# RESIDENTIAL DIFFERENTIATION IN THE CITY OF HAMILTON FROM 1961 to 1981

by

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ABSTRACT

This research identifies the socio-economic, demographic and ethnic composition changes that have occurred within the City of Hamilton from 1961 to 1981. Within this twenty-year time period, Hamilton has undergone growth, downtown renewal and gentrification. A statistical analysis of census data shows the extent to which these changes are reflected in the recent evolution of the socio-demographic structure of Hamilton.

A factor analysis was performed on the data for each of the census years: 1961, 1971 and 1981. The factor scores were mapped to show the spatial distribution of socio-economic status, family status and ethnic composition. In general, the distributions conformed to the classical sectoral, zonal, and multiple nuclei models. The results revealed two areas where changes on these dimensions were most significant: the inner city and the Hamilton mountain.

Statistical tests confirmed these changes. A significant increase in socio-economic status for the inner city area was observed in the period (1971-1981) following the renewal and gentrification. The mountain area retained its high family status throughout the twenty year time period, and ethnic composition became more dispersed throughout the city.

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# CHAPTER I

# INTRODUCTION

## 1.1 NATURE OF THE STUDY

Identifying changes within an urban ecological system requires a micro and macro scale approach (Timms, 1971, p. 86). The micro-scale approach investigates the relationship between residential differentiation and individual decision making. On the macro level, residential differentiation is explained in terms of global characteristics encompassing society. To successfully study change in an urban ecological system both these approaches must be adopted. The results yield a study that examines both change in an urban ecological system and the persistence of structural and spatial patterns in that system.

The city of Hamilton is the urban area selected. In the past decade, this city has experienced urban growth which is most evident on the south mountain. During the sixties this area was still predominantly rural, but since the mid-seventies excessive development has occurred. In addition to this growth on the periphery, major renewal of the downtown core has occurred. The restructuring of York Street, which began in 1974, has had an impact on the residential structure of the city. Similarly, the re-vamping of the downtown retail area has changed the inner city. Accompanying this renewal has been a period of gentrification which in turn has led to an inner city revitalization of surrounding neighbourhoods. These three factors, rapid population growth, renewal, and gentrification have brought with them rapid restructuring of areas

and have precipitated significant changes to the city.

## 1.2 PREVIOUS WORK

The location and socio-economic characteristics of residential areas have been studied extensively by economists, sociologists and geographers (Murdie, 1969, p. 4). The traditional descriptive models which emphasize "concentric", "sectoral", and "multi-nuclei" patterns are well known. Burgess's model proposed that social economic status varies directly from the city centre in a zonal pattern. Hoyt's sectoral model concluded that better residences moved outwards from the city along the major transportation routes. The multi-nuceli theory by Harris and Ullman suggest[5] that land-use patterns develop around several nuclei within the city rather than in a single centre.

Analysis of socio-economic status of residential areas has been handled by sociologists using the "neighbourhood concept" or social area analysis (Murdie, 1969, p. 5). Social area analysis provides a systematic class of residential areas using census tract data. Formulated by Eshref Shevky, it depends on a grouping of census tract variables into three dimensions. They are: socio-economic status, family status (demographic) and ethnic status (segreation). These have been confirmed in numerous statistical analyses of census data based on the factorial ecology approach used in this study of Hamilton. Using factor scores for census tracts, the spatial distribution of these three dimensions can be used to test whether there has been a significant change in Hamilton over the last twenty years.

A major impetus for this analysis is the recent publication of the 1981 census data; the first such set of data available since the

renewal process that occurred in the seventies. This study, examining Hamilton from 1961, 1971, and 1981 census data, is timely since it can be used to determine how significant the restructuring of the city has been in terms of socio-economic status, family status, and ethnic status. In addition, these changes can be tested in terms of how well they conform to the traditional land use models.

## 1.3 HYPOTHESES TO BE EXAMINED

Within this research there are three explicit hypotheses to be tested, each relating to one of the three dimensions identified.

1. Significant changes in the socio-economic status have occurred within the city of Hamilton from 1961 to 1981.
2. Significant changes in family status have occurred within the city of Hamilton from 1961 to 1981.
3. Significant changes in ethnic composition have occurred within the city of Hamilton from 1961 to 1981.

In order to evaluate these hypotheses a factor-analytical model will be applied to census data for each of the three census years to characterize the city in 1961, 1971, 1981; and to provide in detail the changes that have taken place within the city over the past two decades.

The paper is divided into four remaining chapters. Chapter two is a review of the literature which outlines theoretical and empirical background relevant to this study. Chapter three discusses the acquisition of census data, and the quantitative approach of factorial ecology adopted by this research. In chapter four, the analytical results are presented from both qualitative and quantitative

perspectives. Finally, the last chapter focuses on the results of the research, clearly indicating that significant changes have in fact gone on within the city of Hamilton in the last two decades with regards to socio-economic status, demographic and ethnic composition.

## CHAPTER II

## THEORETICAL AND EMPIRICAL BACKGROUND

The location and socio-economic characteristics of residential areas within the urban area have been extensively studied. In doing so, several approaches have developed in order to study urban ecological systems. This paper will now discuss each approach in turn.

### 2.1 MORPHOLOGICAL APPROACH

The first approach is a morphological one. Adopted by ecologists in the early 1900s, the thrust of this approach was a classification of townscapes. The classification examined such variables as the age and function of buildings. This classification led to a categorizing of certain elements such as the number of houses with "Victorian terraces" (Ley, 1983, p. 68). A morphological approach "seeks to identify distinctive regions in the city according to the functions of tangible land use types" (Ley, 1983, p. 68). It is primarily a descriptive analysis. Consequently, although a morphological approach classifies housing types, it fails to incorporate social characteristics of an urban area. This approach can be empirically illustrated but because of its weakness it has often been replaced by interest in "human-land" relations and ecological studies which can monitor change over time.

### 2.2 ECOLOGICAL APPROACH

A concept of higher order than the morphological approach is the ecological approach which was theoretically derived in the '30s and '40s. Central to this approach is the natural area concept which

focuses on the physical and cultural features of a city. The ecological approach takes diagnostic variables from census data and extracts from the data such characteristics as land values or ethnic status. According to this theory, social space is made up of "economic, demographic, cultural, and other kinds of space, which when superimposed on the physical space of the city serve to isolate areas of social homogeneity" (Murdie, 1969, p. 10).

A criticism of this theory is that although single variable classifications have value as a preliminary form of regionalization, a more satisfactory scheme would incorporate several variables. The use of a single variable classification does not permit generalizations to be made (Ley, 1971, p. 71).

## 2.3 CLASSICAL LAND USE MODELS

As urban ecological studies advanced, the development of segregated areas and specific zones gave rise to three important land use models. These models have become the traditional models of a city's spatial structure.

Burgess developed a theory of concentric zones. The city was characterized from the city outward by five zones. Through the theory of invasion and succession, Burgess's concentric zone rings were adapted to fit any city. The ideal city is surrounded by concentric or zonal gradients which radiate out from the business core. Traditional family status has been characterized by these zonal gradients. A criticism of Burgess is that he neglected radial trends along transportation arteries. He also ignored the fact that low economic status groups usually located around industrial areas. These criticisms

have given rise to the second classical land use model.

Homer Hoyt developed his theory of city structure in a sectoral pattern. Like Burgess, Hoyt stressed outward expansion but in a sectoral manner. The elite moved outwards along major transportation routes taking advantage of high grounds and other amenities. As a result, wedge-like sectors characterize the city structure. Hoyt's model characterizes social economic status as having sectoral patterns in a city.

Both these approaches insist on false homogenity and disregard cultural determinants (Ley , 1983, p. 74). In response to these models, a third approach by Harris and Ullman can be used to describe a city's structure. Harris and Ullman developed a model of the city using factors that would modify both zonal and radial patterns expressed by Burgess and Hoyt. In essence, as the city expanded, independent settlements would develop, thereby creating a city with multi-nculeated areas. Ethnic composition is most commonly described by this multi-nucleated pattern.

These early ecological classifications, for the most part, lacked a theoretical base and depended on only a few key variables. In attempt to correct these shortcomings, two further approaches have developed. They are social area analysis and factorial ecology.

## 2.4 SOCIAL AREA ANALYSIS

Social area analysis was derived theoretically from a theory of societal development. It arose in an attempt to meet the shortcomings of the early ecological classification schemas of urban areas. Its purpose is to "provide a systematic classification of

residential areas within large cities using the census tract as the basic unit of study" (Murdie, 1969, p. 5). An advantage of this method is that it permits examination of social trends in the space between cities and through time. The procedure is divided into three stages. The first step identifies constructs based on socio-economic status, urbanization and segregation dimensions. Next, key diagnostic variables are selected from census material and each variable is transformed into a numerical index for each construct. Finally, indices are aggregated into constructs which are then transformed into a map of multivariate classifications of spatial units (Ley, 1983, p. 76). This approach first applied by Shevky and Williams to Los Angeles in the 1950s was later modified by Shevky and Bell in a study of San Francisco.

The empirical validity of social area analysis has been verified by Shevky many times, but its theoretical base has been severely criticized. Hawley and Duncan argue that Shevky and Bell have neglected answering the fundamental question as to why residential areas within cities should differ from one another (Murdie, 1969, p. 19). More importantly, they explain the theoretical basis of social area typology as a rationalization for their indices (Murdie, 1969, p. 19).

Timms argues that although this approach is commendable, it serves only as a descriptive function because the significance of the indices are left unexplained (Timms, 1971, p. 124). Herbert suggests that as a comparative tool, the social map is meaningful because it summarizes and differentiates essential aspects of social geography of an urban area (Herbert, 1973, p. 54). As a response to the criticisms of social area analysis factorial ecology developed.

## 2.5 FACTORIAL ECOLOGY

Social area analysis was criticised because it was too selective in its use of census indicators. As an alternative, the factorial ecology approach applies multivariate statistical methods to the classification of urban census tracts. It has two specific advantages over social area analysis: firstly, the variables drawn from the census data do not need to be limited; and secondly, the arbitrary computational procedure of social area analysis is replaced by formal mathematical operations performed by the computer (Ley, 1983, p. 78). In recent years, factorial ecology has become a preferred approach used by geographers in defining sub-areas within a city and the main social dimensions of an urban society.

Using census data, a large set of variables can be reduced into a set of factor components which serves as a summary of the original data matrix. In factorial ecology studies, three general factors from Shevky and Bell's work consistently emerge. They are: socio-economic status; family status; and ethnic composition.

Scores on each factor are generated for each census tract which enables the area under consideration to be classified according to principal factors. The final stage involves an integration of these separate factors into a higher order classification. This means that areas with similar characteristics are grouped together and mapped. Once this is done, a comparison of the structure to the traditional land use models can be conducted. Evidence from factor analysis indicates that socio-economic status, family status, and ethnic composition continually emerge over time as indicators of social structure.

The results from factorial ecology studies suggest that socio-economic status is identified with a sectoral pattern, family status resembles a zonal pattern, and ethnic status conforms to the multi-nuclei theory.

Factorial ecology is a versatile, objective, statistical procedure that can be used in studies involving urban regionalization. Since it was developed, it has been used in several comparisons of cities in North America, Europe, and the Middle East. It, however, has been criticised because the social area is an artifact of the input variables. A difference in input variables accounts for differences within the factor structure.

Very few studies have specifically investigated change over time in urban residential differentiation. An exception is Murdie's analysis of social and demographic change in metropolitan Toronto between 1951 and 1961. He adopted a factorial ecology approach and examined spatial temporal changes in census tracts to determine how these relate to the descriptive models of ecological structure and change as well as to other North American and European cities.

His results indicated that the "social space of metropolitan Toronto is made up of a series of independent dimensions that overlay the physical space of the city in regular ways" (Murdie, 1969, p. 167). In particular, three basic dimensions were apparent over time which differentiated the population by economic status, family status and zones of recent growth (Murdie, 1969, p. 167). As well, ethnic status disclosed a sectoral pattern, while family status was distributed spatially by concentric zones. Growth elements were associated with particular zones, and ethnic variation with certain sectors. This

study applies the same basic approach to changes in Hamilton from 1961 to 1981.

# CHAPTER III

# RESEARCH DESIGN

The existing literature demonstrates that socio-economic status, family status and ethnic composition consistently emerge as major dimensions of residential differentiation. As a result, they can be regarded as principal elements of social structure. It is from this point that we particularly want to examine how Hamilton has changed with regards to these social dimensions.

## 3.1 HYPOTHESES

As previously stated, three hypotheses are examined in this research study. Significant changes in the city of Hamilton from 1961 to 1981 occurred in three social dimensions: socio-economic status, family status, and ethnic status. In examining these three dimensions, we can determine to what extent the downtown renewal and gentrification process have had an effect on socio-economic, family and ethnic status.

## 3.2 DATA ASSEMBLY

The unit of analysis is the census tract. In 1961 there were sixty-five census tracts. In 1971, there were seventy-three census tracts and currently there are ninety-eight tracts in the 1981 census data. An implication of the data shows that over the three census years the number of census tracts for the city has increased. This is due to the fact that the population has increased from 273,991 in 1961 to 542,095 in 1981. For the factor analysis and the generation of factor

scores all census tracts were retained and included in the analysis. However, for the statistical tests examining change in sub-areas over time, an amalgamation of the tracts for '71 and '81 was necessary in order to conform to the 1961 tracts.

From the census data, twenty-three variables were selected for the analysis. (See Appendix, Table 1). The variables consisted of ethnic, demographic and socio-economic status characteristics. It should, however, be noted that the twenty-three variables selected did not consistently appear in all three census years due to a lack of conformity on the part of Statistics Canada. (A more detailed examination of the variables, and which ones were not consistent is given in the Appendix). This can be regarded as one of the problems associated with factorial ecology; that conformity among variables is not always possible, and that the definitions of the variables change over time.

3.3 ANALYTICAL APPROACH

A factor analysis was performed for each census year. The primary reason was to reduce the original variables to a set of underlying factors which would represent socio-economic status, family status and ethnic status. Reducing the original data provides a set of independent dimensions of social structure. Each factor generates a score for each census tract. From this it is possible to map the scores as a means of descriptively analyzing change over time. It should be noted that for mapping purposes, the boundaries for each census year are retained; there is no need to amalgamate tracts. The amalgamation is only necessary for statistical tests of change between years.

Mapping the scores shows areas where change has occurred. The significance of these changes can then be treated statistically. In this study, two areas are the basis for statistical tests of change: the inner city and the Hamilton mountain. To perform significance tests on these areas it was necessary to amalgamate the census tracts for 1971 and 1981 tracts to conform to the 1961 census tracts.

# CHAPTER IV

# DATA ANALYSIS

## 4.1 INTRODUCTION

This chapter focuses on the results obtained from examining residential differentiation of Hamilton over time. The first section describes the factor structure which emerged from the separate factor analysis performed on each of the census years. These factor structures are then discussed with regards to their comparability. The second section describes the results of the mapped factor scores. The maps are discussed with regards to changes over time of their socio-economic status, demographic and ethnic composition. From the maps, the next section examines how well they correspond to the tradition land use models previously discussed in the literature review.

The fourth section begins with a quantitative analysis of change. Using a social index of change, tracts are examined which reveal a significant increase or decrease by one or more standard deviations. The fifth section discusses the significance test results that were performed on the sub-areas of the inner city and the Hamilton mountain. The final section provides a summary of existing changes that have occurred with regard to socio-economic, demographic and ethnic change over the last twenty years.

## 4.2 THE FACTOR STRUCTURE

Separate factor analyses were performed for each of the three census years. For 1961 and 1971 the factor analysis yielded five

significant factors. For 1981, the factor analysis yielded seven significant factors.

For 1961 (Table 1), the first and strongest factor is labelled socio-economic status. High positive scores on this factor are associated with census tracts characterized by a high percentage of male and female blue collar workers. In contrast, high negative scores characterize high levels of education and professional managerial occupations. Factor two is labelled suburb/inner city. High positive scores identify tracts with single detached housing and a young population. High negative scores indicated single persons and female professionals. Factor three is labelled demographic status. High positive scores indicate young families with children, single person households and a relatively young population. Factor four is ethnic status. High positive scores indicate tracts with strong European origins. In contrast, high negative scores reflect tracts where ethnic composition is low. Finally, factor five is labelled unemployment. High positive scores indicate tracts where male/female unemployment is high. Of the five factors, one (SES); two (demographic); and four (ethnic) were used. The five factors account for 88% of the original variance.

For 1971, (Table 1) five factors emerged. The strongest factor is labelled socio-economic status. High positive scores indicate census tracts where housing and rent values are high and also a professional managerial occupational class. It also indicates new housing (post 1960), and high education levels among the population. In contrast, high negative scores reflect a population with less than Grade 9

TABLE 1 FACTOR SCORES

1961

| FACTOR 1 SOCIAL ECONOMIC STATUS | | FACTOR 2 SUBURB/INNERCITY | | FACTOR 3 DEMOGRAPHIC | |
|---|---|---|---|---|---|
| % Male Blue Collar | .86 | % Single Detached | .77 | Children per Family | .87 |
| % Female Blue Collar | .62 | % Less than 20 yrs. | .76 | Persons per Household | .87 |
| % Less than 69 yrs. | .58 | % Greater than 65 | -.67 | % Male | .59 |
| % University | -.89 | % Female Professionals | -.70 | % Less than 20 yrs. | .57 |
| % Male Professional | -.93 | % Single Greater than 15 yrs. | -.94 | % Greater than 65 yrs. | -.49 |
| % Variance | 39.7 | | 25.5 | | 9.1 |

| FACTOR 4 ETHNIC | | FACTOR 5 UNEMPLOYMENT | |
|---|---|---|---|
| % European | .84 | % Male Unemployed | .80 |
| % Female Blue Collar | .53 | % Female Unemployed | .67 |
| % Born in Canada | -.64 | % Female Professionals | -.45 |
| % Variance | 7.3 | | 6.0 |

1971

| FACTOR 1 SOCIAL ECONOMIC STATUS | | FACTOR 2 DEMOGRAPHIC | | FACTOR 3 YOUNG PROFESSIONALS | |
|---|---|---|---|---|---|
| Median HHSLD Value | .75 | Children Per Family | .91 | % Male Blue Collar | .62 |
| % Male Professionals | .74 | Persons Per Household | .91 | % Non Migrants | .47 |
| Median HHSLD Income | .69 | % less than 20 yrs. | .91 | % Male Professionals | -.57 |
| Average Rent | .69 | Median Housing Income | .44 | % Female Professionals | -.80 |
| % New Housing | .63 | % University | -.47 | % Single Greater than 15 yrs. | .89 |
| % University | .61 | % Greater than 65 | -.79 | | 8.3 |
| % Female Professionals | .42 | | 26.0 | | |
| % Female Unemployment | -.49 | | | | |
| % Male Blue Collar | -.55 | | | | |
| % Female Blue Collar | -.61 | | | | |
| % Old Housing | -.70 | | | | |
| % Male Unemployment | -.71 | | | | |
| % less than Gd. 9 | -.83 | | | | |
| % Variance | 33.4 | | | | |

| FACTOR 4 HOUSING | | FACTOR 5 ETHNIC | |
|---|---|---|---|
| % Own | .90 | % Female Blue Collar | .61 |
| % Single Detached | .87 | % European | .57 |
| Median Household Income | .52 | % Born in Canada | -.67 |
| % New Housing | -.47 | | 5.7 |
| % Variance | 7.1 | | |

education; male unemployment; blue collar workers and old housing. Factor two is labelled demographic status. High positive scores indicate single family households with children and single person households. Negative scores indicate low education levels, and a population over 65 years of age. Factor three is a young professional category. The high positive scores indicate male blue collar workers and non-migrants. Factor four is a housing factor. High positive scores indicate census tracts where single detached housing and home ownership are predominant. Factor five is labelled ethnic composition. Again, positive scores indicate census tracts with strong European origins and negative scores indicate non-European origin. Within the analysis factors one (SES), two (demographic) and five (ethnic) were used. Together the five factors absorb 81% of the original data matrix.

For 1981 (Table 1) seven factors emerged in the analysis. The strongest factor is labelled socio-economic status. High positive scores indicate tracts with male blue collar workers and an adult population. High negative scores indicate professional managerial occupation and high levels of education. Factors two, six and seven are housing factors. Together, high positive scores represent tracts with new housing and families with children. Factor four is an ethnic factor. High positive scores reflect European origins and negative scores indicate a high percentage of Canadian born. Factor five is labelled working class. Positive scores indicate tracts with a predominance of males and families with children. Factors one (SES), three (demographic) and five (ethnic) were used. Together the factors absorbed 88% of the original data matrix.

TABLE 1 (Cont'd)

1981

| FACTOR 1 SOCIAL ECONOMIC STATUS | | FACTOR 2 HOUSING | | FACTOR 3 DEMOGRAPHIC | |
|---|---|---|---|---|---|
| % Male Blue Collar | .76 | % Own | .94 | % New Housing | .87 |
| % Less than Gd. 9 | .66 | % Single Detached | .88 | Persons per Household | .62 |
| Median HHSLD Value | -.47 | Median Household Income | .75 | % less than 20 yrs. | .56 |
| % Male Professional | -.58 | Person Per Household | -.57 | Children per Family | .55 |
| % Female Professional | -.78 | % Non Migrants | .41 | % less than 65 yrs. | -.41 |
| % University | -.89 | % Single Greater than 15 | -.40 | % Single Greater than 15 | -.66 |
| % Variance 24.3 | | % Male Unemployment | -.59 | % Greater than 65 | -.66 |
| | | 20.2 | | 11.1 | |

| FACTOR 4 ETHNIC | | FACTOR 5 WORKING CLASS | | FACTOR 6 HOUSING VALUE | |
|---|---|---|---|---|---|
| % European | .88 | % Male | .68 | Median HHSLD Value | .72 |
| % Less than Gd. 9 | .42 | Children per Family | .52 | 5.6 | |
| % Born in Canada | -.89 | % Female Blue Collar | .48 | | |
| % Variance 8.1 | | Persons per Household | .44 | | |
| | | 5.8 | | | |

| FACTOR 7 OLD HOUSING | |
|---|---|
| % Old Housing | .73 |
| % Variance 4.2 | |

## 4.3 COMPARABILITY OF SOCIO-ECONOMIC, DEMOGRAPHIC AND ETHNIC FACTORS

The factor analysis used within this study is based on the socio-economic status, family status, and ethnic composition factors. For each census year, the results of the factor structure included socio-economic status, demographic and ethnic dimensions. The fact that these three dimensions were central to each census year makes the factors comparable to some extent.

However, there are problems with comparability. A major problem stems from the variables loading on each factor. For each census year, the variables loading on the factor structures differ. For example, (see Table 1) the socio-economic status factor for 1971 has thirteen variables loading on it. The variable types are primarily housing variables such as average rent and percent new housing as well as SES variables. In contrast, the 1961 and 1981 factor structures have fewer variables loading on them and they lack the housing variables which were predominate in the 1971 factor structure. The difference in variables loading on each factor structure affects the 1971 socio-economic status results because of the differences in the factor loadings of the variables. Therefore, comparisons of factor structures between years is possible but complicated somewhat by these specific differences in factor composition.

## 4.4 MAPPING OF FACTOR SCORES

A primary source for examining change within the city of Hamilton can be seen from the maps indicating socio-economic status, family status, and ethnic status for 1961, 1971 and 1981. (See Appendix maps 1 through 9). Areas were classified and mapped by dividing the factor

scores into six categories (> -1.50 to +1.50). For mapping, the subdivisions of the census tracts that have occurred during the last twenty years are retained. To ensure consistency among the mapping results the signs for socio-economic status scores were reversed for 1971. By doing so, high socio-economic status is represented by high negative scores for all three census years.

SOCIO-ECONOMIC STATUS MAPS

From the 1961 map, high economic status is observed in the west end and on the south west mountain. There is also a pocket of high SES located at the mountain brow and Fennell Road. Areas of low economic status are observed in the north, and north east sections of Hamilton. The 1971 map indicates the socio-economic status of the west end has decreased, dropping from the highest SES level to the second and third highest SES level. The pocket of high SES at the mountain brow and Fennell Road has remained constant, but two new areas of high socio-economic status have emerged.

The smaller of the two tracts is located at upper Wentworth and Limeridge Road. This area has increased from the third highest SES level to the highest SES level. More interestingly, is the area in the east end. The area just east of Redhill Creek has jumped from the third highest SES level in 1961 to the highest SES level in 1971. The explanation for this large increase in status is a result of the factor structure.

The 1971 socio-economic status factor is comprised of thirteen variables. Four of these variables are housing variables. This area just east of Redhill Creek experienced new housing and apartment develop-

ment during the early 70s. The housing variables loading on this dimension are causing this factor structure to become an artifact. Therefore, the high SES level observed east of Redhill Creek is a result of the variables loading on the factor. Low economic status is still predominate in the north end of Hamilton.

From the 1981 map, it is apparent that the west end and south-west mountain have once again regained their high socio-economic status. Even more significant is the drop in status in the area just east of Redhill Creek. The fact that it has dropped from the highest SES group in 1971 to the fourth lowest SES group in 1981 further confirms the concept that socio-economic status in 1971 has become an artifact due to the factor composition.

Within this research, we are primarily concerned with the changes that have occurred in the sub-areas of Hamilton. The reason for examining sub-areas is that Hamilton in the last two decades has experienced population growth and a tremendous restructuring of the downtown area. In addition to the renewal and gentrification the downtown area has witnessed the construction of new apartments and condiminium complexes. By focussing on the inner city we can determine the extent of the impact which the renewal, gentrification and new development have had on the socio-demographic structure of the city.

In addition to the inner city, the Hamilton mountain is an area of interest since it has witnessed new housing developments stemming from an increased population. The increase in population has been pronounced. The area south of Mohawk which was previously two census tracts has, by 1981, been subdivided into seventeen tracts.

The Hamilton mountain is our second sub-division used to determine the extent of significant changes in Hamilton from 1961 to 1981.

The inner city area can be described as the area south of York Street, east of Locke Street, north of Aberdeen Avenue, west of Wellington and south of Cannon Street. (See Appendix Map D). For this area, socio-economic status between 1961 to 1971 exhibits a ranking below the mean socio-economic status prior to the renewal of the down-town core. However, between 1971 to 1981 a significant increase in the socio-economic status level can be observed. This indicates that there is some evidence to suggest that change within the inner city area has occurred. A good example is the tract at James Street and King west (tract #13 on '61 map). In 1961, this tract occupied the fourth lowest socio-economic group, but by 1981 it has attained the second highest SES level. Clearly, there are areas where noticeable increase in socio-economic status has occurred.

The inner city area encompasses Hess Village. During the middle '70s the area became the target of new development and gentrification. Numerous high rise apartment buildings and condominiums were erected in a short period of time. In addition, the rejuvenation of old dilapidated houses occurred simultaneously with the new development. These combined factors have increased the socio-economic level in most of the inner city.

With regard to the mountain, the socio-economic level has remained fairly consistent in the twenty year time period.

DEMOGRAPHIC STATUS

What becomes very noticeable from the demographic maps is the

sub-divisions within the census tracts over the past twenty years. The most obvious stimulus has been the increase in the population of Hamilton which has resulted in new housing units on the mountain south of Mohawk Road.

The mountain has traditionally been an area of high family status and the increased population in this area has maintained this tradition. Therefore, the high family status characterizing this area has not changed throughout the twenty year period.

The north east section of Hamilton has traditionally been an area occupied by the industrial working class. For 1961 and 1971 this area exhibited high family status levels. However, by 1981 the high family status surrounding Hamilton's industrial section decreased. Two possible reasons for this are the demolition of family houses by Stelco, and the availability of new housing at affordable prices on the mountain and in Stoney Creek.

With regards to the inner city area, the demographic characteristics have remained fairly constant over time. If anything, single family homes with children have decreased and have been replaced by an older single population. This again can be attributed to the availability of newer housing to the south and east. It may also be due to the fact that the families with children twenty years ago have since aged. The children who have become young adults have moved away from home and now help comprise the single person households of the inner city.

ETHNIC STATUS

Hamilton has always been an area of ethnic diversity. Due to

the way ethnicity has been calculated in the analysis, it is not possible to distinguish the residential locations of various ethnic groups. However, from the maps we can determine for different parts of the city whether ethnicity in general has increased, decreased, or remained the same over the last two decades.

From the 1961 map there are five areas with the highest factor score (over +1.50) of ethnic composition. One area is located on the waterfront around Stelco; another two tracts are located within the city; the fourth tract is the area encompassing York Street; and the fifth is located under the mountain brow at Aberdeen. The two city tracts and the York Street tract differ from the fifth tract in that they all have th Toronto-Hamilton and Buffalo railway (TH&B) as their northern boundaries and York/Cannon Street as their southern boundaries. In contrast, there are two areas which exhibit low ethnic status. One is located at Mohawk Road and Upper Sherman, the other at Queenston and Potruff Road.

By 1971, the tract by Stelco and the area under the mountain brow at Aberdeen Avenue has lost their high ethnic status. Areas of high ethnicity are located along the TH&B west of Gage with one exception at Wentworth Avenue. Two pockets which are of the second highest ethnic status level are located at Main and Kenilworth and Upper James at Limeridge Road.

By 1981, several changes are noticeable. Firstly, the high status observed at Upper James and Limeridge Road in '71 has disappeared. More importantly, is the ethnic pattern of the downtown area. From the maps, it appears that since 1961 the high ethnic status

in the northwest has become less concentrated and more dispersed throughout the city in the past two decades. Clusters of similar ethnic groups still accompany this dispersion. A dispersion pattern has evolved, but there is still enough evidence to suggest that a multi-nuclei pattern is evident.

From the mapped results, an examination of the spatial patterns can determine the extent to which the socio-economic, demographic, and ethnic status of Hamilton conform to the classical land models.

## 4.5 CONFORMITY TO THEORETICAL LAND USE MODELS

As discussed earlier in the literature review, traditional land use models have depicted socio-economic status as having a sectoral pattern; family status as having a zonal pattern; and ethnic status as multi-nucleated.

With respect to ethnic status, all three census years exhibit a multi-nuclei pattern. Multi-nucleated patterns emerge because similar ethnic groups locate near one another for stability and reinforcement of cultural values. In 1961, the high concentration of ethnic groups was located in the north end, while groups of low ethnic status were located on the south mountain. By 1971, ethnic clusters had spread out along the TH&B, but were also found on the southwest corner of the mountain and towards the east end of Hamilton. Areas of low ethnic status were found south of Limeridge Road, and the Beach strip.

By 1981, the high ethnic status along the TH&B has become more dispersed. The mountain area is comprised of the third, fourth, and

fifth highest ethnic status levels, and the east end had a few tracts of the second highest ethnic level. The Beach strip has remained an area of low ethnic status.

From these results it is apparent that ethnic status is characterized by Harris and Ullman's multi-nucleated concentrations, however, by 1981 these pockets of clusters have become smaller and more dispersed throughout the city.

Family status has traditionally been characterized by a zonal pattern. In 1961, a definite concentric zone pattern was observed. Areas of high family status were observed along the waterfront, on the south mountain, and by the eastern city limits. The eastern and southern areas of high family status confirm Burgess's model that the upper and middle class locate in areas away from the central business district. In Burgess's model, zone two was a zone of transition or working class homes. The northeast section of Hamilton falls into this category.

The family status pattern in 1971 is similar to that for 1961 with three distinct zones by the waterfront, eastern border and south mountain. By 1981, the zonal pattern is somewhat less distinct than in previous years. The high family status close to the waterfront and eastern border has declined. However, the upper mountain is still characterized by high family status as a result of the new residential development since the 70s. Despite a less evident zonal pattern in 1981, all three years exhibit a zonal pattern for family status as originally depicted by Burgess.

Socio-economic status has traditionally been depicted in a

sectoral pattern and is evident for all three census years. In 1961, high socio-economic status was contained in a sector encompassing the Westdale and McMaster area, as well as on the southwest mountain. The second lowest socio-economic group was found in a sector covering the northeast end along the waterfront. Both these sectors support Hoyt's theory that the rich tend to locate in areas away from the city along major transportation routes, and low socio-economic status tend to locate around industrial areas.

By 1971, the area of high SES around the Westdale and McMaster community has become less predominant. Instead, a sector of high socio-economic status is located just east of Redhill Creek. As suggested earlier, the reason for this apparent increase in SES in this area is a direct result of the factor structure. The 1971 SES factor has thirteen variables loading on it, four of which are housing variables. In 1971, this area experienced increased housing and apartment building development. As a result, because of the number of variables and types of variables loading on it, the factor has become an artifact in structure. This explains why SES would appear to be high in the area. Low socio-economic status is again confined to the industrial belt. By 1981, the strong SES sector in the west emerges again (confirming the SES 1971 factor to be an artifact), and low economic status surrounds the waterfront area. All three years generally conform to Hoyt's sector model.

## 4.6 INDEX OF SOCIAL CHANGE

To further locate areas where change has been significant, an index of social change was computed for each of the three dimensions over the twenty year time period. The index of social change identifies

specific tracts where there are changes by one or more standard deviation units (see Table 2). The table is divided into socio-economic status, demographic status and ethnic status. For example, tract #47 in 1961 under SES has a factor score of -3.76. In 1971 the same tract exhibited a factor score of -2.40. (High socio-economic status is characterized by high negative scores). In comparing the difference between the two years, the SES level for this tract has decreased by 1.36. This is not evident from the maps since both years have a value greater than -1.50 which categorizes the highest SES group on the maps. More interesting is that from 1971 to 1981 this tract again appears as having changed significantly. By 1981, the tract has further decreased in socio-economic status from -2.40 to -1.03 - a decrease by +1.38. Similar comparisons can be made for the remaining tracts.

Further analysis of the socio-economic status, reveals four other tracts notable for exhibiting a significant decrease in socio-economic status from 1961 to 1971. Two tracts are located in the Westdale area concurring with the mapped results. The third tract is located along York Street, while the fourth tract is found within the inner city at Cannon and Wellington Street. As previously noted, tract #47 at the mountain brow and Fennell exhibited a decrease in socio-economic status. For 1971 to 1981, in addition to tract #47, two other tracts - one of the mountain, the other east of Redhill Creek - exhibited a decrease in SES.

With regards to demographic status, the tract at Cannon and Kenilworth has exhibited an increase in family status from 1961 to 1971. From 1971 to 1981, four tracts were identified with significant

TABLE 2

INDEX OF SOCIAL CHANGE

| TRACT* | SES 61 | SES 71 | ΔSES 61-71 | TRACT | SES 71 | SES 81 | ΔSES 61-71 |
|---|---|---|---|---|---|---|---|
| 1 | -2.96 | -1.19 | +1.77 | 47 | -2.40 | -1.02 | +1.38 |
| 5 | -2.93 | -0.89 | +2.04 | 61 | -1.34 | +0.43 | +1.77 |
| 6 | +0.06 | +1.40 | +1.34 | 63 | -1.46 | -0.30 | +1.16 |
| 16 | -0.18 | +2.18 | +2.36 | | | | |
| 47 | -3.76 | -2.40 | +1.36 | | | | |

| TRACT | DEMO 61 | DEMO 71 | ΔDEMO 61-71 | TRACT | DEMO 71 | DEMO 81 | ΔDEMO 71-81 |
|---|---|---|---|---|---|---|---|
| 35 | -.93 | +6.13 | +0.8 | 10 | -1.70 | -0.58 | +1.12 |
| | | | | 11 | -3.16 | -1.11 | +2.05 |
| | | | | 12 | -2.44 | -0.64 | +1.80 |
| | | | | 16 | -1.29 | +0.16 | +1.45 |

| TRACT | ETHNIC 61 | ETHNIC 71 | ΔETHNIC 61-71 | TRACT | ETHNIC 71 | ETHNIC 81 | ΔETHNIC 71-81 |
|---|---|---|---|---|---|---|---|
| 11 | -1.14 | +0.22 | +1.36 | 6 | +2.54 | +3.54 | +1.00 |
| 15 | +1.12 | +2.41 | +1.29 | 12 | -1.36 | +0.71 | +2.07 |
| | | | | 16 | -1.64 | +0.20 | +1.84 |
| | | | | 43 | -0.40 | -1.26 | - .86 |
| | | | | 45 | +0.21 | +1.44 | +1.23 |
| | | | | 53 | -2.21 | -0.72 | +1.49 |

*TRACT NUMBERS ARE FROM BASE YEAR - 1961

changes. All were characterized as having increases in family status. All four tracts are located within the inner city. Three of the tracts having King and Aberdeen as their north-south borders, and Locke and James as their east-west borders. The fourth tract is in the northeast at Wellington and Cannon. This tract previously experienced a decrease in SES from 1961-1971, and in 1971 experienced an increase in family status.

From 1961 to 1971, the social index identified two tracts where ethnic status changed significantly. These two tracts are located within the inner city. Both have experienced an increase in ethnic status. For 1971 to 1981, six tracts have exhibited significant changes. Out of the six tracts, all but one located at Potruff Road and the TH&B, exhibited an increase in ethnic status. Of the remaining five tracts, three are located in the inner city, one is located in the east end, and one is on the mountain.

From this index, tract #16 at Cannon and Wellington has been identified by all three dimensions as having changed significantly over the twenty year period. The results indicate that this area has had a significant decrease in socio-economic status, but a significant increase in family and ethnic status. The social index also illustrates the tract encompassing York Street as decreasing in SES but increasing in ethnic status. In general, the index identifies specific tracts where change has been most significant and which would not have been evident from the mapped results.

## 4.7 SIGNIFICANCE TESTS

To recapitulate, this paper is concerned with the change in

socio-economic status, family status, and ethnic status of the city of Hamilton from 1961 to 1981. Within this twenty year time period we are specifically interested in sub-areas where change has been most significant. From the mapping of factor scores, two areas of interest demonstrated a change in composition from 1961 to 1981. The two areas are the inner city and the mountain. (See Appendix Maps D and E).

For statistical purposes it was necessary to amalgamate the newly created subdivisions for 1971 and 1981 to conform to the 1961 census boundaries. The newly created subdivisions have been amalgamated by taking the mean of the combined tracts.

THE INNER CITY

The inner city is the area south of York Street, east of Locke Street, north of Aberdeen and mountain brow, and west of Wentworth. The area comprises fourteen census tracts (based on '61 boundaries). From the t-tests, we conclude that no significant change has occurred in this area with respect to ethnic or demographic composition. However, change is characterized by an increase in the socio-economic status of this area over the twenty year time period.

From Table 3, the t-values for the inner city region all confirm that no change in ethnic or demographic composition has resulted due to the downtown renewal and/or gentrification. However, this table also indicates that there is some statistical evidence to suggest that significant changes in socio-economic status has occurred in this area.

The t-values show that between 1961 and 1971 a change in socio-economic status occurred; there was a decrease in SES. The result concurs with the maps where it was suggested that this area, prior to the renewal process, had a socio-economic status level lower than the mean.

TABLE 3

| | Inner City (N=14) | Mountain (N=17) |
|---|---|---|
| Social Economic Status '61-'71 | -2.61* | $1.01^{NS}$ |
| Social Economic Status '71-'81 | 3.76** | -4.52*** |
| Social Economic Status '61-'81 | $1.46^{NS}$ | $-1.93^{NS}$ |
| Demographic '61-'71 | $1.28^{NS}$ | $1.78^{NS}$ |
| Demographic '71-'81 | $-1.19^{NS}$ | 4.00** |
| Demographic '61-'81 | $-.03^{NS}$ | 5.48*** |
| Ethnic '61-'71 | $-.57^{NS}$ | -4.01** |
| Ethnic '71-'81 | $-.75^{NS}$ | $.27^{NS}$ |
| Ethnic '61-'81 | $-1.55^{NS}$ | $-2.06^{NS}$ |

*** $p < .001$
** $p < .01$
* $p < .05$

For the period from 1971 to 1981 the t-value increased significantly illustrating an increase in the SES level for this area. An increase in SES for this time period reflects again what was previously noted. The renewal, gentrification, and new development processes of the mid to late seventies helped to raise the socio-economic status of the inner city area. Therefore, the pattern that is depicted shows that the SES level prior to the renewal was below the mean SES level, and that the period after the renewal had an increase in SES. The fact that no significant change in socio-economic status was observed from 1961 to 1981 indicates the SES level in 1981 was very similar to the SES level in 1961.

THE MOUNTAIN

The Mountain area comprises seventeen census tracts (one was omitted) based on 1961 census boundaries. (See Appendix Map E). This area is comprised of an older section which extends south to Mohawk Road, plus an area of new development south of Mohawk Road. From Table 3, it is apparent that changes in all three dimensions of socio-economic status, demographic and ethnic composition have occurred within the last two decades.

From the period 1961 to 1971 there was no significant change in socio-economic status. However, from 1971 to 1981 there is evidence to suggest that socio-economic status decreased on the mountain. It is important to note that fifteen of the seventeen mountain tracts represent the older section on the mountain. For statistical purposes, it was necessary to amalgamate the newly created subdivisions of '71 and '81 into two tracts to conform to the 1961 census tracts. By doing

this, information from the subdivisions is being lost in the amalgamation process. The result, then, is a reflection of the changes that are occurring within the older section of the mountain because it comprises fifteen out of the seventeen tracts used in the statistical analysis.

The older section of the mountain is characterized by older housing and an older population. The newer section, in contrast, has newer housing and young families. In terms of demographic status for 1961 to 1971 no significant change is apparent. However, from 1971 to 1981 a very significant decrease in family status is confirmed by the statistical tests. In addition, a very significant decrease has been observed for the twenty year period, 1961 to 1981.

The reason for the observed decrease in family status can be attributed to the amalgamation process. Although, the area south of Mohawk Road has been growing in terms of population, the amalgamation process artificially reduces the effect of new developments on the results. The results are therefore, primarily determined by tracts in the older section.

In terms of ethnic change, the results confirm that between 1971 to 1981, and from 1961 to 1981 no significant changes occurred in this area. However, for 1961 to 1971 a significant increase in ethnicity is noted. This result concurs with the mapped results. From the 1961 map of ethnic status the area had a very low ethnic composition with the exception of one tract at Fennell Road and the mountain brow. By 1971, the west mountain had two tracts which increased from the third lowest ethnic status group to the third highest ethnic status

group. This increase in ethnic status between 1961-1971 may have contributed to the decrease in socio-economic status which was observed from 1971 to 1981.

## 4.8 SUMMARY

Based on the index of social change, the results indicated that from 1961 to 1971, and from 1971 to 1981 socio-economic status decreased in selected areas of the inner city, the east end, the east mountain, and the south mountain. However, the decrease in the east end is partly an artifact of the kind and number of variables loading on the socio-economic factor for 1971. For demographic composition, the majority of changes occurred between 1971 to 1981 and were confined to the inner city. Four tracts within the inner city increased in family status. For ethnic status, significant changes occurred from 1971 to 1981. Three tracts within the inner city increased in ethnic status while one tract at the northeast corner decreased. Two other areas exhibited an increase in ethnic status, one in the older section of the mountain, the other in the east end.

T-tests were performed to analyse changes in two sub-areas: the inner city; and the mountain. Amalgamation of the newly created sub-divisions of 1971 and 1981 were necessary to conform to the 1961 census tracts. Out of seventeen tracts, fifteen represented the older section of the mountain. The amalgamation artificially reduced the effect of new developments on the mountain.

The mountain results indicated a significant decrease in socio-economic status for 1971 to 1981. For 1971 to 1981, and from 1961 to 1981 significant decreases in family status were observed. In addition,

ethnic status declined during 1961-1971. For the inner city area, a slight drop in SES occurred from 1961 to 1971, but a significant increase from 1971-1981 concurred with the mapped results. There was no evidence of ethnic changes in the inner city.

# CHAPTER 5

## CONCLUSION AND SYNTHESIS

This research has focussed on identifying the socio-economic, demographic and ethnic compositional changes that have occurred within the city of Hamilton from 1961 to 1981. In the past decade, the city has experienced growth, particularly on the south mountain. In addition, Hamilton's downtown core has undergone extensive renewal, and surrounding neighbourhoods have been affected by gentrification. These three factors, population growth, renewal and gentrification have brought about rapid restructuring of areas and precipitated significant social changes in the city.

Consistent with the results of previous factorial ecology studies, socio-economic status, family status, and ethnic status emerged as major dimensions of social structure. By comparing scores on these dimensions over time the study reveals what changes have occurred in the socio-spatial structure of Hamilton from 1961 to 1981.

The spatial pattern of the factor scores as shown by the maps revealed a strong conformity with the classical land use models. Hoyt identified socio-economic status as having a sectoral pattern. In Hamilton, a sectoral pattern of high socio-economic status was observed in the west end and on the southwest mountain. Burgess postulated family status as having a zonal pattern. A zone of high family status on the mountain consistently emerged for each census year. Similarly, ethnic status conformed to Harris and Ullman's multi-nuclei pattern.

However, from 1961 to 1981, the ethnic clusters decreased in size, became less concentrated, and generally more dispersed throughout the city. In general, all three socio-demographic patterns conformed with the classical land use models.

Analysis of change focussed on the inner city and mountain area to determine the effects of growth, renewal and gentrification. Within the inner city there was evidence to suggest that from 1971 to 1981 the socio-economic status increased significantly. This was consistent with the general expectations based on renewal and gentrification. In terms of family status and ethnic status no significant changes were observed over the twenty year period. The effect of change on the mountain, as shown by the maps, was obscurred in the statistical tests of change by the need to amalgamate the tracts where growth was greatest to conform to the 1961 boundaries. However, the maps revealed that the high level of family status has been retained from 1961 to 1981 despite the increase in population.

In conclusion, three trends which have had a significant impact on the city in the last twenty years were identified. These were, increased population, renewal and gentrification. In spite of the increasingly dynamic character of the city, socio-economic status, family status, and ethnic status have remained as consistent determinants of social structure of residential areas. This result concurs with the earlier factorial ecology studies previously discussed. Thus, it would appear that these dimensions are characteristic of residential areas in cities which have evolved slowly (over a long period of time) and those which have evolved rapidly (over a short period of time). This indicates

that factorial ecology is a useful approach in the study of residential areas within the urban environment.

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APPENDIX TABLE 1

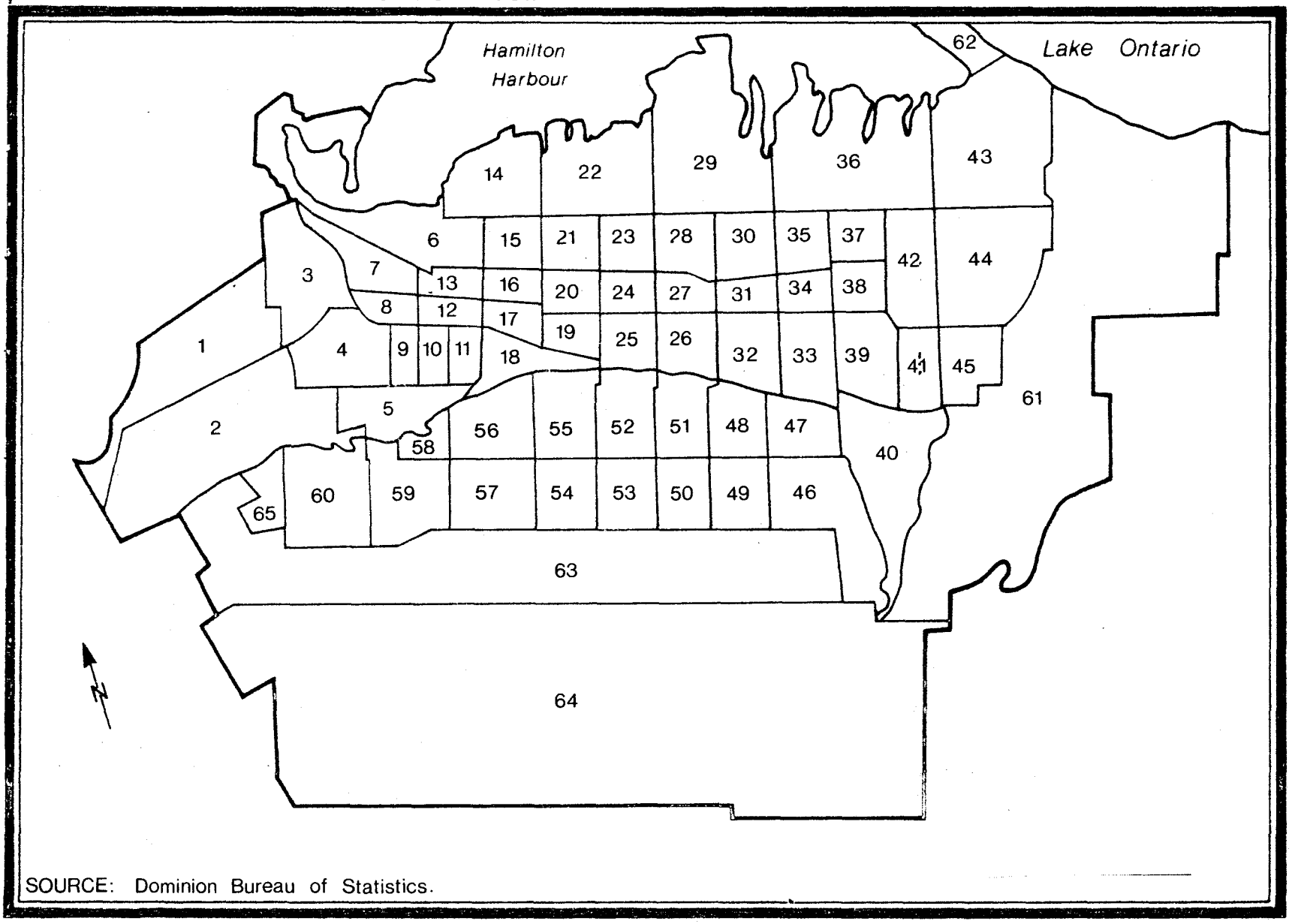
VARIABLES USED IN FACTOR ANALYSIS

| VARIABLE NAME | 1961 | 1971 | 1981 |
|---|---|---|---|
| Persons per Household | ✓ | ✓ | ✓ |
| Children per Family | ✓ | ✓ | ✓ |
| Median Housing Value | ✓ | ✓ | Average Value of Dwelling |
| Average Rent | ✓ | ✓ | ✓ |
| Median Household Income | X | ✓ | ✓ |
| Total Males | ✓ | ✓ | ✓ |
| Total Population Over 65 Yrs. | ✓ | ✓ | ✓ |
| Total Population Under 20 yrs. | ✓ | ✓ | ✓ |
| Single Population Over 15 yrs. | ✓ | ✓ | ✓ |
| Owner Occupied Dwellings | ✓ | ✓ | ✓ |
| Single Detached Dwellings | ✓ | ✓ | ✓ |
| Housing Pre | Before 1920 | Before 1946 | Pre 1961-70 |
| Housing Post | Since 1945 | After 1960 | Post 1971-1981 |
| Males Unemployed | Males Looking For Work | ✓ | ✓ |
| Females Unemployed | Females Looking For Work | ✓ | ✓ |
| Male Professional-Managerial | ✓ | ✓ | ✓ |
| Male Blue Collar | ✓ | ✓ | ✓ |
| Female Professional-Managerial | ✓ | ✓ | ✓ |
| Female Blue Collar | ✓ | ✓ | ✓ |
| European Origin | ✓ | ✓ | Other (Excluding French) |
| Education Less Than Grade 9 | ✓ | ✓ | ✓ |
| Some University | ✓ | ✓ | ✓ |
| Non-Migrants | X | ✓ | ✓ |

✓ Yes X No

# APPENDIX A

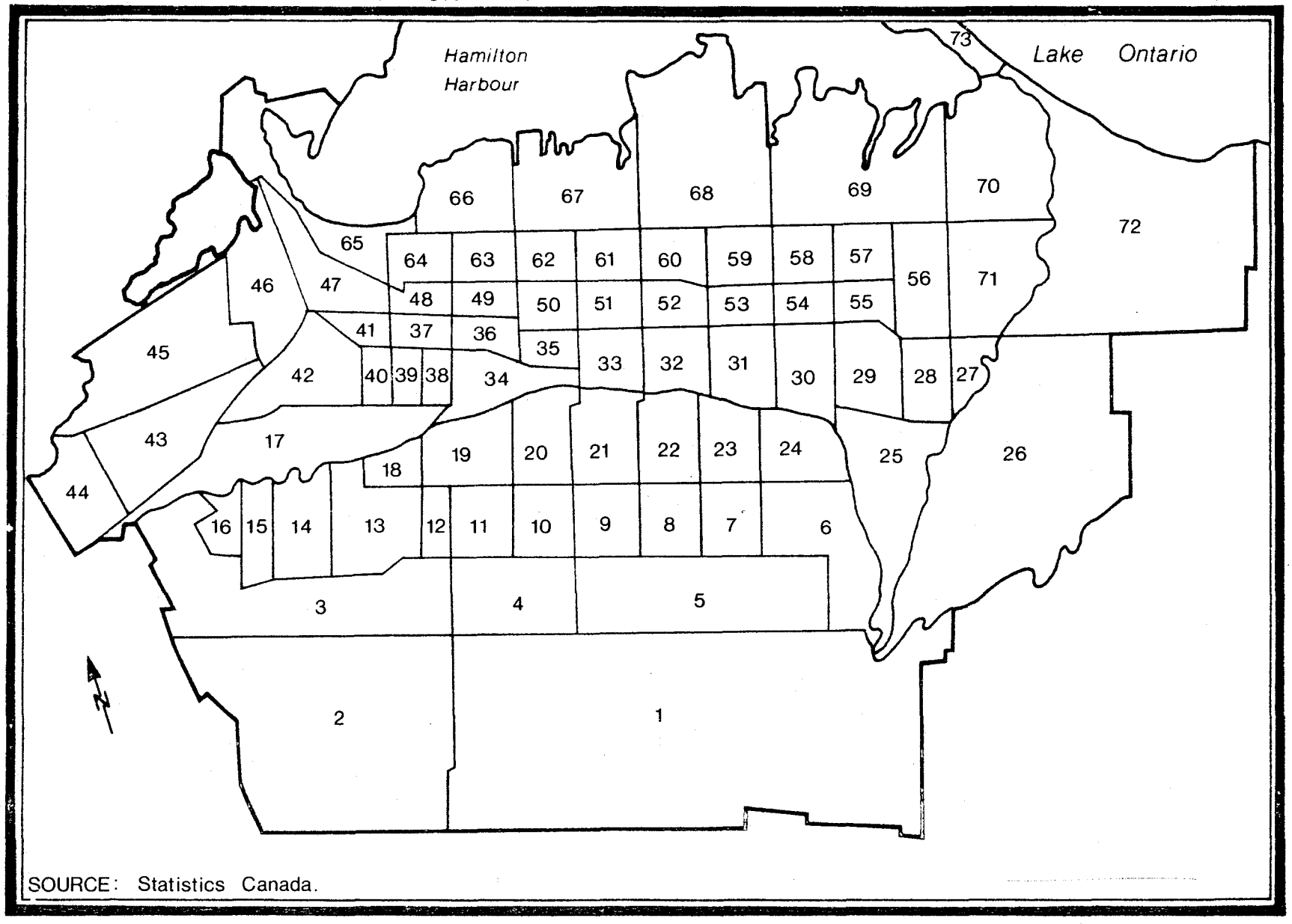
CENSUS TRACT BOUNDARIES FOR 1961.




SOURCE: Dominion Bureau of Statistics.

# APPENDIX B

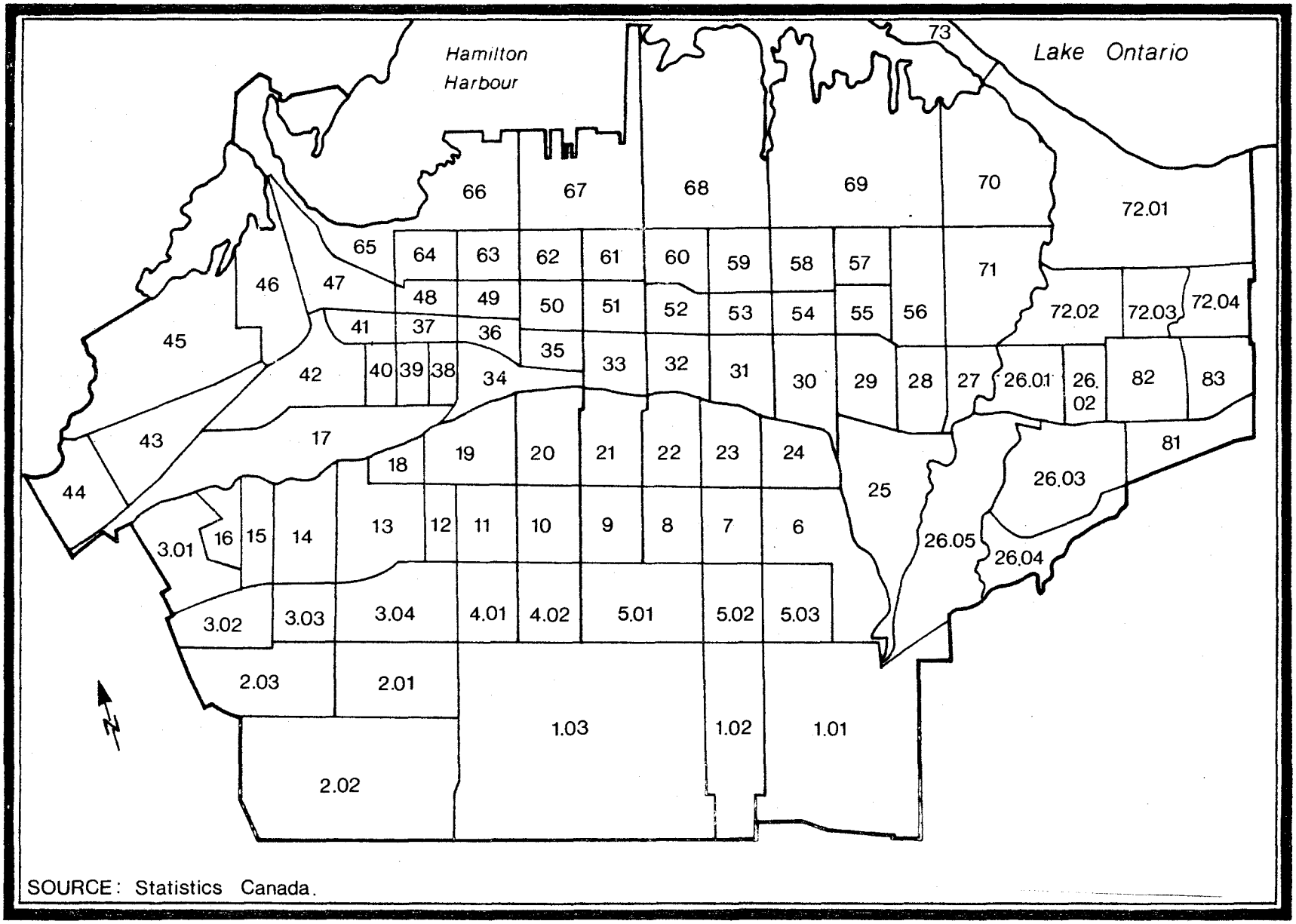
CENSUS TRACT BOUNDARIES FOR 1971.




SOURCE: Statistics Canada.

# APPENDIX C

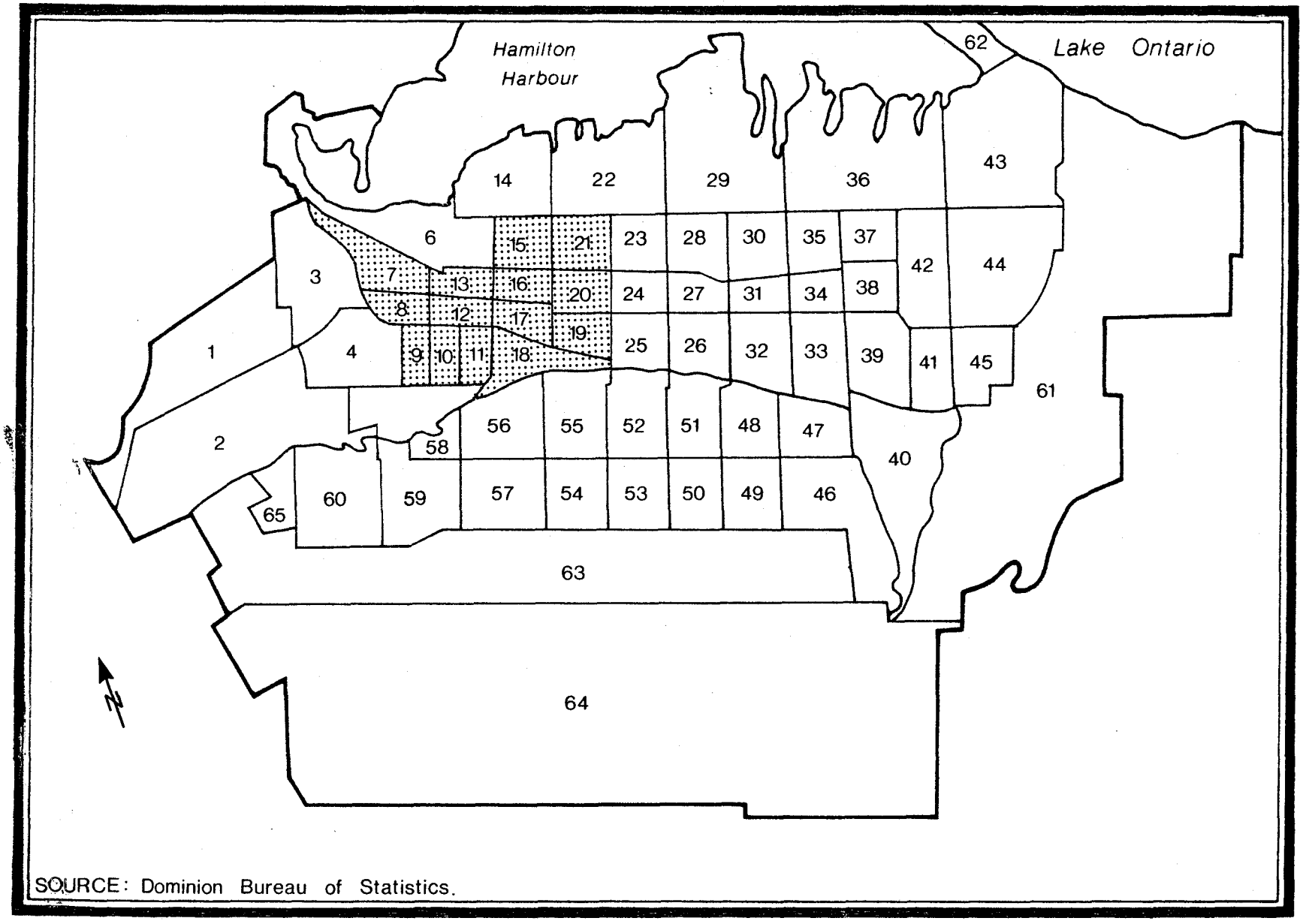
## CENSUS TRACT BOUNDARIES FOR 1981.




SOURCE: Statistics Canada.

# APPENDIX D

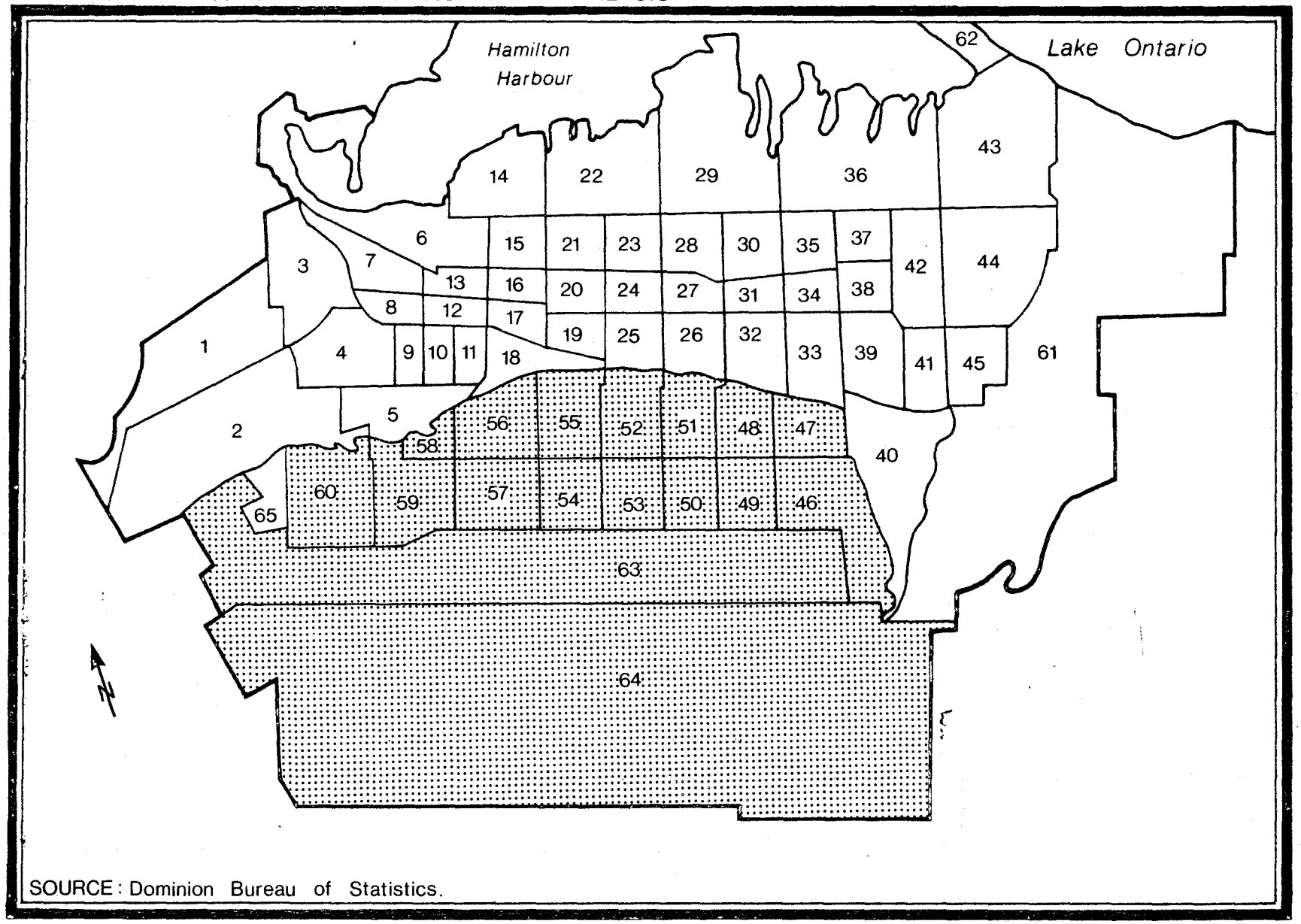
## INNERCITY AREA USED IN STATISTICAL ANALYSIS




SOURCE: Dominion Bureau of Statistics.

# APPENDIX E

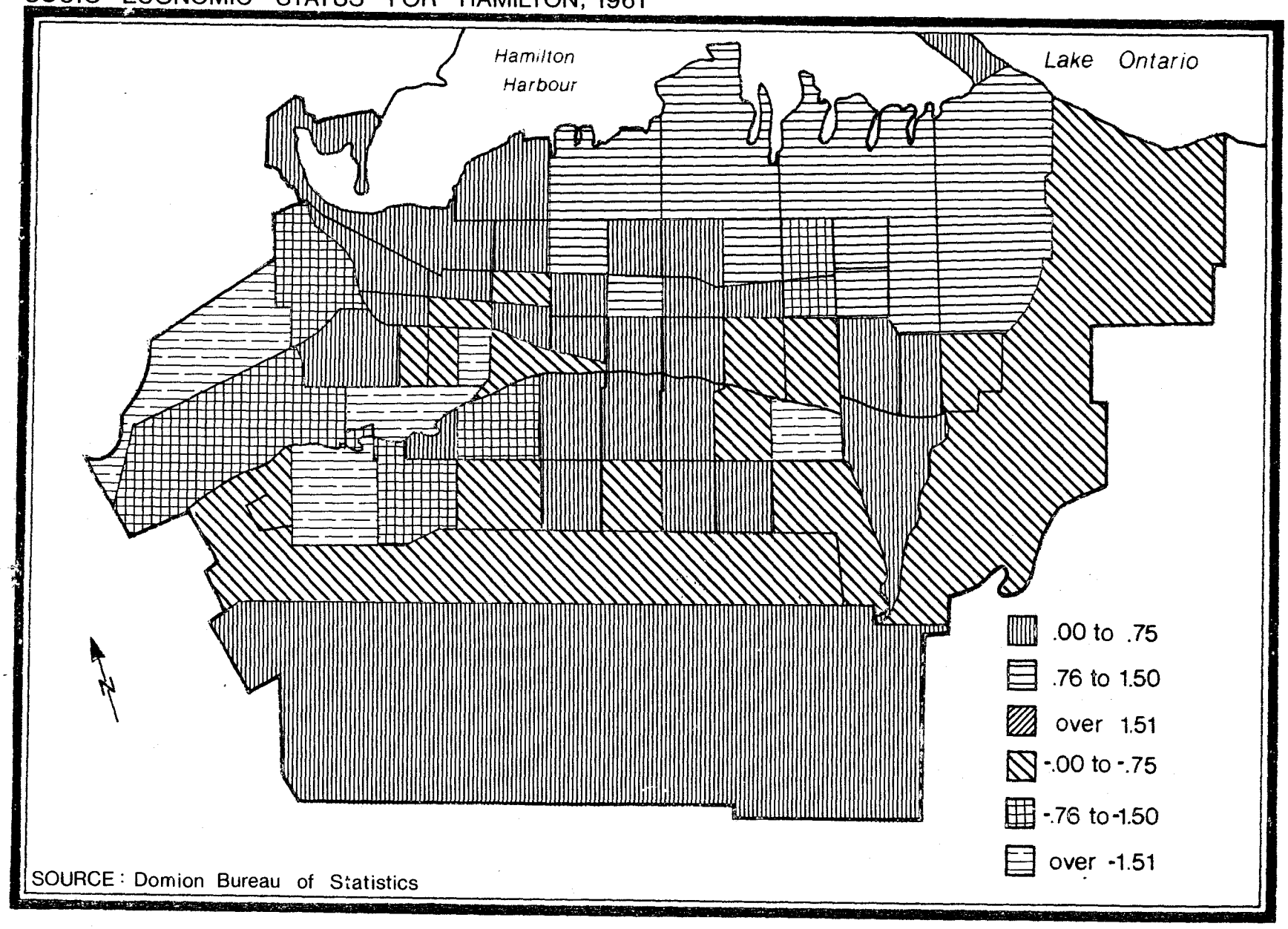
## MOUNTAIN AREA USED IN STATISTICAL ANALYSIS




SOURCE: Dominion Bureau of Statistics.

APPENDIX MAP 1

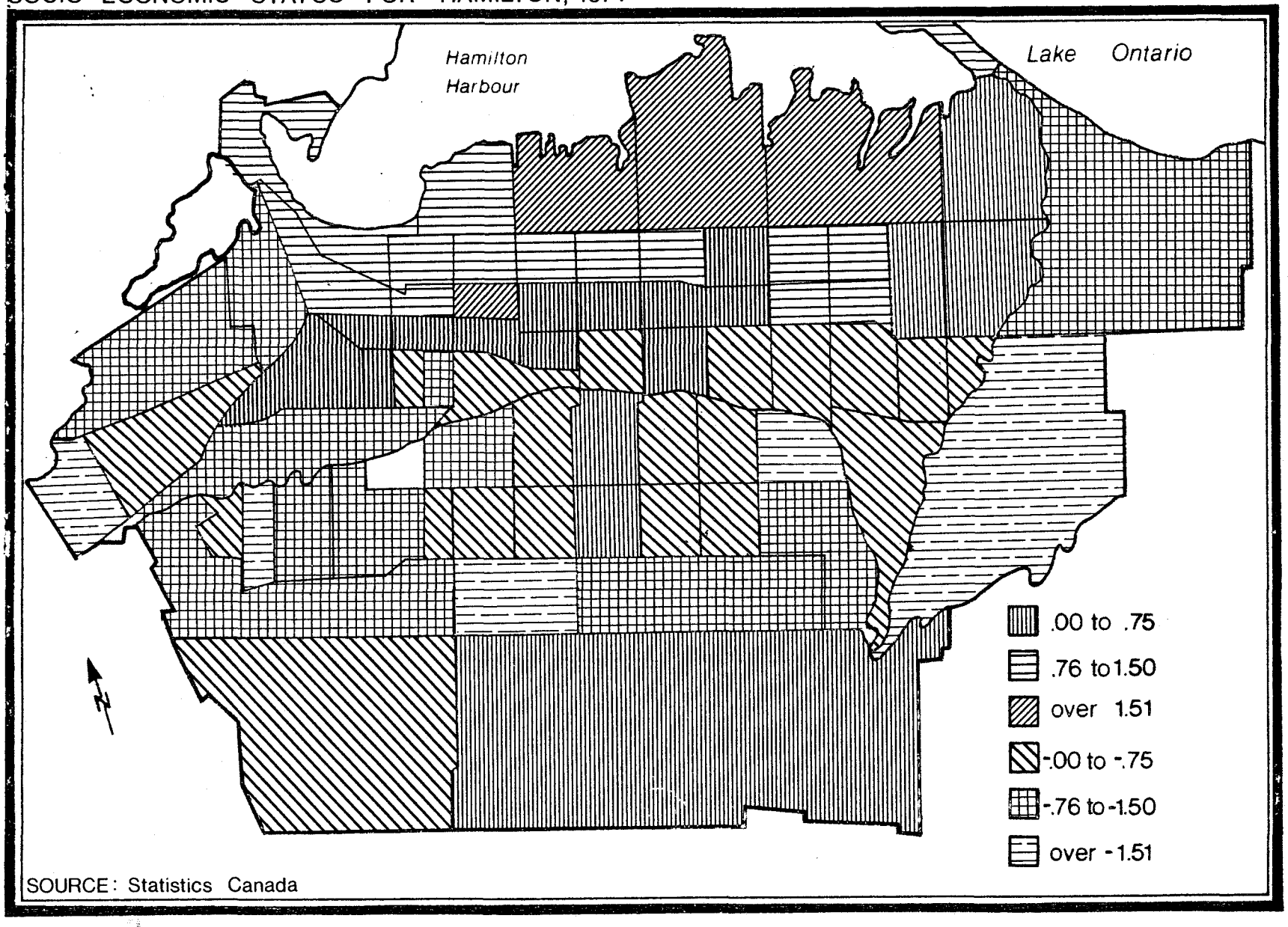
SOCIO-ECONOMIC STATUS FOR HAMILTON, 1961




SOURCE: Domion Bureau of Statistics

APPENDIX MAP 2

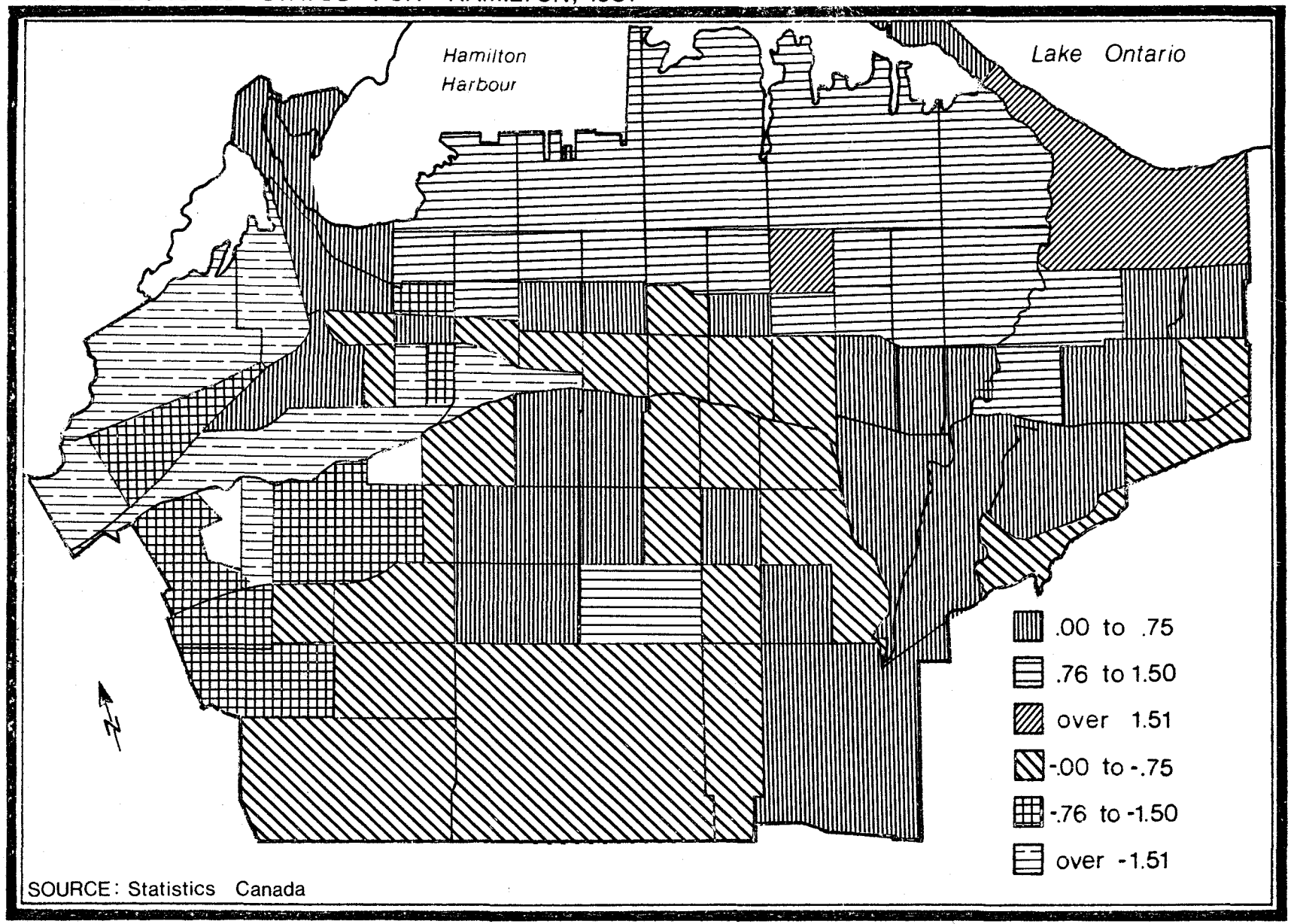
SOCIO-ECONOMIC STATUS FOR HAMILTON, 1971




SOURCE: Statistics Canada

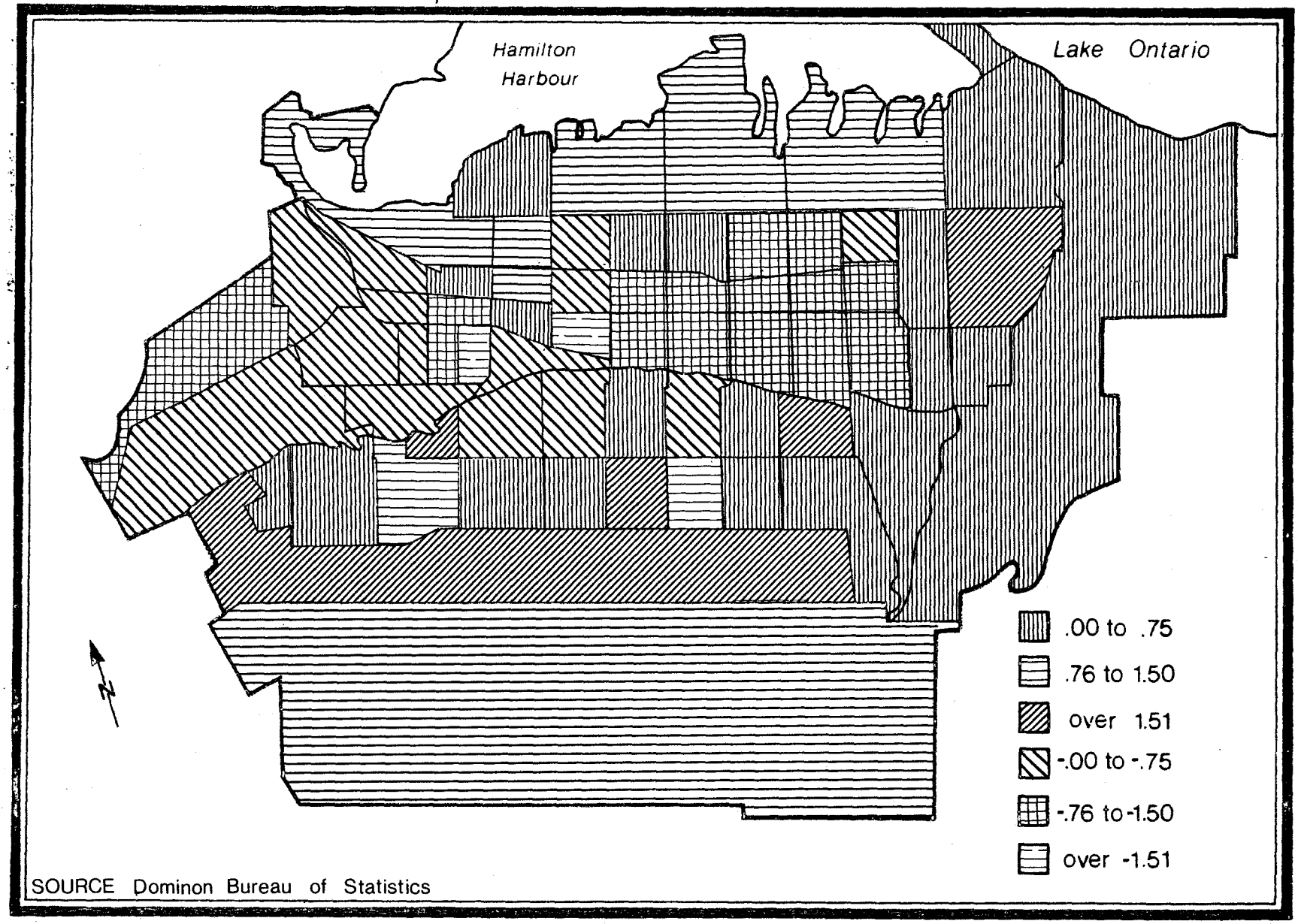
APPENDIX MAP 3

SOCIO-ECONOMIC STATUS FOR HAMILTON, 1981



APPENDIX MAP 4

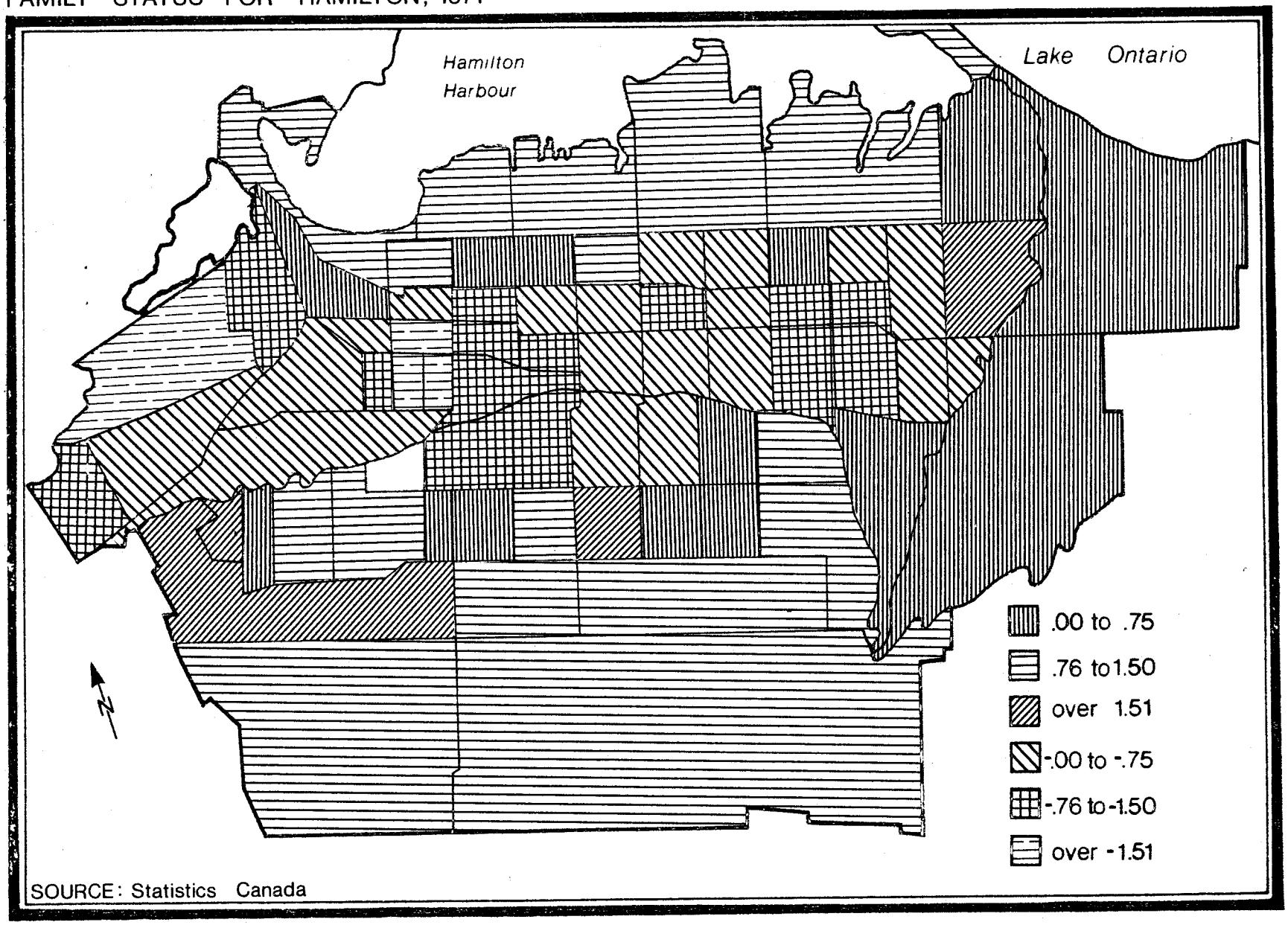
FAMILY STATUS FOR HAMILTON, 1961




SOURCE Dominon Bureau of Statistics

APPENDIX MAP 5

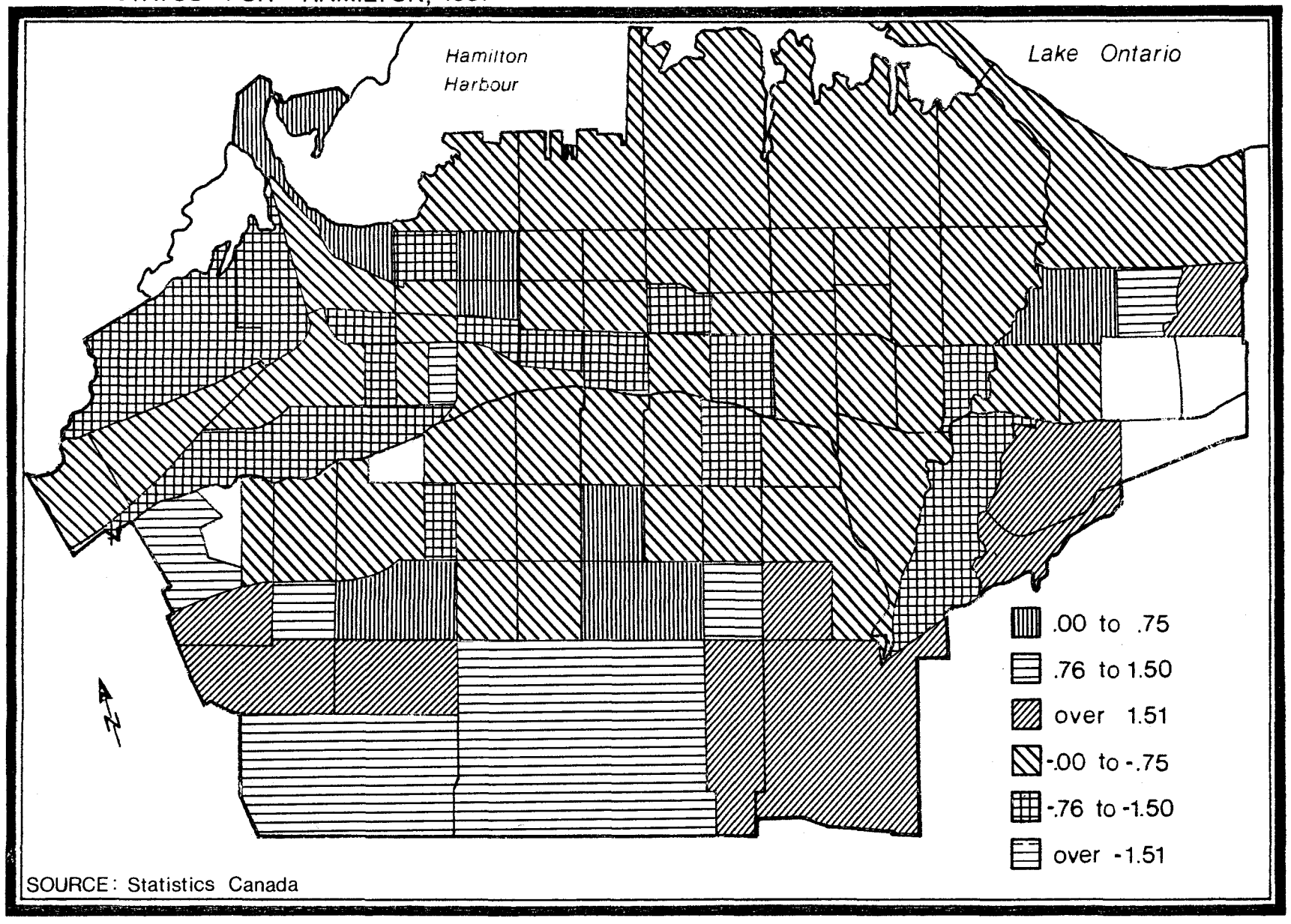
FAMILY STATUS FOR HAMILTON, 1971




SOURCE: Statistics Canada

APPENDIX MAP 6

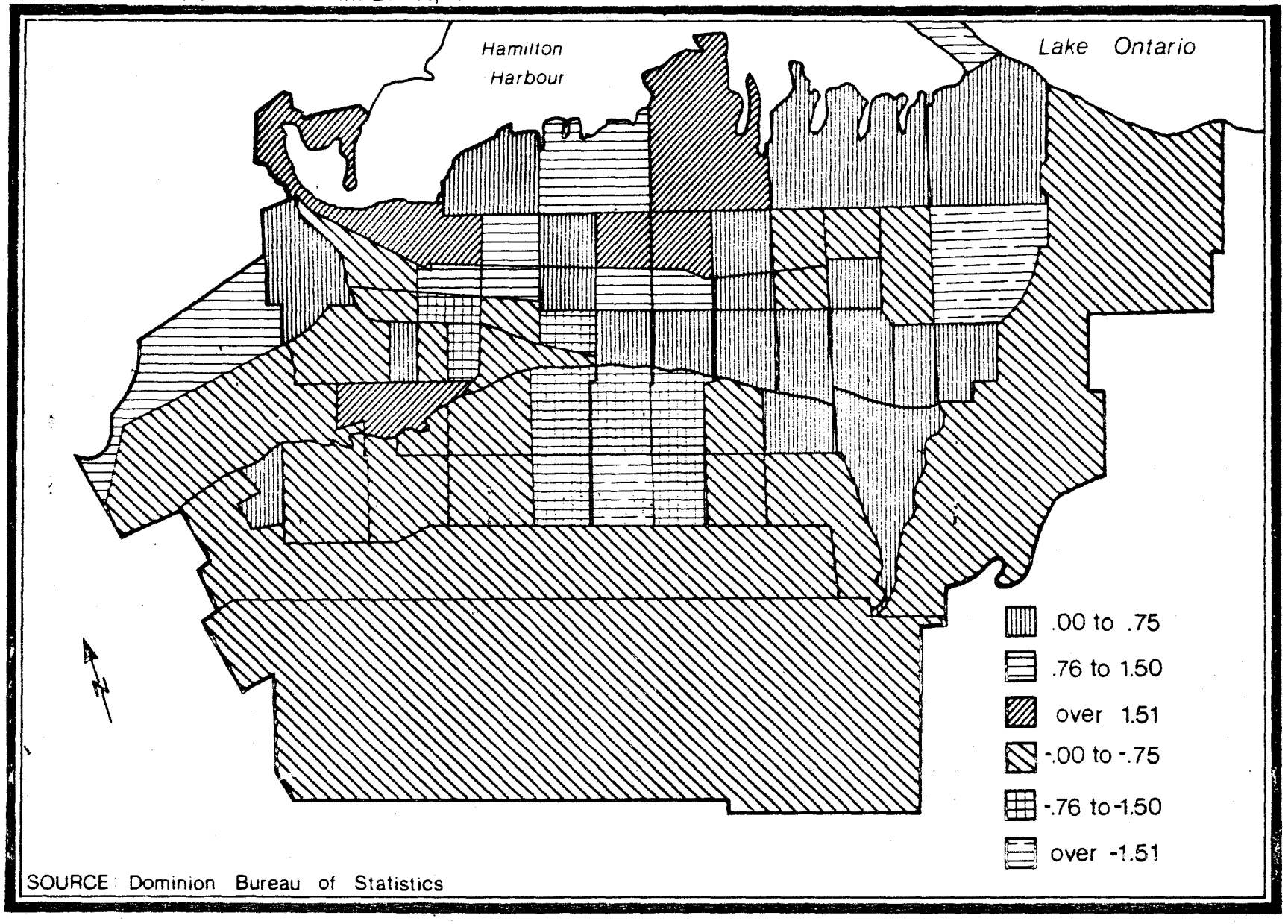
FAMILY STATUS FOR HAMILTON, 1981




SOURCE: Statistics Canada

APPENDIX MAP 7

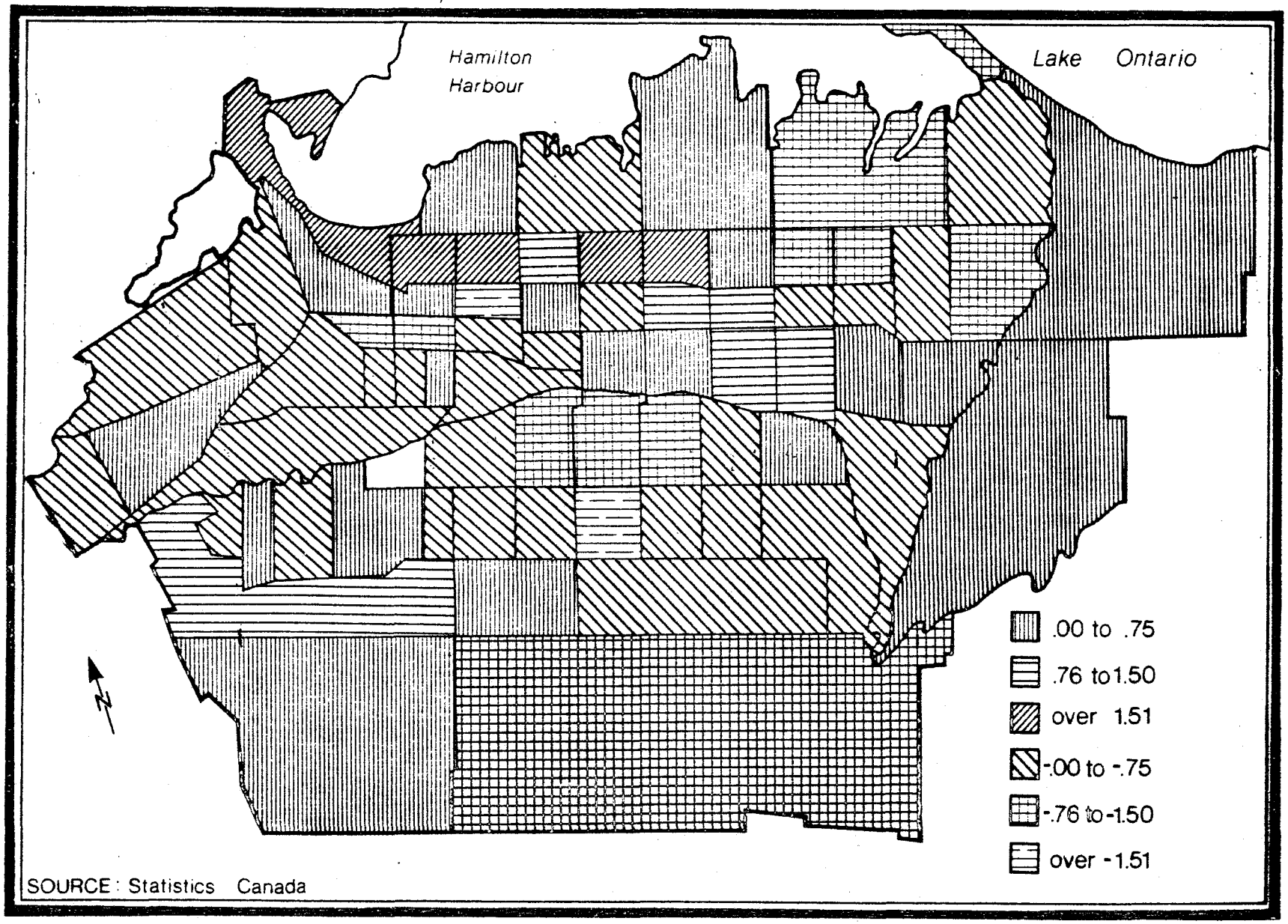
ETHNIC STATUS FOR HAMILTON, 1961

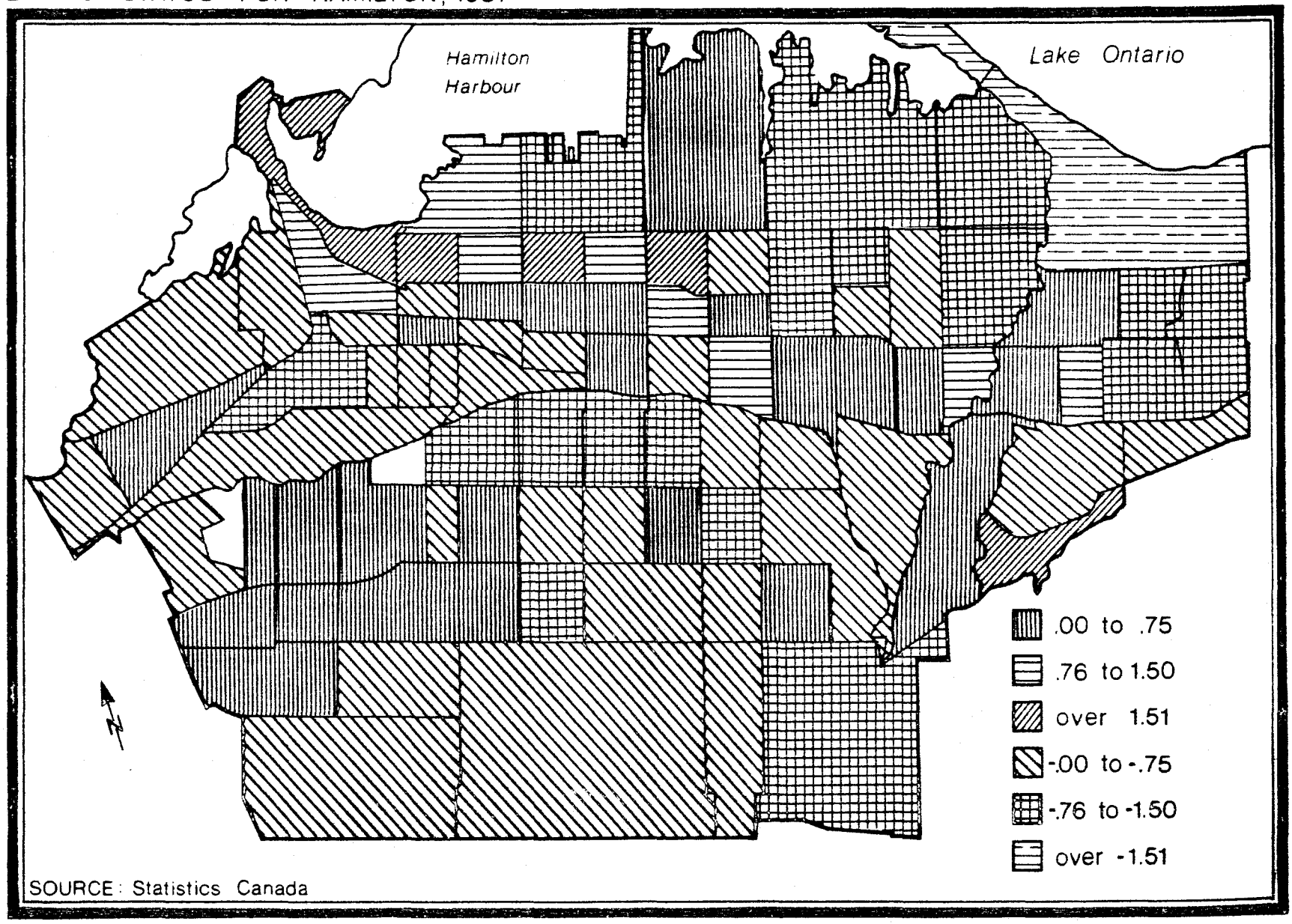



SOURCE: Dominion Bureau of Statistics

APPENDIX MAP 8

ETHNIC STATUS FOR HAMILTON, 1971



APPENDIX MAP 9

ETHNIC STATUS FOR HAMILTON, 1981