.134	52	0.735	7
Renfrew	0.284	21	-0.833	46	-1.003	48
Russell	-1.147	50	-0.019	27	-1.127	51
Simcoe	0.452	18	0.496	40	0.701	8
Stormont	-0.422	38	-0.571	42	-0.315	37
Sudbury	-3.084	54	-0.039	23	0.292	11
Thunder Bay	0.173	23	-0.949	48	-0.108	25
Timiskaming	0.543	16	0.781	6	-1.233	53
Toronto	0.533	17	5.384	1	0.542	10
Victoria	1.937	2	-0.172	31	0.801	5
Waterloo	-1.275	52	0.270	16	2.336	3
Wellington	-0.326	37	0.010	25	-0.462	41
Wentworth	-0.039	27	1.161	4	-0.198	30
York	-0.845	44	-1.079	51	0.553	9

have either average or below average positions (Table 4.2a). In health resource provisions, Lanark and Dundas have done well but Dufferin and Manitoulin are poor. All census divisions have high social instability while general unemployment is low. Mental health stress is very high in Lanark but near average in the other census divisions. Lanark and Dundas have low social deprivation while the reverse is true for Dufferin and Manitoulin.

Group 7 of the present study is found to split and merge with three different clusters in the grouping obtained from Attoh's component scores (Table 4.1b). Thus Waterloo groups with the shield districts (Group 8), Lanark with Group 4 while Manitoulin and Dundas remain in one group (Group 6).

4.2.8 Group 8: Kenora

Group 8 is a single-census division cluster. In the different aspects studied Kenora stands out. Kenora has a large native population, vast unproductive land, and associated problems. Thus the performance of Kenora is quite expected. It has the highest level of socially unstable populations, average in general social well-being, services, health resource provisions and mental health stress. It also has a high level of social deprivation. General unemployment is relatively low.

Kenora also forms an isolated cluster when Attoh's component scores are grouped. But overall performance is poor in almost all components; whereas in the present study, it is mainly average.

4.2.9 Group 9: Renfrew, Russell, Prescott, Glengarry, Stormont

This group clusters the socio-economically depressed census divisions of Eastern Ontario. On both the general social well-being and services components, performance of all census divisions is poor. Renfrew however, has average performances. In health resource provisions, census divisions have mixed performances. Glengarry and Stormont have done very well; Russell and Prescott are poor while Renfrew is average. As is the characteristic of rural census divisions in Ontario, Group 9 has a high level of social stability and a low level of mental health stress. The level of social deprivation and unemployment are high (Table 4.1a, Fig. 4.1).

Grouping of Attoh's component scores shows that Group 9 is split into three. Russell and Prescott group together (Group 10 Table 4.1b) having relatively low overall social well-being. Glengarry joins Dundas and Manitoulin. Renfrew and Stormont having some better performances, join Group 5 census divisions (Table 4.1b).

4.2.10 Group 10: Parry Sound, Muskoka, Haliburton, Victoria, Peterborough

The shield districts form a very clear and contiguous area of social well-being in Ontario. It is characterised by poor soils, farm abandonment trends and development of some recreational and tourism activities. Census divisions that group together have very poor performance in general social well-being. Peterborough is the only exception and has an average position. Group 10 has done very well in services. Muskoka, Haliburton and Victoria have done very well in

health resource provisions. Peterborough and Parry Sound have average positions. With socio-economically depressed characteristics, populations are largely unstable. Mental health stress and deprivation are also high. However, Victoria has done well in social stability. Muskoka has relatively low mental health stress while Haliburton has a low social deprivation.

A grouping of Attoh's component scores shows that the core of the shield districts is the same in both studies. The peripheral units change and cluster differently. Thus, Peterborough and Victoria, having some better scores group with Groups 5 and 9 of Attoh's component scores respectively (Figs. 4.1 and 4.2).

4.2.11 Group 11: Prince Edward Island, Lennox & Addington

Two census divisions that group together to indicate very low levels of social well-being are Prince Edward Island and Lennox & Addington. Located in Eastern Ontario, these two census divisions do not really have anything going for them. Other than having high social stability and low social deprivation, performance on the different components is poor. In general social well-being Lennox & Addington holds an average position while Prince Edward Island has not done well. Both have very poor performance in services and health resource provisions. Unemployment levels and mental health stress are high.

Lennox & Addington and Prince Edward Island are found to cluster with Group 9, i.e. the relatively poor Eastern Ontario census divisions when Attoh's component scores are grouped.

It may be concluded from the above that overall performance trends have remained more or less the same when component scores of all eight components of the present study and Attoh's study are grouped, and compared. Performance trends and changes when scores of only the first three components are grouped is examined below.

4.3 CHARACTERISTICS OF GROUPS AND COMPARISONS: THE 3-COMPONENT CASES

Performance of census divisions on the first 3 components has been discussed in examining overall social well-being in Ontario. Thus, group formulation and comparisons shall be referred to very briefly in this section. Tables 4.3a and 4.3b show groups obtained from the two 3-component cases.

As may be seen from Fig. 4.3, the spatial patterns obtained present a more or less expected picture. Socio-economically developed census divisions stand out clearly as one group separate from the others. This includes Toronto, Middlesex, Ottawa-Carleton, York, Ontario, Peel, Halton, Wellington, Waterloo and Frontenac. (Group 1, Table 4.3a). With general social well-being explaining the highest percentage of total variance, this group appears to have high levels of social well-being with respect to the first 3 components. The relatively highly developed Lake St. Clair and Niagara areas group with some of the better off areas of Eastern Ontario (Group 2). In general Eastern Ontario census divisions have not done very well in general social well-being, but in most cases they have relatively high levels of social stability and employments. Elgin (Group 3) having average scores in all three

TABLE 4.3a

GROUP AFFILIATION OF CENSUS DIVISIONS DUE TO HIERARCHICAL
GROUPING: 3-COMPONENT CASE (PRESENT STUDY)

Group 1	Middlesex
	Ottawa-Carleton
	Toronto
	York
	Ontario
	Peel
	Halton
	Wellington
	Waterloo
	Frontenac
Group 2	Niagara
	Wentworth
	Brant
	Oxford
	Kent
	Essex
	Lambton
	Simcoe
	Durham
	Northumberland
	Peterborough
	Hastings
	Lennox & Addington
	Renfrew
	Leeds
	Grenville
Group 3	Elgin
Group 4	Algoma
	Sudbury
	Nipissing
	Timiskaming
	Cochrane

	Thunder Bay
	Rainy River
	Prescott
	Stormont
Group 5	Norfolk
	Haldimand
	Perth
	Huron
	Grey
	Bruce
	Dufferin
	Lanark
	Dundas
Group 6	Victoria
	Haliburton
	Muskoka
	Parry Sound
	Glengarry
	Prince Edward
	Russell
Group 7	Kenora
	Manitoulin

TABLE 4.3b

GROUP AFFILIATION OF CENSUS DIVISIONS DUE TO HIERARCHICAL
GROUPING: 3-COMPONENT CASE (ATTOH'S COMPONENT SCORES)

Group 1	Ottawa-Carleton
	Peel
	Halton
	York
Group 2	Niagara
	Wentworth
	Brant
	Essex
	Lambton
	Middlesex
	Frontenac
	Renfrew
	Nipissing
	Toronto
	Ontario
	Peterborough
Group 3	Kent
	Elgin
	Oxford
	Waterloo
	Wellington
	Simcoe
	Durham
	Northumberland
	Hastings
	Lennox & Addington
Group 4	Leeds
	Grenville
	Norfolk

TABLE 4.3b (CONT'D)

	Haldimand
	Perth
	Huron
	Bruce
	Grey
	Dufferin
	Lanark
	Dundas
	Manitoulin
Group 5	Parry Sound
	Muskoka
	Haliburton
	Victoria
	Prince Edward
	Russell
	Prescott
	Stormont
	Glengarry
Group 6	Rainy River
	Thunder Bay
	Cochrane
	Algoma
	Sudbury
	Timiskaming
Group 7	Kenora

FIG. 4.3 HIERARCHICAL GROUPING OF CENSUS DIVISIONS: 3-COMPONENT CASE (PRESENT STUDY)

LINKAGE TREE AND ERROR CURVE: 3-COMPONENT CASE (PRESENT STUDY)

FIG. 4.4 HIERARCHICAL GROUPING OF CENSUS DIVISIONS: 3-COMPONENT CASE (ATTOR'S COMPONENT SCORES)

LINKAGE TREE AND ERROR CURVE: 3-COMPONENT CASE (ATTOH'S COMPONENT SCORES)

components stands out separately and does not group with any other census division.

Northern Ontario census divisions form one contiguous group (Group 4). They are just above average in general social well-being but have very high levels of social instability and unemployment. Russell and Prescott, which are poor in general social well-being and employment aspects but relatively better in social stability are included in this group (Table 4.3a).

The Bruce Peninsula and Lake Huron areas cling together along with Norfolk, Haldimand in Western Ontario, and Lanark and Dundas in Eastern Ontario. These have done poorly in general social well-being but are better in employment and social stability situations (Group 5). The shield districts and some of the Eastern Ontario census divisions group together. They mostly have poor performances on all three components analysed (Group 6). Kenora has above average levels of social well-being on two of the first three components. It has high social instability. Only one other census division, Manitoulin, is found similar to Kenora.

In the grouping obtained from Attoh's scores the general picture is more or less maintained (Table 4.3b; Fig. 4.4). The overall pattern of a relatively well-developed 'golden horse shoe'; the Lake St. Clair and Niagara areas grouping with some census divisions of Eastern Ontario; the clinging together of most Northern Ontario census divisions as one unit; the isolation of Kenora; the grouping of the shield districts

with some Eastern Ontario census divisions are all present.

4.4 CONCLUSION:

The general conclusion drawn from examination of overall performances of both the 8-component and 3-component cases is that regionalisations obtained from the reduced data set are very similar to those obtained from the original data set. There are some changes here and there. Core areas have remained the same and change of peripheral units due to a change in data input has not been very remarkable. In fact regionalisations obtained from the present study appear to be clearer and more elegant overall.

CHAPTER V

SUMMARY AND CONCLUSIONS

It is recognised that while the search for adequate social indicators continues, the widespread availability of social and socio-economic data has led to some overuse. The present study is therefore, an experiment in 'parsimony'. The lack of a generally agreed upon social model is a serious impediment in deciding upon which criteria should be used in measuring social well-being. The general practice has been to assemble as much data as possible so that by using direct and surrogate measures combined, it is possible to capture most of what really matters. A careful examination may reveal that much of this information need not be used.

Social indicators and the concept of social well-being were discussed. Distinctive characteristics of social indicators were identified as far as possible. Taking Attoh's study as the starting point, the same outcome was sought when the number of variables used was much reduced. Attoh used sixty-eight variables. A principal components analysis was used to summarise the data and identify spatial expressions of social well-being in Ontario. In the present study Attoh's variables were evaluated based on (i) literature support,

(ii) statistical tables obtained from Attoh's study, and (iii) regularity and reliability of publication. Twenty-seven variables (more than one-third) were then dropped and a principal components analysis was applied to the new data set. The orthogonal varimax rotated 8-component solution was found to be the clearest and best. As Attoh also had an 8-component solution, comparability is well-maintained. Based on results obtained from the two principal component analyses comparisons were made on two aspects: (i) whether or not component structures obtained in the present study and Attoh's study are similar; and (ii) whether or not spatial patterns obtained from component scores on the different patterns are similar.

A comparison of component structure shows that it has been possible to obtain simpler and clearer components while component structure has remained largely the same. The first three components, namely, 'general social well-being', 'social stability' and 'general unemployment' are almost identical with Attoh's. Other than variables dropped from analysis, almost all other variables that loaded highly on each of the components in Attoh's study, also load highly on corresponding components in the present study. However, some change in component structure is also observed, but this is mainly in the case of components that appear later in the analysis and which explain lower proportions of the percentage of total variance. Component 6 is the only exception. This component has changed considerably in structure but it is the second largest component in terms of percentage of variance explained. Both studies have one component each (Component 5, present study;

Component 6, Attoh's study) which are similar in structure and too difficult to interpret.

Comparisons of spatial patterns reveal that overall patterns of performance on the different components are largely similar. On each component census divisions belonging to the two extremes, i.e. category 1 and category 5 have been almost identical. Census divisions belonging to the middle categories (2 to 4) have been more apt to change due to a change in data input. However, change has been mainly to the next higher or lower category. Descriptive interpretation of components have, therefore, remained very much the same. In the case of the 'general social well-being' components of the two studies, for example, the relationship of 'general social well-being' to the overall socio-economic development in Ontario is notable. High general social well-being in areas of economic prosperity and urban development, for example, of the 'golden horse shoe', the Lake St. Clair census divisions and the large administrative centres of Eastern Ontario, the depressed characteristics of rural census divisions etc. are all maintained.

The study of overall performance for the 8-component and 3-component cases in the two studies used a hierarchical grouping technique. Results reveal that overall performance trends have remained more or less the same. Core areas of regions formed are present on both sets of corresponding maps (Figs. 4.1, 4.2, 4.3, 4.4). It is mainly the peripheral units of regions that demonstrate some change in group affiliation. If anything, the regionalisations obtained for the present study appear to

TABLE 5.1

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BASES FOR A FURTHER ELIMINATION
OF VARIABLES

CRITERIA	VARIABLE NAME	HIGH CORRELATIONS WITH OTHER VARIABLES	LOW LOADINGS
<u>WELFARE AND SOCIAL SECURITY</u>	SOCIAL		
<u>HOUSING</u>	AUTOCAR YEARS30 CROWDED OWNERS RENT BR IMR		
<u>HEALTH</u>	GDR TB DENTIST DOCTOR PSYCH HOSPBED HOSPEXP OHIP CHILDDP	AGEDEP (.924, INCOME5 (-.818), INCOME5 (.828)	
<u>POPULATION</u>	AGEDEP URBAN POPINDEX	GDR (.924), INCOME5 (.810) INCOME (.813), INCOME (-.860)	.440 (C ₂)
<u>ETHNICITY</u>	ETHNIC INCOME5	GDR (-.818), URBAN (.813), WHITE (.807)	
<u>INCOME AND WEALTH</u>	INCOME5	URBAN (-.860), INCOME5 (-.933), RENT (-.847), GDR (.828), AGEDEP (.810)	
<u>AVAILABILITY OF SERVICES</u>	RETAIL SERVICE HEALWELF LIBRARY ARTLIT SUICIDE		
<u>SOCIAL DISORDER</u>	ILLEBORN CDR JUVENILE		
<u>EMPLOYMENT</u>	WHITE DEGREE PARTRATE UNEMPLOY MALEUR	RENT (.838), INCOME5 (.807), DEGREE (.833), POST SEC (.826) WHITE (.833)	
<u>EDUCATION</u>	DEGREE POSTSEC ELEMENT PTRATIO	WHITE (.833) ELEMENT (-.911), RENT (.817), DEGREE (.826) PARTRATE (-.800), POSTSEC (-.911)	
<u>DEMOCRATIC PARTICIPATION</u>	VOTER		

Note: 'C' indicates 'components'; component loadings are from the
varimax rotated 8-component case (present study).

be clearer and more elegant overall.

Forty-one variables were retained after examining Attoh's 68-variable data set. Following an analysis of the 41-variable data set (present study) an attempt was made to eliminate variables further. No strong arguments were available to reduce variables based on literature support. Statistical outputs of the present study were also examined. As shown in Table 5.1, high correlations between variables mainly indicate a good clustering of variables. Thus, dropping some and retaining others as representative variables is not considered reasonable. A study of the component loading matrix shows that only one loading (child dependency ratio -- loading .440) is low enough to consider a variable eligible to be dropped (Table 5.1). Therefore, the number of variables that could be dropped, if the data were to be re-analysed is small. Thus, the consideration of a further reduction of variables was dropped.

One general conclusion that may be drawn from the present analysis is that a careful selection of variables can perform a much more efficient and elegant job. In the case of Ontario, it may be observed that while the knowledge of spatial variations in the different aspects of social well-being is indispensable in setting up goals and priorities, it must be remembered that costs involved in data collection, data processing, computerised mapping of information etc., are immense. Besides, in order to keep up with newly arising problems, government and planning bodies need to collect and analyse such information

repeatedly -- thus incurring still larger amounts of government expenditure. The present study shows clearly that many of these costs can be cut down with a careful selection of indicators. With more than one-third of the total number of variables dropped, this study shows that there is no great loss of detail; nor does it suggest a radically different picture. Thus, if decision makers are to use the present study instead of Attoh's study for an understanding of conditions in Ontario, the reduced data set can give them more or less the same information. This simpler and therefore, more elegant approach provides a framework for better utilizing society's scarce resources.

Regarding problems in the choice of criteria, it may be observed that under present limitations of established social theory and methods of measuring the social system, many alternative approaches are being tried. These include following the patterns of economic modeling of the cost-benefit type that have been relatively successful in national economic modeling; and methods to operationalise abstract concepts involved in the understanding of social well-being. Perloff (1969) provides an interesting example of the cost benefit approach applied to a comprehensive framework for evaluating policy measures for the urban environment. This is similar to Isard's (1969) idea of building the environment onto the conventional industrial input-output table as additional rows and columns. Terlekyj (1970) has demonstrated one possible economic framework for a system of social indicators. This too is basically an input-output table in which a list of activities

is depicted as contributing to "specific goal output indicators" by means of coefficients similar to the Leontief input-output model. Hoffenberg (1970, B-781) has stressed the empirical problem of arriving at the coefficients to show how much social product a particular activity would input into a particular goal output category.

In dealing with the allocation of scarce societal resources, many abstract concepts such as "freedom" and "the dignity of the individual" (concepts over which there is as yet no general consensus) come into play. Whether allocations are discriminatory for individuals, groups or territories brings in the whole question of 'rights', 'need', 'equality', 'contribution to common good' etc. In discussing the claims that individuals have over society's resources, their actual distribution and the concept of territorial distributive justice, Harvey (1973) points out that the ultimate decisions as to whether a distribution is 'just' or 'unjust' depends upon the criteria of "justice" that have been applied. Thus, in each instance is involved giving abstract ideas a more concrete identity in the form of specific concepts. The role of value judgements in this instance is great. Next is the problem of internal validity, or "the extent of correspondence between social science concept and its operational definition" (Etzioni and Lehman, 1969, 46). And, finally comes the question of measurement of concepts operationally defined. Smith (1973, 59) points out that just as a poor operational definition can distort the picture, so poor measurement can change the meaning of the concept as it has been defined, or render it virtually without meaning. Explorations of the present state of inquiry

must continue. As with the general model of society, so with variables and parameters for measuring social well-being -- these will have to emerge from research during the course of time. Whatever the phenomenon under investigation, data requirements are massive. Thus in order to avoid further complicating an already complicated problem, the caution not to incorporate non-essential data must be taken right from the beginning.

APPENDIX A

TECHNICAL APPENDIX: CONCEPTS AND DEFINITIONS

1. WELFARE AND SOCIAL SECURITY(i) General Welfare Assistance

The General Welfare Assistance Act provides for cost sharing of social assistance that is administered to individuals and families in need by the municipal governments. Under this Act General Assistance is the main income maintenance program for people who are in short term emergency need.

(ii) Family Benefits

The Family Benefits Act provides for people who are likely to need social assistance for a longer term. They include the disabled and families where the father is absent or disabled. This program is administered by the Ministry. Other cases involved include blind cases, unemployable cases, mothers and children.

(iii) Child Welfare

The Child Welfare Act is administered by the Children's Aid Societies with funds from the provincial and municipal governments. Generally each society serves one or more counties or districts. Beneficiaries are defined as total number of children receiving protection and preventive services. And all types of cases are as follows: children in care cases, services to unmarried parents cases, private adoption society supervised cases.

(iv) Social Service Expenditure/Capita

Social service expenditures by federal, provincial, municipal governments and other agencies include: family benefit allowances, general welfare assistance allowance, homes for the aged, child welfare and the rest going to a variety of social services.

2. HOUSING

(i) Occupied Dwelling - refers to a private dwelling occupied by a person or persons on Census Day, or whose usual occupants were temporarily residing elsewhere.

(ii) A dwelling refers to a structurally separate set of living quarters with a private entrance from outside or from a common hallway or stairway inside the building.

- (iii) Owned - refers to a dwelling which is owned by some members of the household. This includes dwellings under separate ownership in any multiple dwelling structure. A dwelling is classified as owned even though it may be mortgaged.
- (iv) Cash Rent - Figures for 'cash rent' relate to tenant-occupied non-farm dwellings and are based on the dollar amount required to secure occupancy, but not the ownership, of a dwelling for either the week or month prior to enumeration day. Averages have been determined on the basis of stated rent, excluding cases in which no cash rent was paid.
- (v) Value - figures for "dwelling value" are based on the amount expected by the owner if the dwelling were to be sold to a willing buyer. Dwelling values include the value of the land on which the dwelling is situated and of any other structure on the property such as a garage or shed. The values are for single, detached, owner-occupied, non-farm dwellings.
- (vi) Rooms - refers to an enclosed area within a dwelling which is finished and suitable for year-round living. Not counted as rooms are bathrooms, clothes, pantries, halls and rooms solely used for business purposes.
- (vii) Bath Facilities - refers to installed bath and shower facilities connected to a drain using piped running water and controlled by a tap.
- (viii) Television - refers to both portable, console and combination models powered by either battery or regular electrical sources and belonging to any member of the household including relatives and lodgers.
- (ix) Automobiles - refers to passenger vehicles for personal use by any member of the household, belonging to any member of the household, including relatives and lodgers. Trucks, vehicles out of permanent working order and company cars used entirely for business are not included.
- (x) Crowded - refers to households that have more than one person per room.

3. HEALTH

- (i) Crude birth rate - includes live births and stillbirths.
- (ii) Infant mortality rate - includes infants under one year of age.
- (iii) Wolfson's Hospital Health Index - Used by Wolfson to rank the seriousness of ill-health associated (by doctors) with a set of 59 disease categories. The index is dependent upon patients being processed by the health care system. It does not pick up untreated illness or illness where no consultation takes place with a physician. High values of the index indicate a worse community health status.

(iv) Deaths resulting from disease of the circulatory system

Diseases here are related to: Active rheumatic fever, chronic rheumatic heart disease, hypertensive disease and other forms of heart disease, as well as disease of the arteries, arterioles and capillaries.

(v) Deaths from all malignant neoplasms

Includes diseases related to the buccal cavity and pharynx, oesophagus, stomach, intestine, rectum, larynx, trachea, bronchus and lung, bone, skin, breast, uteri, digestive organs, urinary organs, leukemia, benign neoplasms and Hodgkin's disease.

(vi) Deaths from disease of the respiratory system

Includes - acute respiratory infection, influenza, viral pneumonia, bronchitis, emphysema, asthma, empyema and lung abscess.

4. POPULATION

(i) Sex Ratio - proportion of males to 100 females.

(ii) Dependency Ratio - used to measure the impact of age composition on the livelihood activity of the population. It purports to measure how many dependents each 100 persons in the productive years must support. The ratio can be computed in parts, one part measuring the dependency load of youth (child dependency ratio) and the other part, the dependency load of the aged (aged dependency ratio).

(iii) Urban - includes the population living in (a) incorporated cities, towns and villages with a population of 1,000 or over; (b) unincorporated places of 1,000 or over having a population density of at least 1,000 per square mile; (c) the built-up fringes of (a) and (b) having a minimum population of 1,000 and a density of at least 1,000 per square mile.

(iv) Population Growth Index - Population growth index for 1966-1971 is as follows:

$$\frac{\text{Population in 1971} - \text{Population in 1966}}{(\text{Population in 1971} + \text{Population in 1966})/2} \times 100$$

(v) Average Family Size - the average number of persons per family. A family consists of a husband and wife, with or without children who have never been married (regardless of age) or of a parent with one or more children never married, living in the same dwelling. A family may consist also of a man or woman living with a guardianship child or ward under 21 years for whom no pay is received.

5. ETHNICITY

- (i) The ethnic diversity index is a composite measure based on the proportion of a census tract's population in each of 12 ethnic groups, that allows the evaluation of the degree of diversity of the population of a neighbourhood according to ethnic origin. The formula is as follows:

$$\text{Ethnic diversity index} = 1 - \sum P_i^2$$

Where P_i = the proportion of a census tract's population in the i th ethnic group.

One first calculates the proportion of the tract's population in each ethnic group, squares each of these proportions, then sums these squares and subtracts the total from 1. The index has a possible range from 0 to 0.92; an index of 0 would indicate that all the population has the same ethnic origin (an ethnically homogeneous census tract). An index of 0.92 would indicate that the population has a large number of ethnic groups 0 an ethnically diverse census tract.

6. INCOME AND WEALTH

- (i) Average Family Income - Includes the incomes received by all members of the family 15 years old and over, from all sources during the calendar year 1970. Included are wages and salaries, net income from business and professional practice, net income from farm operations, transfer payments, retirement pensions, investment income and other miscellaneous sources.
- (ii) Service Trade - refers to the operation of establishments in the service trades sector: data aggregated to reflect the activities of "business locations". The kind of service establishments are related to amusement and recreation services, services to business management, personal services, accommodation and food services and miscellaneous services (photographers, automobile rentals, repair shops, etc.).
- (iii) Retail Trade - the retail kind of business was arranged into six major groups as follows: food stores, general merchandise stores, automotive stores or shops, apparel and accessories stores, hardware and home furnishing stores and other retail stores (pharmacies, florists, jewellers, etc.).

7. SOCIAL DISORDER

- (i) Juvenile Delinquent - A juvenile delinquent as defined in the Juvenile Delinquents Act means any child who violates any provision of the Criminal Code or of any Dominion or Provincial Statute, or any By-Law or Ordinance of any municipality, or who is guilty of sexual immorality or any similar form of vice, or who is liable by reason of any other act to be committed to an industrial school or juvenile reformatory

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under the provision of any Dominion or Provincial Statute. The commission by a child of any of these acts constitutes an offence to be known as delinquency. The upper age limit of children brought before the Juvenile Court in provinces varies. The Juvenile Delinquents Act defines a child as meaning any boy or girl apparently or actually under the age of 16 or such other age as directed in any province. In Ontario the age limit is 16.

- (ii) Indictable Offence - It is regarded as an offence not only against a person but against the whole state. These offences are designated by statute, which also defines maximum punishment in each case; they demand a more formal hearing than ordinary offences.

Indictable offences are usually classified for statistical purposes as:

- (1) Criminal code offences such as: against the person (abduction, kidnapping, assaults, criminal negligence, incest, rape, libel, murder); against property, with violence (breaking and entering, robbery, extortion); malicious offences against property (arson, other malicious damages to property); forgery and offences against currency.
- (2) Federal Statutes such as offences against the Customs Act, Excise Act, Food and Drug Act, Narcotic Control Act, and Post Office Act.

8. EMPLOYMENT

- (i) Labour Force - refers to all those persons reported to have either worked (employed) or looked for work (unemployed) during the reference week for pay or profit.
- (ii) Participation Rate - The percentage the labour force forms of the population 15 years and over in the category or area.
- (iii) Unemployed Labour Force

The unemployed consists of all non-inmates 15 years and over, who, during the week prior to enumeration, were not working but were looking for work, or were on temporary lay-off or would have been looking for work except that they were temporarily ill, or believed no suitable work was available in the community.

- (iv) White Collar Workers - White collar workers include the following occupations:

- Group 11: Managerial, administrative and related fields
- Group 21: Natural sciences, engineering and mathematics
- Group 23: Social sciences and related fields
- Group 25: Religion
- Group 27: Teaching and related fields
- Group 31: Media and health
- Group 33: Artistic, literary, recreational and related fields
- Group 41: Clerical and related fields
- Group 51: Sales.

9. EDUCATION

- (i) Level of Schooling - refers to the highest grade or year of elementary school, secondary school or university ever attended and for some levels whether or not post-secondary education was reported or not. Individuals may have completed vocational training, either apprenticeship or other full-time courses, in addition to the schooling shown. The three levels presented in this study are:
- (a) Elementary: Grades 1-8 (including no schooling).
  - (b) Post-secondary, non-university and vocational: Grades 9 to 13.
  - (c) University degree: Includes university certificates, diplomas, and degrees at all levels.

10. ENVIRONMENTAL QUALITY

- (i) Suspended Particulates - Suspended particulates is a general term applied to a wide variety of solid or liquid particles of a size and configuration such that they tend to remain suspended in the air and can thus be drawn into the respiratory passages. Particulate material is the most commonly perceived form of air contamination, often manifesting itself by interference with visibility, by its soiling effect on materials, or as a respiratory irritant.
- Forest fires, iron ore mining and beneficiation, asbestos production, power generation by utilities, stone quarrying and processing, and cement manufacturing are major sources of suspended particulates.
- (ii) Sulphur Dioxide - is a colourless gas and normally is not present in urban air at concentrations high enough for its odour to be detected. It is emitted into the atmosphere mainly from the production of primary copper and nickel, from natural gas processing, and from the combustion of sulphur containing fuels.
- (iii) Nitrogen Oxide - is formed when fuels are combusted at high temperatures in engines and furnaces; therefore an important source of NO_2 is the gasoline-powered motor vehicle. Other sources include diesel (internal combustion) engines, power generation by utilities, and industrial fuel combustion.
- (iv) Carbon Monoxide - Carbon monoxide is produced by the incomplete combustion of any organic fuel. The primary source of CO emissions is the gasoline-powered motor vehicle. Other important sources include forest fires, the non-highway use of gasoline, the petroleum refining process and wigwam burners.

Source: Attoh (1980, 131-136)

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