## THE RECENT EVOLUTION OF CANADA'S METROPOLITAN - NON-METROPOLITAN ETHNIC COMPOSITION

## A COMPARISON OF CENSUS YEARS 1971 AND 1981

BY

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#### ABSTRACT

The purpose of the research is to observe and describe recent evolutionary trends in Canada's metropolitan and nonmetropolitan ethnic composition by comparing census years 1971 and 1981. To identify salient spatial and temporal trends, three types of analyses were used: the index of ethnic diversity, the chi square test, and cluster analysis. These analyses employed ethnic origin data taken from the 1971 and 1981 censuses. Twenty-five CMAs were used and nine ethnic groupings. The non-metropolitan components were aggregated provincially. The research shows that variations in conditions over time and space affect ethnic composition While the degree of diversity may be to some extent. similar, the internal ethnic composition may be very different. It will also invalidate the claim that the size of cities is correlated with their index of ethnic In addition, a metropolitan and diversity. nonmetropolitan regionalization are produced which identify four main ethnic regions in Canada based on similarities in ethnic distributions. Factors such as historical settlement, socio-economic opportunities, demographic characteristics, cultural atmosphere, internal migration and immigration policy are offered as determinants of ethnic composition and change.

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Josame.

To Mom and Dad

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#### 1 INTRODUCTION

Issues relating to ethnic composition and cultural change in Canada have always been in the forefront of the nation's politics. Debates over Canada's Official Language Act, continual review of immigration policy, and the Royal Commission on Bilingualism and Biculturalism are but a few examples of the importance of cultural differences in the The uneven spatial distribution of Canadian population. Canada's many ethnic groups has made the challenge of coping with cultural diversity all the greater. Studies focusing ethnicity must be undertaken in response to this on challenge. Because ethnic origin is related to so many levels, occupation variables, such as education other structure, fertility rates, religious denomination, and the power structure, its changing nature must be regularly monitored and studied so that its impacts on these variables can be understood.

The relevance of this study stems from the need to establish a full understanding of the dynamics of Canadian ethnicity which can then be used in areas of policy generation, conflict resolution and the like. The generation of immigration policy, for example, is highly dependent upon ethnic composition studies. Immigration officials must know the consistency of populations and their location throughout the country before they can generate efficient policies that will prevent over-saturation of

immigrant groups and other such problems. Similarly, multicultural policies, designed to ensure the rights of ethnic groups and promote their persistence in Canada, must be based on accurate and current knowledge about the size, location and changing nature of the various ethnic communities existing in the country.

Ethnic conflicts also emerge in certain areas when and aspirations of significant groups the needs are restrained by government policy. overlooked or The be aware of population characteristics government must before they can direct that population in an effective Certain ethnic populations may require tailored manner. policies in order to further themselves in Canadian society. Some may require special supplementary education programmes to help them adopt the Canadian language while others may require employee training programmes to assist in learning basic skills and in searching for employment. To be able to target such social and economic policies, governments must know who and where the needy populations are and this requires extensive study of the nation's ethnic composition.

The continued significance of ethnic origin in the definition of Canada's social mosaic has prompted the undertaking of the present study. The main purpose of the research is to observe and describe recent evolutionary trends in Canada's metropolitan and non-metropolitan ethnic composition by comparing census years 1971 and 1981.

Several research questions will form the basis of this It is essential that the researcher determine how paper. variations in conditions over time and space affect ethnic composition. Not only does one expect ethnic composition to differ between St. John's and Vancouver due to variations over space, but also between 1971 and 1981 due to variations Another valid research question is concerned over time. with the size of cities. Casual empiricism suggests that Toronto, being a larger city, will have a more complex ethnic fabric than Thunder Bay. To actually confirm such an observation, the researcher must determine whether the size of cities is correlated with their index of ethnic It will also prove useful to determine how diversity. similar Canada's metropolitan areas are in terms of ethnicity and the type of metropolitan regionalization that can be made based on those similarities. In addition, the whether researcher shall endeavour to discover nonmetropolitan areas are more homogeneous in character than their urban counterparts and how they vary amongst themselves.

The next section will review literature relevant to the study of ethnicity and will attempt to place the present study in its appropriate literary context. This review will be followed by an examination of the data source, the data organization, and the research methodology that was employed. Once this task is completed, the results

obtained from the various analyses will be presented followed by some comments as to why certain trends emerged. 2 LITERATURE REVIEW

#### 2.1 INTRODUCTION

Canadian ethnicity can be studied in many ways using One may choose to examine a single many approaches. characteristic over many ethnic groups or many characteristics of a single group. The geographic scale of the study may be national, regional, or local and may focus on an urban or rural level. The methodology may borrow from one or many disciplines including sociology, history, geography and virtually all of the social sciences and humanities. Ethnicity may also be studied with respect to many other variables such as education, occupation, fertility, the power structure and so forth. The existence of many different ethnic groups, the various geographic scales, the numerous disciplinary approaches, and the many aspects and impacts of ethnicity have different all contributed to a vast and varied body of Canadian ethnic literature.

In spite of the great variety of Canadian ethnic studies, it is possible to identify nine main topical areas. These include: ethnic identity per se; ethnic group survival; ethnic identity change; the history of specific ethnic groups; demographic analysis of immigration and ethnicity; the place of ethnic minorities in Canada; ethnic

relations; multicultural policies and education; and ethnic composition. The present study falls into the final it will examine the changing ethnic category since composition of selected metropolitan areas between 1971 and Literature from this category will be reviewed to 1981. indicate past approaches used in the study of ethnic composition and the types of results obtained. Studies from other categories, such as ethnic identity per se, the history of ethnic groups, and demographic analysis of immigration, will be examined as well since they contribute to the overall understanding of ethnic composition in Canada.

#### 2.2 ETHNICITY PER SE

Before undertaking an ethnic study, one must have a comprehensive understanding of what ethnicity means. Thus, it was necessary to review literature dealing with ethnicity Researchers have generally tried to identify se. per various factors as possible components of ethnic identity. Berry (1958) suggested the possibility of the ethnic group possessing ties of cultural homogeneity; a high degree of loyalty to certain basic institutions such as family patterns, religion, and language; distinctive folkways and mores; moral codes; patterns of art and recreation; a consciousness of kind; a political unit. Others, such as sociologists Theodorson (1969) and Schermerhorn (1970), believe significant factors of ethnic identity to be a

common cultural tradition and sense of identity as a traditionally distinct subgroup within a larger society. Anderson (1981) argues that ethnic identity is determined by ethnic origin, mother-tongue, ethnic-oriented religion, and folkways, all of which he describes in detail. A study by Cohen (1984), which focuses on concepts and models for ethnic change, also provides a thorough analysis of ethnic identity per se. Cohen argues that ethnic identity is a dynamic phenomena which is the product of complex cultural, social, economic, and political processes. He believes ethnic groups to be distinguished from the surrounding population by shared cultural characteristics such as language, religion, history, and geographical origin. All of these studies have provided an intrinsic understanding of ethnic identity, and in so doing, are significant to the present research.

#### 2.3 ETHNIC GROUP HISTORY

Literature related to the history of various ethnic groups was also reviewed. In understanding historic settlement patterns, power structures, and so forth, the researcher will be able to more readily explain Canada's present ethnic situation. A study by sociologist Kalbach (1978)`showed how initial French dominance followed by the Conquest of 1760 and British charter status led to a Canadian population that was approximately ninety per cent British and French by Confederation. Hecht (1983) also

importance of Loyalist migrations recognized the to The two founding Ontario's present ethnic composition. to dominate Canadian have continued ethnic groups composition up to the present decade emphasizing the importance of ethnic history in determining contemporary 'visible' Other historical studies focus on trends. These include Robin Winks' The Blacks in Canada minorities. (1971), Myrna Kostash's account of the Ukrainians in All of Baba's Children (1977), and Ken Adachi's study of the Japanese in The Enemy That Never Was (1976). All of these detail the background of the group's coming to Canada, the roots of hostility toward it, its internal conflicts, and its place in Canada's economic, political, and social order. These factors will help assess the evolution of the group in Canada's ethnic structure. They may explain increases or decreases in the ethnic group's percentage of the total population or offer insight about spatial patterns of settlement.

#### 2.4 IMMIGRATION AND RELATED POLICY

Studies concerned with the demographic analysis of immigration have also been reviewed due to the direct impact that immigration has on ethnic composition. Kalbach (1970) has produced a very thorough study of the effects that immigration has on population, population distribution, and demographic characteristics. The latter includes items such as age-sex characteristics, labour force characteristics,

educational attainment, and marital status. Changes in all of these characteristics are studied within an ethnic context thus reflecting patterns of evolution in Canada's cultural fabric.

addition to studying demographic analyses of In immigration, it is important that literature on changing immigration policies be examined because one would expect changes in ethnic composition to be a function of such (1978), and Kalbach Anderson (1981), Richmond policy. give rather detailed histories of (1970) all Canada's immigration policy. Certain changes in policy had definite impacts on Canada's ethnic populations over time. For example, Asiatics were restricted during the 1930s due to the Great Depression and lack of employment opportunities. In general, government policy to the mid 1950s discouraged immigration from non-traditional sources. There is no doubt that these policies had definite impacts on the ethnic composition of Canada, and for this reason, the researcher must be familiar with policy trends.

In exploring more recent literature, a significant change in immigration policy was discovered which will be of special relevance to the present study. Beaujot (1986) reviewed the 'Green Paper on Immigration and Population' which was passed as Bill-C24 in 1978. The paper implied that it would be in the best interests of Canada to continue immigration from traditional sources such as Britain,

Ireland, and France. This reserved and ambivalent policy would most likely affect ethnic composition abroad. In addition, it would affect the spatial distribution of ethnicity because it urged migrants to settle away from the largest urban centres. Knowledge of recent policy modification is vital to the present study because it will offer a partial explanation for changes in ethnic composition and distribution.

#### 2.5 ETHNIC COMPOSITION

review of studies dealing specifically with A ethnic composition is naturally of great Canada's It gives one the opportunity to survey the significance. different approaches and techniques used in ethnic research and also provides an overview of past results and trends. Several studies have been selected to indicate the type of research that has been done in the area. Frederick Hill (1976) must be commended for his intensive study of ethnic composition in which he examined national trends as well as provincial and urban size differences in birthplace, mothertongue, and ethnic origin. By using three different measures of ethnicity, he was able to make an accurate overall assessment of Canada's changing ethnic patterns, and at the same time, was able to highlight the strengths and shortcomings of each measure. He noted that while the British and French remained dominant through time, the most spectacular gains have been registered by non-traditional

groups such as the Asians. His study is of particular relevance due to the use of an index of ethnic diversity which is also embodied in the present research. The index is used by Hill to determine how diverse selected urban areas are and whether they are becoming more diverse over time. the index itself will be described in a later chapter on methods of analysis. In general, Hill was able to show that western cities tended to be more diverse than eastern cities, that larger cities tended to be more diverse than smaller ones, and that the average Canadian city changed very little in ethnic diversity between 1961 and 1971. This same index will be used in an attempt to determine similar evolutionary patterns.

Statistics Canada is an obvious source for studies on ethnic composition. For each census, one can find profile studies of various topics including ethnicity. In the volume of profile studies (1971), Statistics Canada considers how ethnic composition has changed from the previous census, how it varies regionally, and how it varies on an urban-rural scale. The demographic, cultural, and economic aspects of ethnicity are also examined to indicate how total population will be affected. Statistics Canada basically deals with frequency distributions and related measures. Their findings tend to be similar to those of Hill.

Another interesting study was done by Alfred Hecht

(1983) which focused on ethnicity in Central Canada. Hecht employed a statistical tool called centrography to translate a large quantity of numerical data into graphic form. The centrographic technique summarizes the central location of each individual ethnic group and allows one to determine the distribution of ethnic categories. In his study, Hecht found that, in Ontario, the British are concentrated in the Toronto-core area, the French and Natives have high concentrations in northern Ontario, and Western, Eastern, and Southern Europeans all have disproportionate concentrations in the north, but also have significant percentages in geographic proximity to the south core. Such an approach proves very useful in determining the spatial distribution of ethnic groups, and if applied over time, could be used to determine ethnic change.

Anderson (1981) and Kalbach (1978) have also contributed to the study of Canada's ethnic composition. Anderson uses census statistics to determine historical as well as recent trends in the country's ethnic fabric. Not only does he examine changes in the growth rates of various cultural groups, but also determines their distribution over space. In doing so, he is able to illustrate some of the regional disparities in immigrant distribution. Kalbach's study provides interesting insights as well. Part of his research focuses components of ethnic change: on two immigration and fertility. He discerns many new trends

which have resulted from changes in these components. For example, he notes how a decline in the traditionally high fertility levels of the French in Quebec will affect their relative position within the Canadian population. Such components must be considered as plausible causes for change in the ethnic structure between 1971 and 1981. Like Anderson, Kalbach examines the regional distribution of ethnic populations and also discusses their urbanization tendencies. Both of these studies provided valuable insights as to the types of trends that should be identified when examining ethnic groups.

#### 2.6 CONCLUSION

Canadian ethnic literature is indeed very ranging and categorical, but the categories are intrinsically related. Although a single aspect of ethnicity may be chosen for intensive study, this review has shown that a general knowledge of various ethnic-related topics is required. One could not possibly explain trends in ethnic composition without first understanding immigration policy, ethnic group histories, and other such factors. In addition, the review has provided valuable background information concerning past approaches used in the study of ethnic composition and the types of results obtained.

#### 3 DATA SOURCE AND RESEARCH METHODOLOGY

#### 3.1 INTRODUCTION

This chapter provides information concerning the

sources used to obtain the data, the manner in which the data was organized, the methods of analysis that were employed and their basic design. The three basic analyses to be discussed include: the index of ethnic diversity, the chi square test, and the cluster analysis. Each of these has been used to address one or more of the research questions previously defined.

#### 3.2 THE DATA: SOURCE AND ORGANIZATION

The data to be used comes from the 1971 and 1981 Canadian censuses and is organized on a metropolitan - nonmetropolitan scale. Twenty-five Census Metropolitan Areas been chosen along with ten non-metropolitan areas have aggregated provincially. For each of these areas, nine categories have been used to classify the ethnic origins of The areas and categories are listed in the population. Appendix A. These categories were constructed by combining ethnic origin groupings from the census as shown in Appendix The resultant categorization was the most and C. B disaggregate that could be achieved given the nature of the data in the two years. The partitioning of the population into ethnic categories in 1981 was complicated by the use of multiple origins. People with multiple origins were divided evenly into the different categories employed. Thus, if 100 people were found to have both British and French origins, then 50 were designated French and 50 British. Summing the nine categories and subtracting this figure from the total

population left a small residual group classified as "other". This category was not incorporated into the data set. The number of people in each ethnic group, in a particular place and at a particular time, is expressed as a percentage of the total metropolitan - non-metropolitan population.

#### 3.3 METHODS OF ANALYSIS

## 3.3.1 The Index of Ethnic Diversity

Three tests were applied to the data base in an attempt to draw some conclusions about Canada's changing ethnic composition. The first analysis conducted involves an index of ethnic diversity. The index itself is given by

# $1 - \Sigma P_i^2$

where P<sub>i</sub> is the proportion of an urban area's population in the i<sup>th</sup> ethnic group. The index assumes a value of zero when everyone in the urban area has the same ethnic origin (Hill, p.258). If each of the nine ethnic groups being considered accounts for one-ninth of the metropolitan population, then the index will yield a maximum value of .8889. The index of ethnic diversity was calculated for 1971 and 1981. It can be used to indicate how ethnicity varies between metropolitan areas, how well correlated ethnic diversity is with city size, and whether or not cities are becoming more diverse in nature. The index can also be calculated for non-metropolitan areas in Canada to determine if they are becoming more diverse or homogeneous and to observe how they compare with their metropolitan counterparts. The results of this 1971-1981 calculation can be compared with trends observed in Hill's 1961-1971 study based on 137 urban areas and twelve ethnic groups.

3.3.2 The Chi Square Test

A second test to be conducted is the chi square test for two or more independent samples. The test statistic is given by  $k + \frac{1}{2} \left( 2 + \frac{1}{2} \right)^2$ 

$$\chi^{2} = \sum_{i=1}^{k} \sum_{j=1}^{1} \frac{(O_{ij} - E_{ij})^{2}}{E_{ij}}$$

where

k = total number of categories l = total number of samples O<sub>ij</sub>= observed frequency in category i, sample j E<sub>ij</sub>= the expected frequency in category i, sample j which is calculated by multiplying the total number of observations in all samples in given category by the total number of observations in all categories in the given sample, divided by N

To compare distributions over time, two samples are defined by the years 1971 and 1981. Each of these samples is split into the same nine mutually exclusive categories defined by the various ethnic groupings. The samples consist of absolute frequency data which was obtained by multiplying the percentage representing a particular ethnic group in a particular city at a particular time by the total area population at that same time. Once the chi square value was calculated for each metropolitan - non-metropolitan area, it was tested for significance by comparing the computed value to some critical value for a required level of significance and degree of freedom. The degrees of freedom is given by

$$v = (k-1)(1-1)$$

where k and l are defined as in the previous manner. By comparing the sample frequencies in each category, one could determine the probability that the samples are drawn from different populations. In other words, the chi square test enabled the researcher to determine how similar or dissimilar ethnic origin compositions are over time. A chi square test could also be applied to determine similarity of distributions over space. In such a case, each metropolitan ethnic distribution for a particular time can be compared to an average distribution for the same time. However, the next analysis proved to be more visually explicit in determining similarities between metropolitan (nonmetropolitan) areas over space.

#### 3.3.3 The Cluster Analysis

The cluster analysis was used to visually demonstrate spatial similarities and dissimilarities between metropolitan areas and also between non-metropolitan areas. This, in turn, allowed a metropolitan and a non-metropolitan regionalization based on ethnic composition to be produced.

The CLUSTER feature available on SFSS<sup>×</sup> was employed in this research. CLUSTER uses an agglomerative process which computes or reads the proximities between individual cases (initial clusters) and combines the two nearest clusters to form a new cluster. It then recomputes the proximities between existing clusters and the new cluster. Next, it recombines the nearest clusters until all cases have been combined into one (SPSS<sup>X</sup> Inc., 1986). This process yields a hierarchy of cluster solutions ranging from one overall cluster to as many clusters as there are cases.

In this particular research, the aim was to cluster the twenty-five CMAs (and ten non-metropolitan areas) into groups that were relatively homogeneous with respect to the variables used in the ethnic origin distribution. This process was done for 1971 and 1981. The data was in percentage form so as to factor away any size differential between the cities. Although seven methods of clustering are available, the single linkage or nearest neighbour method was selected because it would cluster those cities that were closest in proximity or 'most similar'. The number of clusters chosen ranges from one to twenty-four so that a complete hierarchy can be observed which clearly illustrates spatial associations and ethnic similarities and dissimilarities. The output is in the form of a vertical icicle plot and agglomeration schedule which shall be further described in the discussion of the results.

#### 4 THE RESULTS

#### 4.1 INTRODUCTION

The results of the three analyses highlight some interesting trends concerning ethnic distribution in Canada.

These trends are generally spatial and temporal in nature and can be used to address the research questions outlined at the start. The results of each test will now be examined.

#### 4.2 THE INDEX OF ETHNIC DIVERSITY

The index of ethnic diversity provided a useful summary measure of ethnic composition in metropolitan - nonmetropolitan areas. Table 4.2.1 contains the 19<sup>-1</sup> and 1981 index calculated for each area and a list of the differences in these indices over time. Figure 4.2.1 and 4.2.4 attempt to highlight any spatial clustering. The numerical code is explained in Appendix D.

Table 4.2.1 Summary of Index of Ethnic Diversity

	Metz	opolitan		
Place		1971	Difference	:281
l		.059	+.002	. 361
2		.350	029	. 321
3		.311	019	- 292
4		.108	052	. 356
5		.508	+.005	- 513
6		.286	005	. 281
7		.116	023	. 293
8		.088	037	. 051
9		.519	+.061	- 290
10		.592	+.042	- 534
11		. 399	+.048	. 447
12		.453	013	- 440
13		. 594	+.035	. 529
14		.639	008	- 531
15		.692	021	.571
16		.709	009	.700
17		.575	+.110	.685
18		.666	+.029	- 595
19		.699	+.040	- 739
20		. 656	+.030	- 586
21		.668	+.019	- 586
22		.594	+.028	- 522
23		.693	+.018	-711
24		.574	+.063	- 537
25		. 379	+.039	- 418
		ME	AN = .031	
	Non-N	<u>letropolita</u>	<u>n</u>	
L		.109	+.025	-134
2		.295	+.031	- 326
3		.386	+.029	-415
4		.538	+.009	- 547
5		.214	038	-176
6		.616	045	- 571
7		.749	006	.743
8		.718	002	-716
9		.713	023	- 690
10		.671	022	- 649
		ME	CAN = .023	



INDEX OF ETHNIC DIVERSITY 1981 25 SELECTED CMAs

A clear spatial distinction can be made, as illustrated in Figure 4.2.1 whereby metropolitan areas in Eastern Canada tend to be less diverse than those in Ontario and especially the West. This distinction is also evident in Hill's 1961-1971 study of ethnic diversity. The history of the Atlantic Provinces and Quebec, together with their deep cultural roots, are obviously responsible for their ethnic homogeneity. Continued movement to Canada's "western frontier" may be responsible for its general diversity with other more specific forces, such as cultural policy, historical settlement and so forth, acting to produce specific diversities. The most diverse metropolitan areas were Thunder Bay and Winnipeg in 1971 and 1981 respectively and the most homogeneous for the same years were St. John's and Chicoutimi. Again, cities with a distinct ethnic history and character emerge as the most homogeneous.

Toronto experienced the most substantial increase in diversity from .575 to .685 which constitutes a difference of .10. While increases in diversity ranged from .10 in Toronto to .002 in St. John's, all decreases in diversity were less than .05 with most being substantially less. Thus, there is a tendency for cities to remain virtually the same in terms of diversity or to become more diverse. Note that fifteen of the twenty-five CMAs became more diverse. In general, the average Canadian city changed very little in ethnic diversity between 1971 and 1981 with a mean difference of .031. Hill (1976) also found this to be the case between 1961 and 1971. While Hill was surprised that Canadian cities did not increase in ethnic diversity in view of the amount of immigration during his chosen time of study, the 1971-1981 trend is not as surprising in light of the more reserved immigration policy imposed by the Green Paper in the mid 1970s.

addition to these trends, casual empiricism In suggests that there may not be a strong and consistent correlation between city size and diversity. Although very large cities such as Toronto, Montreal, and Vancouver have indices greater than .5, cities such as Thunder Bay and Sudbury suggest that size is not the only factor influencing diversity. These two cities have indices in the .6 and .7 range reflecting their diverse ethnic fabrics. Yet, the populations of these two CMAs are in the 100 000 range. So, the hypothesis that city size is correlated with ethnic diversity cannot be conclusively drawn. Figures 4.2.2 and 4.2.3 clearly demonstrate that the two are not positively related.

Figure 4.2.2

## . 2 INDEX OF ETHNIC DIVERSITY 1971 AGAINST CITY SIZE





In non-metropolitan areas which were aggregated provincially, the east-west distinction is clear once again with Quebec and the Atlantic Provinces being less diverse than Ontario, the Prairies and the Pacific Coast. This trend is clear in Figure 4.2.4.

Figure 4.2.4

INDEX OF ETHNIC DIVERSITY 1971 PROVINCIAL NON-METROPOLITAN



Between 1971 and 1981, non-metropolitan areas in Quebec, Ontario and the West became more homogeneous while those in the East became more diverse. Hill found that most nonurban areas became more homogeneous between 1961 and 1971 as Average change in non-metropolitan areas for the well. time period in question was .023 which is slightly less than the metropolitan counterpart. It was surprising to observe some rather high indices in the .5 to .7 range. These areas were expected to be more homogeneous than the CMAs. Since smaller cities within the urban hierarchy have been considered "non-metropolitan", this trend is not very odd. The inclusion of smaller urban centres greatly contributes to the diversity of this non-metropolitan category. Nonmetropolitan, in this case, is not synonymous with nonurban.

It is important to note that while the index is a summary measure of ethnic diversity, it does not actually reveal how internal ethnic composition changes over time. In other words, it doesn't reveal specific changes in proportions between ethnic groups in a particular city, but rather indicates overall change. The index, however, does illuminate many salient features of Canada's ethnic distribution.

#### 4.3 THE CHI SQUARE TEST

The chi square test also gave rise to some interesting results. A detailed chi square sample test is

provided in Appendix E. Choosing 1971 and 1981 as the two samples, the ethnic distributions in each metropolitannon-metropolitan area could be compared over time to determine whether or not they had changed substantially. Upon calculation of the chi square statistic, it was found that, in every case, the test statistic was greater than the critical value for any level of significance and eight degrees of freedom as shown in Table 4.3.1.

Table 4.3.1 Summary of Chi Square Values

Metropolitan

Place	2	Value
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 19 20 21 22 24		1809.335 3028.350 1674.658 1804.520 79635.530 2914.920 2834.772 1189.041 13247.970 14378.180 5833.661 2497.892 13623.010 2941.488 2461.597 1889.337 101379.900 5902.342 28096.320 4152.141 3931.193 23355.280 28250.420 61883.730
45		3683.151
		<u>Non-Metropolitan</u>
1 3 4 5 6 7 8 - 9 10		884.110 387.555 2600.117 1387.079 80590.460 292088.500 7249.829 5955.632 16090.760 12558.870
FOFFOM.		

DEGREES OF FREEDOM: 8 CRITICAL VALUE: SIGNIFICANT FOR ANY

result enabled the researcher to reject the null This hypothesis that the ethnic composition of the area did not vary significantly over time. Rather, the nature of the distribution changed substantially over time. The chi square test captures changes in the proportion of people within particular ethnic groups which is something that the index of ethnic diversity, as a summary measure, doesn't. So while the index of ethnic diversity may not change much over time, internal changes in proportions may occur as reflected in the chi square test giving rise to a very different population in an ethnic sense. Although the chi square values are very large and seemingly not very discriminatory, they do prove this point. One must realize that the degree of ethnic diversity in an area can remain the same over time while composition and consistency vary. This trend reflects the dynamic nature of the Canadian population and continued movement and migration.

#### 4.4 THE CLUSTER ANALYSIS

The cluster analysis was used to group the cities into relatively homogeneous clusters based on their ethnic distributions. This, in turn, allowed a metropolitan and non-metropolitan ethnic regionalization to be produced. By conducting the analysis for 1971 and 1981, temporal changes in clustering could be observed in addition to spatial changes.

Stage	Clusters Cluster 1	Combined Cluster 2	Coefficient	Stage Cluster Cluster 1	lst Appears Cluster 2	Next Stage
l	4	7	.264267	0	0	2
2	4	9	1.582819	1	0	19
3	11	25	9.333344	0	0	7
4	19	23	26.705490	0	0	6
5	20	21	30.664520	0	0	6
6	19	20	32.197205	4	5	13
7	11	12	34.734116	3	0	10
9	2	3	41.110291	0	0	10
9	22	24	46.679238	0	0	17
10	2	11	54.047982	8	7	12
11	9	17	56.401194	0	0	12
12	2	9	67.069000	10	11	15
13	16	19	83.979897	0	6	14
14	10	16	91.067337	0	13	17
15	2	14	101.598526	12	0	18
16	13	18	103.335648	0	0	20
17	10	22	104.973297	14	9	18
18	2	10	131.582886	15	17	20
19	4	5	195.443853	2	0	21
20	2	13	222.895569	18	16	22
21	4	5	333.514648	19	0	24
22	1	2	370.358398	0	20	23
23	1	15	476.938721	22	0	24
24	1	4	1338.287598	23	21	0

Table 4.4.1 Agglomeration Schedule Using Single Linkage Metropolitan 1971

Table 4.4.1 is an agglomeration schedule for the twenty-five 1971 metropolitan areas which shows the stages of clustering and the corresponding proximity values at which items and clusters combined to form new clusters. For each stage, the schedule also shows the prior cluster levels at which the combining clusters were formed and the next stage at which the cluster combines with another. Note that a zero value indicates no prior stage or no subsequent stage. Each cluster is represented by a single number or item, that is, cluster one of the two items clustered. So, the cluster of four and seven in stage one will be represented by a four in subsequent stages.

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3	X	X	XX	XXXX	X	X	X	X	X	X	X	X	X	X	x	x	x	X	x	XX	XX	X	X	x
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To complement the agglomeration schedule, a vertical icicle plot is used as shown in Figure 4.4.1. It is a visual representation of the clustering process described in the schedule. The vertical icicle plot uses the single or nearest neighbour linkage method and is a complete plot of all cluster levels. Groups which are clustered together in the early stages of the plot (or schedule) are most similar while those grouped together in the latter stages are less similar. This point is reinforced by the magnitude of the the clustering proximity values which increases as progresses from many independent clusters to one overall cluster. The number of clusters or the cluster stage is shown on the vertical axis while the case label for the CMA or non-metropolitan area is shown on the horizontal axis.

Certain spatial trends emerge in the 1971 data for the twenty-five census metropolitan areas. In stage one, the first metropolitan areas to cluster were Quebec City (7) and Chicoutimi (4). It was expected that these Quebec-based CMAs would cluster early on since they are largely French in nature. Immediately, in stage two, Trois Rivieres (8) is added to this cluster. Since it was more homogeneous than the others, that is, less similar, it was not linked until the next stage. The clustering of these cities in the first two stages is indicative of their very strong ethnic similarities.

Tn stage three, London (11) and Victoria (25)cluster together. These two metropolitan areas show rather strong similarities despite the distance between them. This trend seems to be the only real aberration from the pattern that is to emerge. In stage four, the Western cluster begins to emerge with Edmonton (23) and Winnipeg (19) showing ethnic similarity and, in the next stage, Regina (20) and Saskatoon (21). By stage six, the Western cluster is even more apparent with Saskatoon, Regina, Edmonton, and Winnipeg all joining together. Thus, these CMAs are highly similar in terms of their ethnic distributions which is logical in light of their spatial proximity.

In stages seven through ten, the beginnings of the Ontario and Atlantic clusters emerge. Oshawa (12) joins the London (11) cluster and St. John (3) and Halifax (2) form a

group. Vancouver (24) and Calgary (22) also cluster together, but remain separate from the larger Western cluster denoting some degree of dissimilarity. In stage eleven, Toronto (17) and Hamilton (9) are clustered together. Despite the substantial size difference between the two, their ethnic distributions are fairly similar. This result is again supportive of the fact that ethnic diversity is not necessarily correlated with city size alone as was also suggested by the index of ethnic diversity.

Up to stage eleven, the linkages have been, for the large part, between metropolitan areas of close proximity. In other words, they have been intra-regional. One would expect CMAs that are closely located to have higher levels of similarity in terms of their ethnic composition because they are more likely to share populations of similar nature. The Quebec cluster, for example, was expected because of the French nature of the province while the Western cluster was expected by virtue of the greater ethnic mix characterizing the West.

By stage twelve, inter-regional linkages begin to occur. Thunder Bay (16) joins the Western cluster containing Winnipeg (19) while Halifax (2) joins the Ontario cluster. It is interesting to note that inter-regional linkages occur between some CMAs before certain intraregional linkages. Halifax (2) and St. John (3) prove to be more similar to Ontario CMAs than to St. John's (1). This

trend can be explained by St. John's disproportionate share of persons of British origin. Similarly, Thunder Bay (16) joins the Western cluster because it is more diverse in character than most of Ontario's metropolitan areas. Since it is spatially removed from the other Ontario CMAs, which are largely concentrated in the south, this trend is not too unusual. As Canada's third largest port and western terminus of the St. Lawrence, Thunder Bay may be an attractive area for immigrant populations.

Ontario CMAs continue to join the Ontario cluster by stage eighteen, the Western and Ontario clusters and, cohesive group suggesting that the degree form a of similarity between the clusters is beginning to diminish. With this fact in mind, one realizes that those CMAs joining clusters in the later stages of the analysis tend to be quite diverse and ethnically unique. Windsor (18) and Ottawa (13) form and independent cluster from stage sixteen until they join the West, Ontario and the Atlantic in stage twenty. While they do form a cluster, the strength of the similarity is not very great due to stage in which it appears. Hull (6) and Montreal (5) join the Quebec cluster in stages nineteen and twenty-one respectively. While they are most similar to the French CMAs, they are significantly different as well as indicated by the lateness of their inclusion in the cluster. Since Montreal is very large and cosmopolitan in nature and Hull on the provincial border,

the two CMAs may not be as homogeneous as the other French cities. In the final stages, St. John's (1) joins the cluster and so to does Sudbury (15). These CMAs join latest because they are the most homogeneous and most diverse respectively. These trends described for 1971 are consistent with similarities in the ethnic diversity indices.

After examining the cluster process for metropolitan areas in 1971, a metropolitan regionalization based on ethnic similarity can be made. Four distinct ethnic regions can be identified: the Atlantic, Quebec, Ontario, and the West. Most of the initial clusters were intra-regional and gave rise to this particular regionalization. However, certain irregularities can be seen in a few cases.

The region where there is strongest similarity between CMAs is Quebec as indicated by early clustering. Quebec remained distinct from the rest of Canada right up until stage twenty-four when it finally joined the other regions. Thus, it obviously has its own ethnic character. The Western provinces also clustered early on especially those metropolitan areas on the prairies. Although Vancouver and Calgary joined the cluster later than the others, they did prove to be most similar to the Western metropolitan areas. Victoria was the only exception which seemed to tend toward Ontario rather than the West. It may be less diverse due to its close proximity to Vancouver

where most immigrants and internal migrants would be likely to settle due to its large size and mainland location. Despite this, the Western CMAs seemed to form an ethnic region of their own characteristically more diverse than the others. Most of Ontario's metropolitan areas formed and identifiable region as well. Although a few exceptions, such as Sudbury and Ottawa, existed, most were clustered together in a distinct group. But, clustering of Ontario CMAs occurred much later than those in Quebec and the West suggesting that the degree of ethnic similarity between Ontario CMAs is not as great as in the other two regions. In other words, Ontario has the greatest intra-regional The last differentiation in terms of ethnic composition. identifiable region was the Atlantic where St. John and Halifax showed similarity joined by St. John's in the later stages. This region was expected to emerge due to its homogeneous British character.

Consider the relations between regions. While Quebec remained a distinct region until the final stage, the other regions showed some degree of similarity earlier on. The Atlantic region proved to have some semblance with Ontario as St. John joined together with London. Ontario and the West also showed similarity as Winnipeg and Thunder Bay were grouped together as well as Ottawa and Vancouver. The strength of these similarities was less than the intraregional ones since they occurred in the later stages of the

analysis. They do, however, convey something about the likeness of regions.

For 1981, the metropolitan trends were very much the same as 1971 with a few notable changes. Table 4.4.2 along

with Figure 4.4.2 capture these trends.

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The Quebec cluster remains very distinct from the other regions joining them, once again, in the final stage. Montreal (5) joins the Quebec cluster a little later than in indicating it is becoming more diverse. Patterns 1971 comparable to 1971 can also be seen in the West. Saskatoon (21) and Regina (20) cluster fairly early on as do Edmonton (23) and Winnipeg (19). However, these four do not form a single cluster until stage eleven as compared to stage six This observation suggests that their ethnic in 1971. fabrics, although most similar when compared to other CMAs, have experienced changes since 1971 that are making them comparatively different. This point is supported by evidence from the ethnic diversity indices.

Within Ontario, certain changes have occurred as well. The most notable change is seen in Toronto (17). The Toronto area has become much more ethnically diverse as indicated by its association with more diverse CMAs in Ontario and the West. Certain Ontario CMAs still show inter-regional linkages with the West such as Thunder Bay (16). Hamilton (9) and St. Catharines (14) have become more alike while Oshawa (12), London (11) and Victoria (25) show a strong likeness. Victoria remains a spatial anomaly. The CMAs of the Atlantic provinces remain most like Ontario, but st. John's is weakly related because it is still disproportionately British.

The main ethnic regions identified in 1971 remain

Quebec CMAs still share strongest apparent in 1981. similarities followed by the West, Atlantic, and lastly, Ontario. A greater degree of intra-regional differentiation based on ethnicity can be seen in the CMAs of the West as well as those in Ontario. The Ontario cluster seems to be the weakest since it is divided into two separate parts. This division has resulted from the growing diversity of certain CMAs and the growing homogeneity of others.

## Table 4.4.3 Agglomeration Schedule Using Single Linkage Non-Metropolitan 1971

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В		A	ĸ					D						B			A	ĸ		-			D		
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9 14	~~~~~	CAX.	XXXX	XXX	XX	XXX	XXXX	x					9	XXX	XX	XXX	XXX	XXX	XXX	XX	XXXX	XXX	XX		
a X	XXXXXXX	CCC	XXXX	XXX	XX	XXX	XXXX	(X				1	8	х	XX	XXX	XXX	XXX	XXX	XX	XXXX	XXX	XX		
7 X	x xxx	ccc	XXXX	XXX	XX	XXX	XXXX	X					7	X	X	XX	XXX	XXX	XXX	XX	XXXX	XXXX	XX		
6 X	X XXX	(XX)	XXXX	XXX	X	XX.	XXXX	(X					6	x	x	XX	XXX	XXX	XXX	XX	XX	XXX	XX		
5 X	X XXX	CCC	XXXX	XXX	X	XX.	XX	х					5	X	X	XX	XXX	XXX	XXX	XX	XX	XXX	х		
4 X	X XXX	XXX	XXXX	x	х	XX	XX	х				- 1	4	x	x	XX	XXX	XXX	XX	X	XX	XXX	X		
X 8	хх	XX	XXXX	X	х	XX	XX	X					2	Ŷ	x	Y	XY	XXX	XX	X	X	XXX	X		
2 X	хх	XX	XXXX	x	x	X	x	x					-	÷	*	Ŷ	27	YYYY	YY	×	X	X	x		
1 X	XX	XX	XX	x	x	x	x	x					-	-	-	-	~	-	vvv	-	×	x	x		

XXXX

x

Tables 4.4.3 and 4.4.4 and Figure 4.4.3 and 4.4.4 patterns for non-metropolitan areas aggregated show provincially in 1971 and 1981 respectively. For nonmetropolitan areas in 1971, the pattern is similar to that metropolitan counterparts. Alberta of their (9), Saskatchewan (8) and Manitoba (7) are most similar clustering within the first two stages. Nova Scotia (3) and Prince Edward Island (2) are quite similar as well with Newfoundland (1) joining in later on. Newfoundland's nonmetropolitan areas are more similar to those of Nova Scotia Prince Edward Island than are their metropolitan and counterparts. Non-metropolitan New Brunswick (4) is quite different from the rest of the Atlantic in that it has a weak but direct relation with British Columbia. This trend may be due to the fact that non-metropolitan New Brunswick has a larger number of smaller urban areas (non-CMA) than the other Atlantic provinces thus lending to greater ethnic diversity. Finally, Quebec joins the cluster in the final stage representing its dissimilarity even on the nonscale. A four-sector regionalization metropolitan is evident, once again, with Quebec, the West, Ontario and the Atlantic forming clearly identifiable clusters. In terms of regional associations, the West is most closely associated with Ontario and Ontario with the Atlantic. Ouebec is highly distinct.

In 1981, the non-metropolitan pattern is virtually

the same. Saskatchewan (8) and Manitoba (7) prove to be more similar than in 1971 when Saskatchewan was more like Alberta (9). But, all three still cluster within the first two stages. The other trends remain unchanged.

#### 4.5 SOME DETERMINANTS OF ETHNIC COMPOSITION AND CHANGE

Canada's ethnic composition is a function of many forces which shall now be discussed. Immigration policy, which is largely a political concern, has a definite impact on overall ethnic structure. In 1978, the Green Paper on Immigration and Population was passed as Bill-C24 imposing a much more reserved and ambivalent policy. In examining the results, one observes that, in most cases, ethnic diversity has changed very little between 1971 and 1981. Thus, the 1978 policy, in combination with other factors, may have limited ethnic growth.

An area's ethnic history is a vital determinant of contemporary ethnic trends as well. Various regions of Canada support this fact. Quebec, for example, remains largely French today because it has always been the centre of French culture in North America. Aggressive French colonization in the late seventeenth and early eighteenth centuries led to the emergence of a distinct nationality in the St. Lawrence area. Despite the many crises Quebec has faced, including conquest, division and the like, the province has remained the cultural hearth of the French due to these strong historical roots. Similarly, the Atlantic remains highly British in the 1980s. As a traditional fishing ground for the British, its coasts eventually came to be dominated by British colonists and a type of ethnic inertia set in. The West, however, is much more diverse as a result of the 'frontier' mentality which has characterized its history. People of different races, religions and nationalities have always turned toward the West where they believed they could find greater freedom and opportunity. The ethnic mix in the West has continued to attract a great variety of cultural groups who feel they can openly express themselves in this 'frontier' region.

To these ideas, one may add the notion that many cities acquired the ethnic and linguistic characteristics of the immigrant stream that was entering Canada at the time the area was settled. Thus, Quebec is mainly French because the French dominated the immigration stream at the time the area was settled. Similarly, the West acquired a peculiar ethnic mix because immigrants from Eastern and Central Europe were a much more important component of the immigration stream around the turn of the century when the West was opening up (Hill, 1976). Historical trends, therefore, are an important determinant of ethnic composition.

Socio-economic and cultural factors may also affect ethnic patterns. Internal migrants and immigrants will settle in those cities whose economies provide the types of

jobs in which their cultural group specializes. Admittedly, Canadians of all ethnic origins are found in all occupations, but there is a degree of occupational specialization of ethnic groups which is translated into a weak relationship between ethnicity and the occupation structure. Cities with a lot of manufacturing, for example, usually have a high percentage of Italians while Jews are found in cities where managerial and professional skills are in demand. Cities with an abundance of jobs will prove to be more attractive as well since they have something to offer newcomers.

In addition, an atmosphere conducive to the traditions of a particular culture will be sought. Individuals of a certain ethnic character will tend toward areas where institutions and enclaves of their persuasion are established. For example, Jewish immigrants will go to Toronto and Montreal where Jewish areas and institutions are to be found while Scandinavians will go to Vancouver (Hill, 1976). This type of migration often reinforces cultural differences between cities.

Ethnic change in Canada also has many demographic components including: differences in the age structure of ethnic groups which give them a different potential for growth; ethnic differences in fertility, marital status, sex ratios and inter-marriage with other ethnic groups; and changes in the number and nature of errors in reporting

ethnic origin. In addition to these components of ethnic change, urban Canada as a whole and each urban area also experience changes in ethnic composition because of ethnic differences in internal migration. The ability of a city to attract migrants from other parts of Canada is significant in determining the modern ethnic-cultural mix. Winnipeg, for example, derived its French component not from immigrants from France but from migrants from Quebec. A city's continued power to attract immigrants long after the initial settlement period is a very important component of ethnic change as well.

#### 5 CONCLUSION

This research has described recent evolutionary trends in Canada's metropolitan and non-metropolitan ethnic composition between 1971 and 1981. Using the index of ethnic diversity, the chi square test, and cluster analysis, definite spatial and temporal trends could be identified. The study showed that ethnic composition does vary between metropolitan (non-metropolitan) areas due to variations in the conditions associated with those areas whether they be historical, demographic, socio-economic or the like. The index of ethnic diversity showed Western cities to be more diverse than those in Ouebec and the Atlantic which tended to be very homogeneous. Ontario assumed a middling position in terms of diversity. Some changes could also be observed between 1971 and 1981 due to variations in conditions over

These changes were not so much in the degree of time. diversity as they were in the internal ethnic composition of cities. This fact was demonstrated by the chi square test. Despite some specific changes, the cluster analysis showed that, in regional terms, minimal change has actually occurred. Western cities remained most similar to each other as did those in Quebec, Ontario and the Atlantic. Non-metropolitan areas also remained quite similar. This analysis also showed that, in an intra-regional sense, Ontario has the greatest degree of internal differentiation while Quebec and Western cities are much more similar in It was clear that the size of cities is not nature. necessarily correlated with their degree of diversity. Some very diverse cities were actually quite small compared to others.

The research also attempted to suggest some of the factors that determine ethnic composition and change. It was shown that immigration policy of a reserved nature will result in declined ethnic growth rates. Historical factors, such as the timing and nature of settlement, are also important because they determine the ethnic base of cities. A number of socio-economic and cultural determinants were identified which included occupational structure, institutional character and the like. Demographic components and features of internal migration are also important influences on ethnic composition.

This study has provided an ethnic profile of Canada which can be employed in other studies of a more specific nature. The determination of policies related to immigration, education, occupation, fertility, religion and so forth cannot be effectively accomplished unless a full understanding of Canadian ethnicity is achieved. This research has contributed to that understanding and, in the long term, to more effective policy-making with respect to Canadian immigrant groups.

## APPENDIX

25 CENSUS METROPOLITAN AREAS

The following list indicates at what scale the data are available for the census years:

1971 CENSUS

CMA

A

St. John's Halifax St. John Montreal Ouebec Hamilton Kitchener London Ottawa Sudbury Thunder Bay Toronto Windsor Winnipeg Calgary Edmonton Vancouver Victoria Chicoutimi-Jonquiere St. Catharines-Niagara Hull Regina

Saskatoon

1981 CENSUS

All 25 CMAs present.

#### ETHNIC ORIGIN VARIABLES

AFRICA - AFRICAN ORIGIN AMERICA - AMERICAN ORIGIN ASIA - ASIAN ORIGIN EUR\_B - BRITISH ORIGIN EUR\_E - EAST EUROPEAN ORIGIN EUR\_F - FRENCH ORIGIN EUR\_N - NORTH EUROPEAN ORIGIN EUR\_S - SOUTH EUROPEAN ORIGIN NATIVES - INUIT OR NATIVE INDIAN CA

Trois Rivieres Oshawa

NOTE:

CMA	-	Census	Metropolitan
		Area	

CA - Census Agglomeration

## ETHNIC CATEGORIES BY CENSUS

1971 CENSUS

AFRICA	AMERI	CAS
NEGRO	WEST	INI

S

EUR E

CZECH ESTONIAN HUNGARIAN JEWISH LATVIAN LITHUANIAN POLISH RUSSIAN SLOVAK UKRANIAN

WEST INDIAN

ASIA

CHINESE EAST INDIAN JAPANESE

## EUR F

## FRENCH

## BRITISH ISLES

EUR B

EUR N

AUSTRIAN BELGIUM DANISH DUTCH FINNISH GERMAN ICELANDIC NORWEGIAN SWEDISH

EUR S

GREEK ITALIAN PORTUGESE ROMANIAN SPANISH SYRIAN-LEBANESE YUGOSLAVIAN

#### NATIVES

INUIT NATIVE INDIAN

## 1981 CENSUS

The partitioning of the population into ethnic origin categories in 1981 is complicated by the use of multiple origins. People with multiple origins were divided evenly into the different categories employed here. Thus if 100 people are found to have both English and French origins, 50 are designated French and 50 British.

#### AFRICA

AMERICAS

AFRICAN NORTH AFRICAN

#### LATIN AMERICAN

ASIA

ARMENIAN PALESTINIAN ASIAN ARAB WEST ASIAN INDO-PAKISTANI CHINESE INDO-CHINESE JAPANESE FAR EAST ASIAN PACIFIC ISLES

EUR B

BRITISH ISLES

#### EUR E

CZECH AND SLOVAK POLISH HUNGARIAN BALTIC RUSSIAN UKRANIAN ALBANIAN BULGARIAN MACEDONIAN OTHER BALKANS JEWISH

#### EUR\_N

WEST EUROPEAN FINNISH SCANDINAVIAN AUSTRIAN GERMAN SWISS

#### EUR S

ROMANIAN CROATIAN, SERBIAN GREEK ITALIAN MALTESE FORTUGESE SPANISH LEBAUENE SVRIAN

## EUR\_N

FRENCH

#### NATIVES

NATIVE PEOPLES

D METROPOLITAN AND NON-METROPOLITAN CODE NUMBERS FOR GRAPHS AND TABLES

#### METROPOLITAN

PLACE	PROVINCE	CODE
ST. JOHN'S	NEWFOUNDLAND	1
HALIFAX	NOVA SCOTIA	2
ST. JOHN	NEW BRUNSWICK	3
CHICOUTIMI	QUEBEC	4
MONTREAL	QUEBEC	5
HULL	QUEBEC	6
QUEBEC CITY	QUEBEC	7
TROIS RIVIERES	QUEBEC	8
HAMILTON	ONTARIO	9
KITCHENER	ONTARIO	10
LONDON	ONTARIO	11
OSHAWA	ONTARIO	12
OTTAWA	ONTARIO	13
ST. CATHARINES	ONTARIO	14
SUDBURY	ONTARIO	15
THUNDER BAY	ONTARIO	16
TORONTO	ONTARIO	17
WINDSOR	ONTARIO	18
WINNIPEG	MANITOBA	19
REGINA	SASKATCHEWAN	20
SASKATOON	SASKATCHEWAN	21
CALGARY	ALBERTA	22
EDMONTON	ALBERTA	23
VANCOUVER	BRITISH COLUMBIA	24
VICTORIA	BRITISH COLUMBIA	25

## NON-METROPOLITAN

#### NON-METROPOLITAN

NON-METROPOLITAN NON-METROPOLITAN NON-METROPOLITAN NON-METROPOLITAN NON-METROPOLITAN NON-METROPOLITAN NON-METROPOLITAN

NEWFOUNDLAND	1
PRINCE EDWARD ISLAND	2
NOVA SCOTIA	3
NEW BRUNSWICK	4
QUEBEC	5
ONTARIO	6
MANITOBA	7
SASKATCHEWAN	8
ALBERTA	9
BRITISH COLUMBIA	10

Ξ

AMPL	E CHI	SQUARE	SPREADSHEET	48			
ONDO	N. ON	TARIO					
THNI	CG	1971	1981	TOTAL			
	1	328	519	847			
	2	306	993	1299			
	3	1040	4345	5385			
	4	189855	206430	396285			
	5	12680	16305	28985			
	6	9017	9912	18929			
	7	28152	25977	54129			
	8	6281	15495	21776			
	9	1072	2008	3080			
TO	TAL	248731	281984	530715			
	I	j	Oij	Eij	0-E	0-E^2	0-E^2/E
	1	1971	328	396.96	-68.96	4756.1	11.98
	1	1981	519	450.04	68.96	4756.1	10.57
	2	1971	306	608.80	-302.80	91690.4	150.61
	2	1981	993	690.20	302.80	91690.4	132.85
	3	1971	1040	2523.80	-1483.80	2201650.8	872.36
	3	1981	4345	2861.20	1483.80	2201650.8	769.48
	4	1971	189855	185727.49	4127.51	17036346.9	91.73
	4	1981	206430	210557.51	-4127.51	17036346.9	80.91
	5	1971	12680	13584.44	-904.44	818018.4	60.22
	5	1981	16305	15400.56	904.44	818018.4	53.12
	6	1971	9017	8871.48	145.52	21175.2	2.39
	6	1981	9912	10057.52	-145.52	21175.2	2.11
	7	1971	28152	25368.72	2783.28	7746646.9	305.36
	7	1981	25977	28760.28	-2783.28	7746646.9	269.35
	8	1971	6281	10205.79	-3924.79	15403982.7	1509.34
	8	1981	15495	11570.21	3924.79	15403982.7	1331.35
	9	1971	1072	1443.51	-371.51	138018.4	95.61
	9	1981	2008	1636.49	371.51	138018.4	84.34

x^2= 5833.661

DATA BASE

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PLACE	PROVINCE	YEAR	POP'N	AFRICA	AMERICAS	ASIA
ST JOHNS	NFDLAND	1971	132.351	.023	.019	.218
HALIFAX	NOVSCOT	1971	242.088	.854	. 106	.313
ST JOHN	NEWBRUN	1971	103.998	.263	.014	. 148
CHICOUTIN	AQUEBEC	1971	125.424	.008	.012	.019
MONTREAL	QUEBEC	1971	2777.596	. 182	.176	.471
HULL	QUEBEC	1971	138.701	.010	.040	100
QUEBECIT	QUEBEC	1971	489,697	.013	.023	. 112
TRIVIERES	SQUEBEC	1971	107.816	.000	.000	. 143
HAMILTON	ONTARIO	1971	494.562	. 181	200	575
KITCHENER	RONTARIO	1971	233.104	. 117	.223	350
LONDON	ONTARIO	1971	248.733	. 132	. 123	.418
OSHAWA	ONTARIO	1971	118,476	.000	. 000	604
OTTAWA	ONTARIO	1971	462.227	. 190	. 150	. 751
ST CATH	ONTABIO	1971	285 049	106	036	232
SUDBURY	ONTABIO	1971	152.737	. 106	.096	251
THUNDERBA	ONTARIO	1971	113.584	.061	.014	621
TORONTO	ONTABIO	1971	2515.863	.516	.653	1 587
WINDSOR	ONTARIO	1971	245,904	475	.078	477
WINNIPEG	MANITOB	1971	553.979	190	173	733
REGINA	SASKTWN	1971	140.779	045	041	1 020
SASKATOON	NSASKTWN	1971	126.563	.134	.065	856
CALGARY	ALBERTA	1971	392,918	113	088	1 440
EDMONTON	ALBERTA	1971	468 344	157	076	1 209
VANCOUVER	RECOLUMB	1971	1032.955	118	.070	4 437
VICTOBIA	BCOLUMB	1971	195 784	087	.000	1 797
ST JOHNS	NEDLAND	1981	152 657	.007	.024	558
HALIFAX	NOVSCOT	1981	276 278	1 053	203	1 055
ST JOHN	NEWBRUN	1981	111.100	.000	.200	270
CHICOUTIN	QUEBEC	1981	133.712	.000	.000	.270
MONTREAL	QUEBEC	1981	2809.885	. 405	.892	1 729
HULL	QUEBEC	1981	171.497	.000	166	160
QUEBECIT	QUEBEC	1981	569.659	.000	. 091	297
TRIVIERES	SQUEBEC	1981	110.472	.000	.000	. 207
HAMILTON	ONTARIO	1981	540.713	. 193	487	2 112
KITCHENER	RONTARIO	1981	286.065	. 179	. 667	2 236
LONDON	ONTARIO	1981	281.989	. 184	.352	1 541
OSHAWA	ONTARIO	1981	152.343	.000	.582	1.023
OTTAWA	ONTARIO	1981	543.453	.387	. 489	3.351
ST CATH	ONTARIO	1981	305.403	.000	. 144	962
SUDBURY	ONTARIO	1981	150.425	.000	.000	.638
THUNDERBA	AONTARIO	1981	122.028	.000	.000	652
TORONTO	ONTARIO	1981	2949.885	.708	2,151	741
WINDSOR	ONTARIO	1981	250.132	. 498	.273	2.418
WINNIPEG	MANITOB	1981	583.637	.260	.644	4.593
REGINA	SASKTWN	1981	161.759	.000	348	2 364
SASKATOON	NSASKTWN	1981	148.837	.000	.000	2.953
CALGARY	ALBERTA	1981	562.720	.338	.522	5 922
EDMONTON	ALBERTA	1981	633.807	.324	.518	5.802
VANCOUVER	RBCOLUMB	1981	1235.830	.220	.259	12 752
VICTORIA	BCOLUMB	1981	228.133	.000	.234	4.001

EUR_B	EUR_E	EUR_F	EUR_N	EUR_S	NATIVES
96.949	.368	1.161	1.131	.096	.034
79.698	1.678	8.673	7.775	.665	.237
81.880	.813	12.862	3.585	.392	.043
4.329	.240	94.313	.717	. 199	. 165
16.771	6.647	67.417	2.192	6.142	.365
13.495	.652	83.342	1.676	.417	.268
4.392	.261	93.890	.603	. 383	.324
3.761	. 184	95.373	. 430	. 108	.000
67.363	6.949	4.503	10.960	8.847	. 422
54.851	6.845	4.571	31.500	1.370	.172
76.329	5.098	3.625	11.318	2.525	. 431
72.558	8.399	5.977	9.441	3.081	.000
57.387	4.883	26.188	6.601	3.322	.221
55.903	10.865	9.038	13.420	10.144	.256
37.625	6.550	38.348	9.798	6.827	.399
46.092	17.507	6.593	18.287	9.905	. 920
62.497	11.073	3.844	8.201	11.358	.271
51.357	9.547	21.843	7.674	8.325	. 223
45.226	22.656	9.000	18.937	1.831	1.251
48.697	13.439	4.612	29.272	.737	2.137
47.206	18.064	5.202	27.029	.576	.868
58.435	9.963	4.258	22.580	2.538	.586
46.262	19.166	7.522	22.254	1.892	1.095
61.867	7.601	4.184	18.090	2.932	.715
77.762	3.539	3.261	11.519	.976	1.034
96.852	.000	2.069	.437	.000	.084
81.770	.986	7.751	5.728	1.219	.235
82.870	.000	14.071	2.304	.484	.000
2.436	.000	97.090	. 199	.000	.274
12.606	5.293	67.736	1.454	9.387	.364
12.010	. 160	83.857	.973	2.237	. 438
3.776	.000	95.153	.372	.487	.324
2.647	.000	97.353	.000	.000	.000
62.256	10.660	4.813	8.259	10.492	.729
54.265	6.891	4.480	24.361	6.449	.374
73.205	5.782	3.515	9.212	5.495	.712
73.789	7.794	5.070	6.895	4.207	.640
54.155	4.427	26.280	5.013	5.428	. 471
57.020	10.866	9.463	10.660	10.454	. 431
39.107	5.790	40.445	6.591	6.152	1.276
48.760	15.318	8.532	14.496	9.889	2.354
51.781	11.337	3.715	5.272	17.080	.507
48.368	10.382	20.813	5.584	11.227	.435
42.938	19.250	9.753	15.921	3.890	2.750
47.836	12.164	5.300	25.369	2.554	4.084
47.562	15.652	6.152	23.862	1.009	2.811
58.060	8.439	6.089	15.501	4.010	1.119
47.491	15.581	8.419	16.270	3.603	1.991
56.545	7.184	4.414	13.043	4.427	1.156
75.299	3.938	4.098	9.446	1.951	1.033

		51			
NM	NFDLAND 197 PEI 197	1 389.749 1 111.600	.011 .046	.010	. 225 . 157
NM	NOVASCOT 197	1 546.912	.698	.027	.296
NM	NEWBRUN 197	1 530.602	.053	.010	.176
NM	QUEBEC 197	1 2388.566	.004	0.000	.264
NM	ONTARIO 197	1 2832.861	.048	.015	1.241
NM	MANITOB 197	1 434.221	.008	.025	.922
NM	SASKTWN 197	1 658.858	.019	.007	.620
NM	ALBERTA 197	1 766.638	.031	.021	1.405
NM	BCOLUMB 197	1 955.861	.031	.018	2.992
NM	NFDLAND 198	1 415.043	.051	.042	.283
	PEI 198	1 122.500	.044	.056	.338
NM	NOVASCOT 198	1 571.122	. 292	.081	. 420
NM	NEWBRUN 198	1 585.300	.081	. 101	.416
NM	QUEBEC 198	1 2642.975	. 100	. 127	1.079
NM	ONTARIO 198	1 3042.264	. 300	. 193	8.830
NM	MANITOB 198	1 442.563	. 177	. 162	.897
NM	SASKTWN 198	1 657.704	. 122	. 166	.884
NM	ALBERTA 198	1 1040.773	.233	.266	2.388
NM	BCOLUMB 198	1 1280.237	.287	.225	3.596

			52		
94.293	. 164	3.610	.759	. 349	. 581
82.792	. 341	13.749	2.289	. 345	. 283
77.126	1.157	10.911	7.762	1.306	.717
53.257	. 449	42.016	2.711	. 594	.734
5.326	. 176	88.361	.868	3.556	1.024
58.633	5.304	11.786	11.645	9.626	1.751
38.781	16.140	8.672	24.108	2.889	8.461
40.241	15.801	6.616	29.472	1.642	5.583
42.660	13.718	5.759	28.092	3.587	4.949
51.682	7.820	5.070	21.358	6.450	4.588
92.933	.241	4.320	. 888	.336	. 905
80.696	. 391	14.640	3.085	.305	. 444
74.957	1.164	12.119	8.642	1.176	1.150
51.478	. 495	43.250	2.810	.486	. 880
5.121	. 165	90.590	.968	. 483	1.403
61.772	1.030	11.643	14.630	6.074	2.208
39.235	13.611	7.597	25.535	1.267	11.406
41.308	13.314	6.469	29.109	1.082	7.539
46.551	9.894	6.166	27.544	2.059	4.900
54.084	5.958	5.388	21.392	4.334	4.736

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