

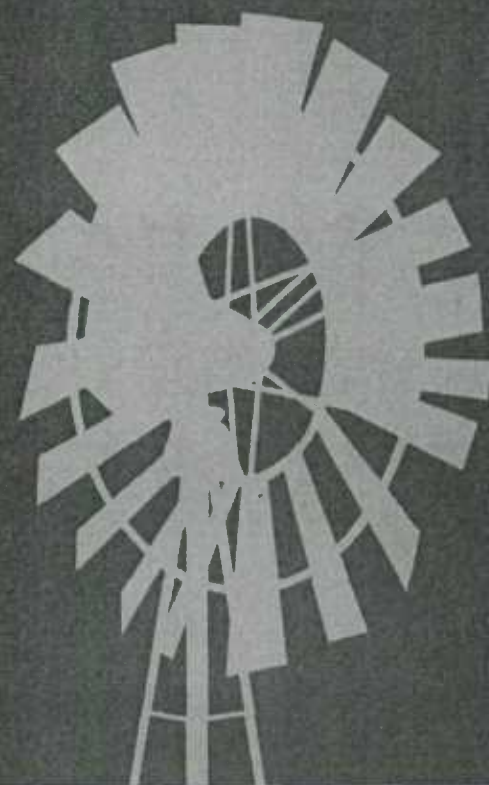
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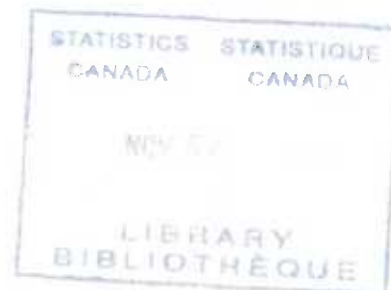
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Mapping the Diversity of Rural Economies A Preliminary Typology of Rural Canada

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Mapping the Diversity of Rural Economies:

A Preliminary Typology of Rural Canada

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Mapping the Diversity of Rural Economies:

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1 INTRODUCTION

1.1 Objectives

Rural areas have traditionally been defined with reference to an urban benchmark. This process has tended to give the impression that rural Canada is one residual area largely homogenous in its demography, employment base, income, culture and social infrastructure.

Recent debate has focused on the nature of changing economic, social, environmental and technological processes. As part of this debate, it is increasingly acknowledged that restructuring and experiences of change at the local level will differ across rural Canada. This realization has brought new policy attention to rural economies.

The aim of this project is to re-examine the assumption of one 'rural Canada' and to use data from the 1981 and 1991 Census of Population to identify and map types of 'rural'.

1.2 Review of literature

During the 1980s, rural areas of many western countries experienced different types of change. Areas depopulated during industrialization phases became repopulated, while remoter regions still dependent on the natural resource base boomed or slumped according to the prosperity of one industrial sector and their opportunities to diversify. The nature of change derives partly from the characteristics of the area and partly from pressures and social changes originating in local, metropolitan or, in many cases, international areas. Since changes are filtered through a highly diverse range of social, economic, cultural and environmental landscapes, it is highly unlikely that there could be one set of characteristics to identify a rural area, nor one process of rural change.

It is the issue of how to cope with rural diversity that has encouraged both policy makers and academics to seek a classification of rural areas. For "the classification of social phenomena is often a necessary prelude to understanding them" (Whatmore *et al*, 1987). Methods that have been used to classify rural areas reflect the different agencies interested in the results. No method has led to an easy solution. Policy makers have tended to use published data sources such as population numbers and density to develop a workable definition. Academics have tended to combine publicly available data with primary data sources and subjective interpretation

(see Gilg (1992) and Marsden *et al* (1992)). These conceptual classifications have often become so intangible that some academics have proposed the abandonment of the term 'rural', concentrating instead on themes such as 'health' or 'education' (Hoggart, 1990). However, this seems to avoid rather than clarify the issue - because, however defined, the 'rural' areas remain and raise different issues which require 'rural'-specific solutions.

1.3 Different Classifications of Canadian Rural Areas.

Over the years different definitions of 'rural' for data collection and analysis have emerged. Statistics Canada has developed their definitions of rural and small town Canada to reflect the changing world but within the restrictions of data compatibility. The result (as shown in Table 1), has been to incorporate a spatial dimension to account for urban sprawl (Biggs *et al*, 1993). Urban areas are now defined by population density and proximity to an urban core. The residual population is assumed to be rural.

Table 1

Census Year	Population Definition
1931, 1941	Urban Population - anyone residing within boundaries of cities, towns and villages, regardless of size.
1951	Anyone living within a census metropolitan area, plus anyone residing in a town with a population greater than 1,000.
1956	Same as 1951, plus population resident in fringe parts of medium cities (10,000 to 30,000) and with similar economic geographic and social relationships.
1961, 1966, 1971	Urban defined as: 1) Cities, towns and villages with population greater than 1,000 in continuous settlement. 2) Discrete cities towns and villages with population greater than 1,000 and density greater than 1,000/square mile (will include urban fringe settlement).
1976	Urban - population of 400/square kilometre with a maximum discontinuity between settlements of 1 mile.
1981, 1986	Persons living in continuously built-up areas with population of 1,000 or more and density of 400/square kilometre.

SOURCE: Biggs, Bollman and McNamers, 1993, pp.7

Further work on the definition of rural areas has been stimulated through the OECD rural indicators project and the federal Interdepartmental Committee on Rural and Remote Canada. OECD rural indicators relate to the same concepts of population count and population density, but the definition is slightly more complex. The initial step is to identify communities with a population density of less than 150 persons per square kilometre as rural. Communities were defined in terms of census consolidated sub-divisions. Regional units (i.e., census divisions) are classified according to the proportion of total population located in communities described as rural. Three classes result - agglomerated (rural community population < 15%)¹, intermediate (rural community population = 15-50%) and rural and remote (rural community population greater than 50%).

The advantage of this approach is that it focuses on a definition of rural, rather than rural as a residual of urban. It is also simple and universal - which is consistent with its aim of providing standard internationally compatible indicators. However, at a theoretical level, it is still limited by the requirement of using political boundaries to define a spatial distribution. Changes in boundaries may cause changes in classification as the population of one small village is transferred from one subdivision to another.

Another attempt at categorizing rural space has been Beale Codes. This system was devised to classify rural areas in the US. Codes were broadly defined so that they were relevant to states from Maine to Texas, and have been successful in that they are frequently used to describe social and economic change in the US.

The basic principle is that changes in levels and types of employment and changes in population numbers or the age structure of rural communities will vary according to the distance of an individual settlement to a major city. Counties were divided into 3 classes, metro for metropolitan areas, adjacent for those adjacent to a metro area and non-adjacent for the rest. Settlements were classified according to whether they were located in metro, non-metro adjacent or non-metro non-adjacent counties. If the settlement was located in a non-metro county, the codes also showed whether the county contained population dispersed into small settlements or concentrated in small towns.

A similar procedure was recently used to classify Canadian census divisions (Ehrensaft & Beeman, 1992). They found a number of methodological problems in applying the US system to a Canadian context (pp.198,199) - not least of the problems was how to deal with the Canadian north. In the US case the two non-contiguous states of Alaska and Hawaii were excluded from the analysis. The Canadian northern territories could not be 'excluded' from the analysis because of their important role within the national society and economy, not withstanding the huge land mass they cover. The solution was to allocate all northern areas a separate code. Although agreeing with some of the conclusions of this analysis, and

¹ In addition, the presence of a community with population greater than 300,000 was made a sufficient condition for a CD to be classified as agglomerated. This criterion led to the reclassification of the CDs containing Edmonton and Hamilton from the intermediate to the agglomerated regional class.

acknowledging its simple intrinsic logic and possible use for policy makers there are several limitations a method which relies on distance measures and hints of economic determinism (for a detailed critique of this system see Fuller,1992, pp.29).

Another attempt at categorising rural space develops the issue of accessibility. One of the major obstacles to economic development encountered in rural areas is the limited access to goods or services that accompanies life in small, isolated communities. Armstrong (1993) developed an accessibility index to show the average distance any one person would have to travel from the centre of the census sub-division in which they live to come into contact with 100,000 people. These distances clearly show the isolation of the northern territories. However, as Armstrong himself argues, it is a crude measure insofar as accessibility is defined in terms of straight distances and does not incorporate the availability of transportation infrastructure, the cost of transport, nor does it include human aspects, such as the ability to pay for transport.

While both Beale codes and accessibility indices are useful to define different rural areas and for categorising social and economic change, it cannot help to describe the area. Two approaches by Fuller (1992) and Bruce *et al* (1993) begin to define "Where rural is, not what it is" (Fuller,1992, pp.9).

At a conceptual level both Fuller and Bruce *et al* have developed theories or models of rurality. Fuller suggests that the rural society for the future is one which "is more mobile and in which social and economic activity is more dispersed". These differences he suggests are ones of 'lifestyle' and concludes that to describe rurality requires an assessment of changing lifestyles which can only be measured by using a combination of different variables. Bruce *et al*, develops a model of rurality at the provincial level stating that "The multi-variable approach best captures the combination of factors which inform us about rural places" (Bruce *et al* 1993). However neither author translates this into a full multi-variable analysis. Bruce *et al* use population density, total population, adjacency to an urban area but add an employment dimension with the percentage of employment in primary resource industry. They use a scoring system by dividing all variables into quartiles (scored 1 to 4) and then summing across variables. The result provides a useful addition to previous work. However, although the authors create a "reference for understanding what it means to be called most rural or least rural", they fail to identify the characteristics of rural; if anything it implies that the characteristics of rural are similar - just of different magnitude.

This paper starts from the position that within rural there is considerable diversity which makes it difficult to categorise all rural areas as one type opposed to urban. While acknowledging the need to develop theories of rural areas this paper takes a more practical approach to the classification of rural areas which may help to inform development of later theoretical models. Using the 1991 Census of Population, the paper examines aspects of change in single variables. It then uses some of the patterns and lessons learnt from individual variables to attempt a multivariate analysis of the census data to categorise 'types' of rural.

2 DISTRIBUTION AND CHANGE IN POPULATION, EMPLOYMENT AND INCOME: 1981-1991.

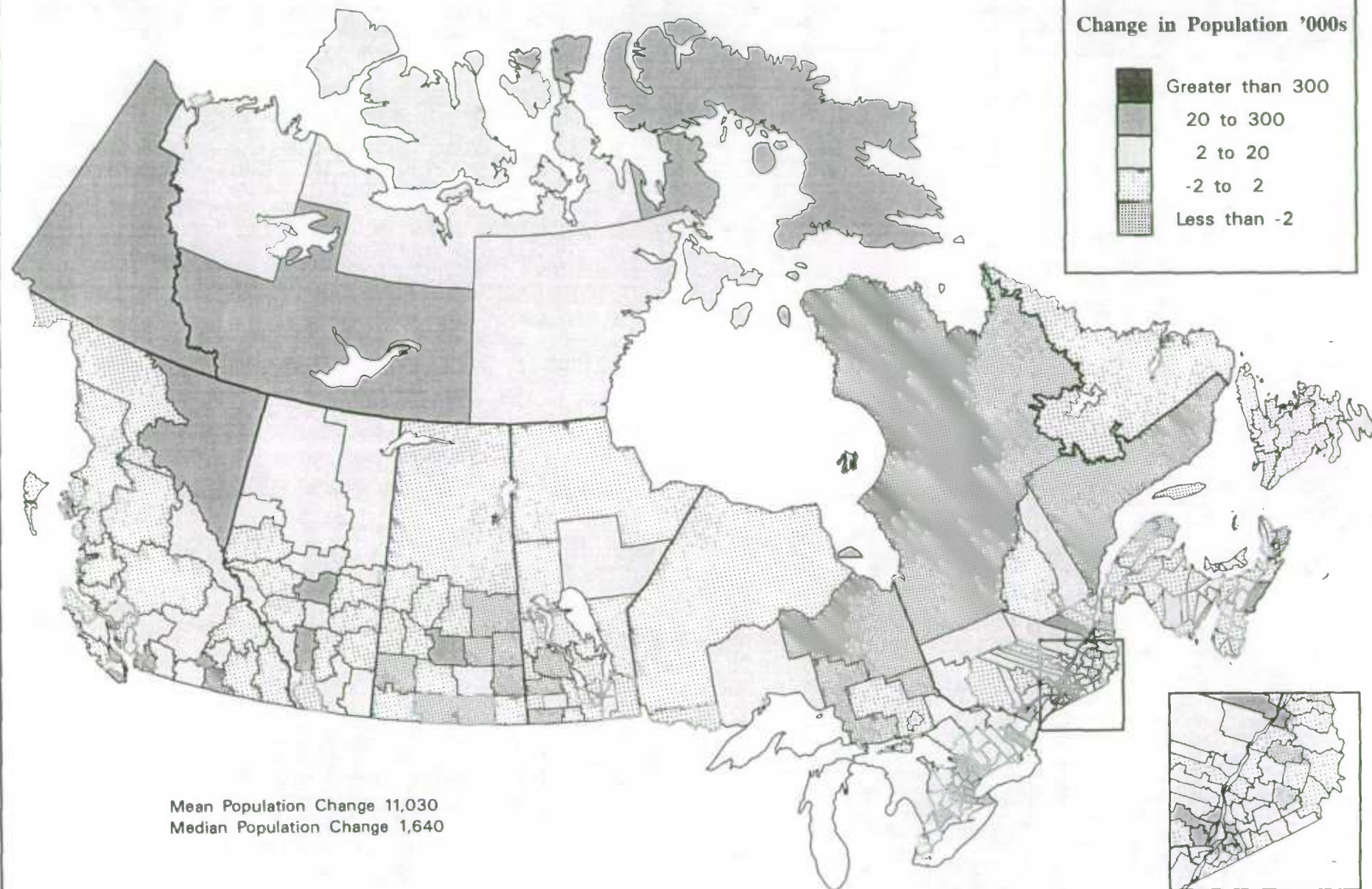
2.1 Demographic Change, 1981-1991.

During the 1970s, rural areas for the first time since 1871, recorded a greater population growth rate than urban areas. Between 1971 and 1976 rural areas grew by 8% and urban areas by 6%. Such population growth at the national level hides considerable diversity at the local level. Marchand and Charland (1991) argue that the rural expansion was a transitory experience which became overturned in the 1980s due to the recession in traditional primary industries. Their study gives a detailed insight into the problems caused by depopulation of rural communities at a local scale. For example they speak of four communities in Newfoundland where population decline between 1981 and 1986 reached over 20%, and similar cases in Quebec and British Columbia. The data to be discussed here is highly aggregated. It can point to census divisions which have experienced population increase or decrease but can only acknowledge that this will hide great diversity at more local levels.

In absolute terms the average population for a Canadian census division (CD) increased by 11,000 people. However the median value of 1,600 shows that increases were highly concentrated in certain census divisions with most experiencing change of between -530 and 7,260 (the 25th and 75th percentile). The census divisions with the greatest absolute change were those containing large metropolitan areas (Map 1). Vancouver (290,000), Calgary (136,000), Toronto (134,000) and Ottawa (129,000) all showed large increases. The 1971-1981 period had seen a westward drift in population, but this was less apparent in the 1981-1991 period. Calgary continued to experience large absolute rises in population, but Edmonton only increased by 30,000 and Winnipeg by 51,000. Montreal also showed only slight increases in population (13,550) in contrast to the other major metropolitan areas. Many of the greatest absolute increases were in the municipalities neighbouring Toronto - for example, York (253,000) and Peel (240,000).

In percentage terms we find that census divisions neighbouring large metropolitan areas again figure significantly (Map 2). Divisions nearby to Montreal (Soulanges, Vaudreuil, Deux Montagnes), Quebec (Levis), Ottawa (Prescott and Lanark), Toronto (Peel, York, Dufferin, Wellington, Halton, Muskoka and Haliburton), Winnipeg (CDs #12 and #13 to the north), Calgary (CD #15 to the west), Vancouver (Sunshine Coast, Fraser-Cheam and the Central Fraser Valley) all show increases of greater than 15% which, in all cases except Calgary, is a greater percentage rise than the city itself. Again the greatest increase is found adjacent to Toronto - Peel and Durham rose by nearly 50% while York municipality doubled over the ten year period.

Absolute Change in Population 1981-1991 by 1986 Census Division



Source: 1981 and 1991 Census of Canada, Statistics Canada

Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

However, there is another area of population explosion - the Canadian north. Although absolute numbers are small, rates of population increase varied from 16% in Inuvik to over 35% in Baffin, Keewatin and Kitkimeot. Likewise the Yukon and some parts of northern Manitoba increased by over 20%. This increase is consistent with recent historical trends. Unlike the increases surrounding metropolitan areas, the rise in the north is due to higher rates of natural increase (ratio of births to deaths) than migration.

The most extreme areas of depopulation in absolute terms are spatially discrete (Map 1). The 5 CDs with the largest population losses are Cape Breton Island in Nova Scotia (-7,000), Megantic (-5,500) and Saguenay (-13,000) in Quebec, Algoma in Western Ontario (-6,000) and CD #14 in Saskatchewan (-5,000). However, there is a band of depopulation stretching westward as far as Alberta which separates the expanding populations of northern territories from the expanding metropolitan belt. The census divisions in Saskatchewan, excluding the containing Saskatoon, shows a general decline in population as does the majority of Manitoba and northern Quebec CDs.

In percentage terms we find similar patterns of depopulation although the greatest rates of change are in Gaspé, Quebec (-19%), Saskatchewan CDs #3 and #4 (-14%) and Manitoba CDs #4 and #5 (-12%).

Migration affects the absolute population change in a census division, but it also affects the resultant population structure. Outmigration of young people leaves an ageing population structure even though the absolute number of elderly may not change. Census divisions that had the largest numbers of young people leaving were Cape Breton, Saguenay and Chicoutimi in Quebec and the Algoma and the Sudbury regions in Ontario (Map 2). These areas, with the exception of Sudbury, also ranked high in terms of the percentage of their young population that moved elsewhere during the 1981-1991 period. Young people were most attracted to divisions near Toronto (Wellington, York, Peel) and Vancouver.

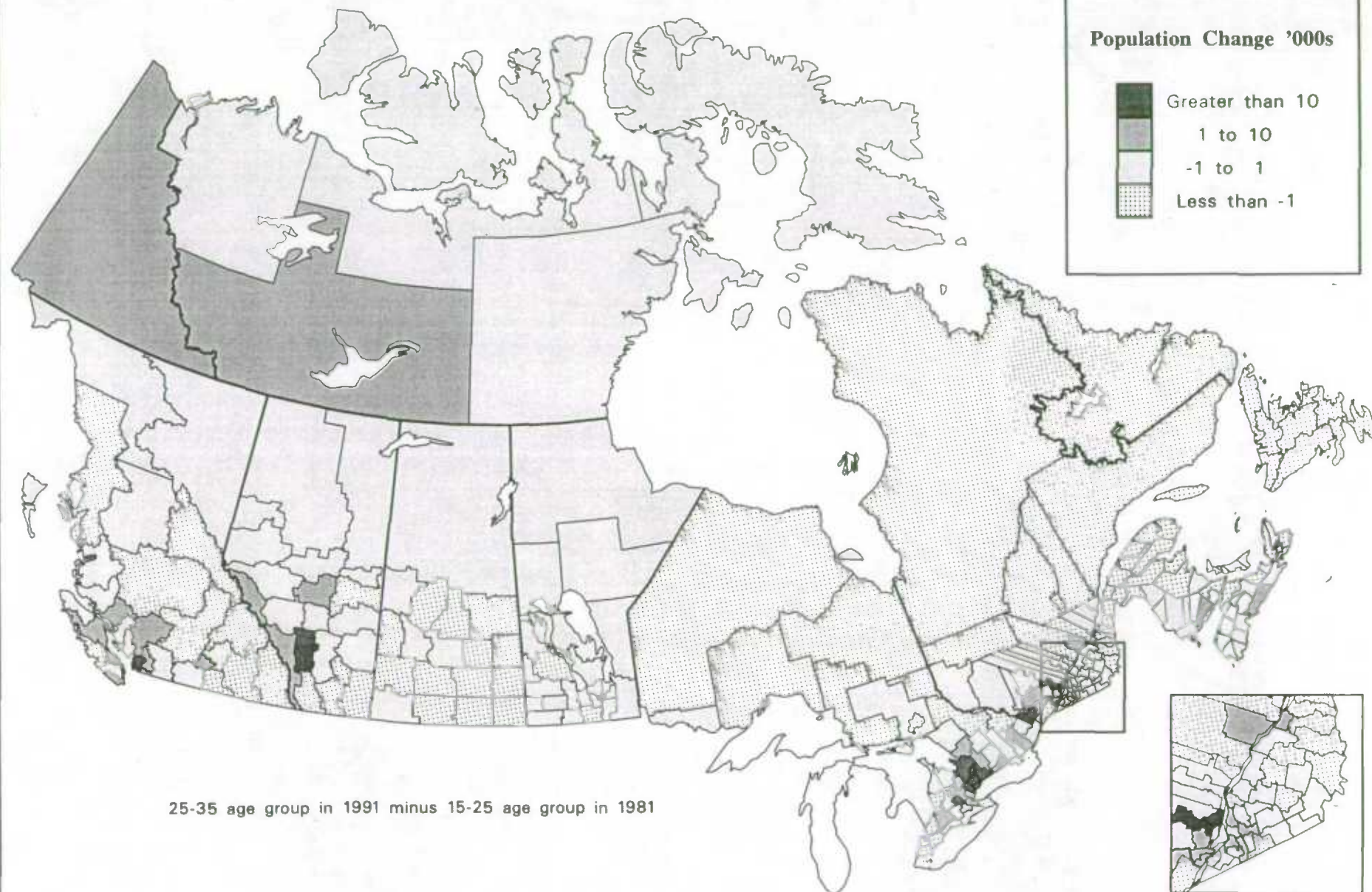
Migration of elderly population shows considerable variation but generally there is movement out of the large metropolitan areas². The distribution in Map 3 shows that Toronto decreased (-151,795) as did Montreal (-140,715), Vancouver (-70,300), Winnipeg (-39,275) and Hamilton (-29,115). In contrast, the lowest depopulation amongst this age group occurred in Central Fraser Valley and Central Coast Region in BC and in the northern CDs of Stikine, Keewatin, and Kitkimeot.

Patterns of demographic change over the period appear quite complex. Main centres of population increase have been the Golden Horseshoe in southern Ontario and the coast of British Columbia which has attracted a large number of migrants. Northern territories have also experienced rising population in percentage terms. The westward trend of population seen between 1971 and 1981 is less evident in this period - what is more apparent is the poor prospects of Prairie regions and some areas of Quebec.

² This migration figure compares the numbers who were 55-65 in 1981 with the numbers 65-75 in 1991. We would expect decreases amongst this class because of death, but positive numbers do indicate net in-migration.

Migration of the Young Population

Population Change 1981-1991

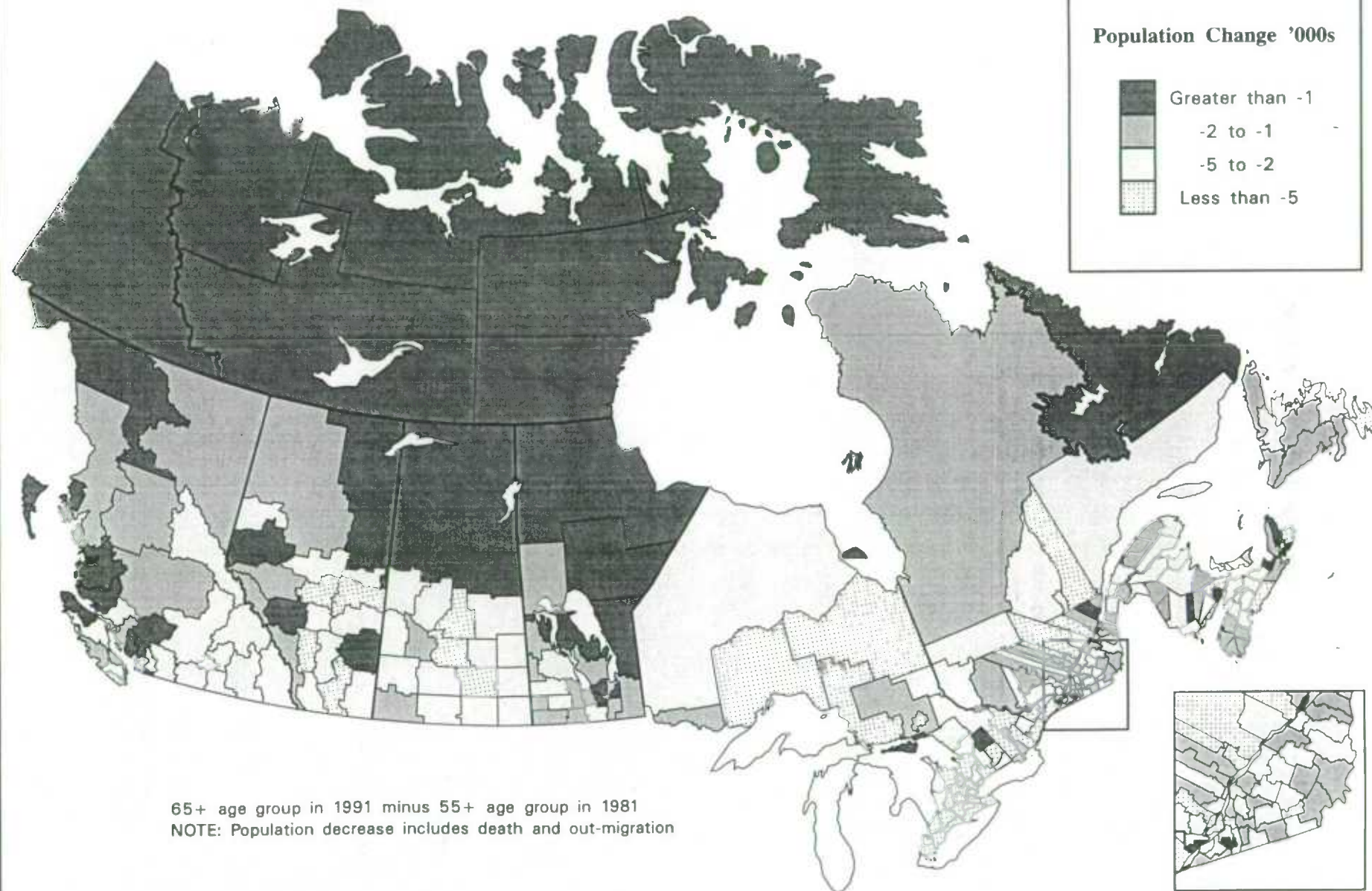


Source: 1981 and 1991 Census of Canada, Statistics Canada

Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

Migration of the Retiring Population

Population Change 1981-1991



2.2 Employment Change 1981-1991.

Literature often refers to rural change as one dynamic of global restructuring, or the internationalization of capital. It is of no doubt that technological change has changed perceptions of space and distance, and created the opportunities for more flexible working patterns. For example, some large companies have moved away from central metropolitan areas to greenfield sites, while the use of home computers and modems can enable businesses and training to be located in remote areas. However distance can remain a problem; time delays and logistical problems of cargo transport may hamper movement of goods from a distant production site to the main centres of demand, and also hamper the movement of factors of production to the production site. Hence, the biggest demand for plant relocation may be found in areas with countryside surroundings but within relatively easy access of large centres of demand. More remote areas may remain untouched by these processes.

The average gross employment rate³ in Canada in 1991 was 42%, but they ranged from rates of 24-28% in 4 divisions of Newfoundland and one in Manitoba (CD #16) to rates of around 50% in Manitoba CD #10, Saskatchewan CDs #3, #4, #13 and Alberta CD #4. The high rate in the prairie region may be indicative of the crises in primary industries which has pushed people without jobs away from the area.

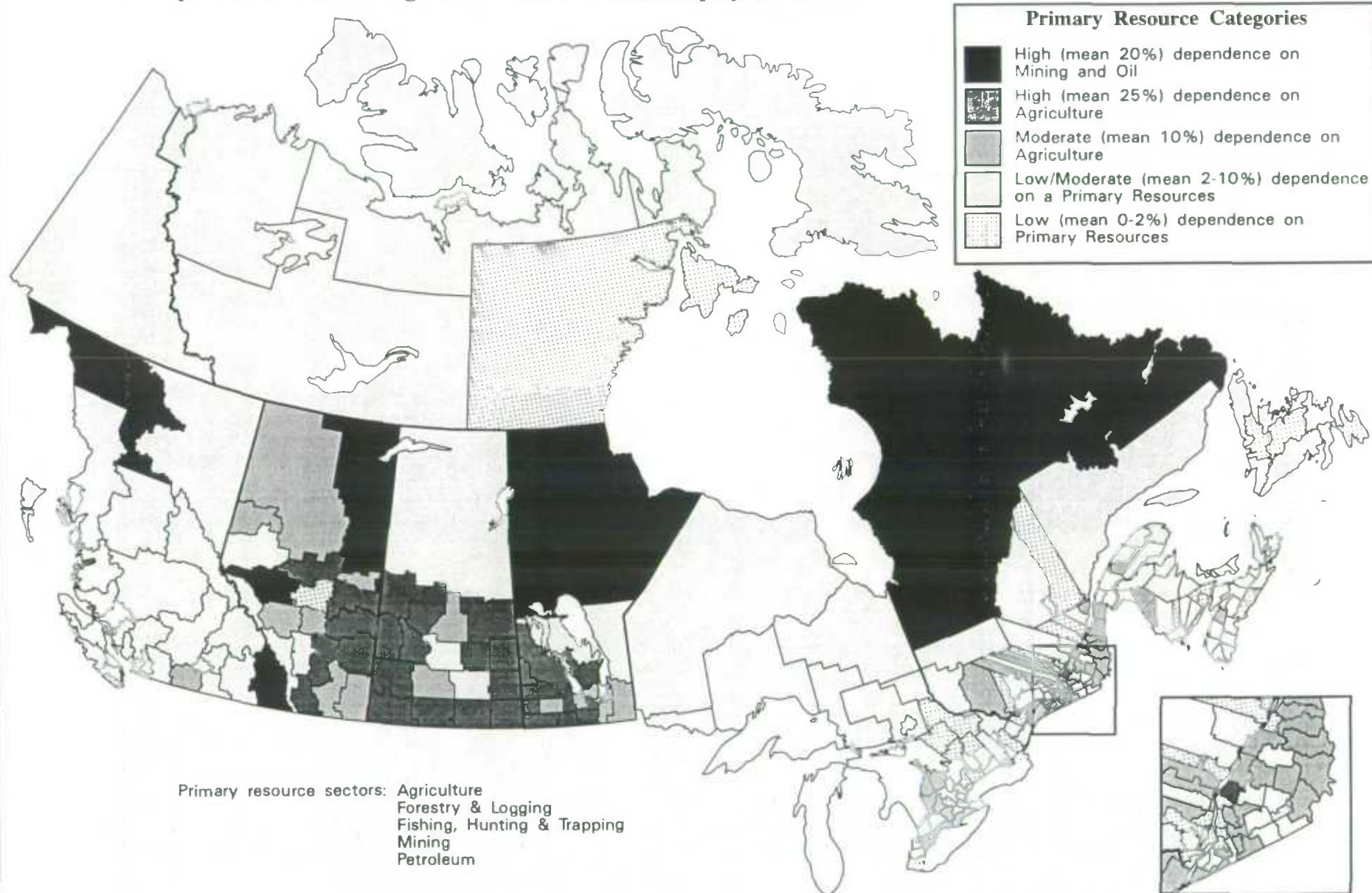
Female employment rates are lower. On average, 33% of the female population are employed, although again there is considerable diversity with the same 4 divisions of Newfoundland showing the lowest rates (Bonavista peninsula, Baie Verte, and the southern coast) and higher rates in Saskatchewan and Manitoba. Low rates again could infer that women have left the area to seek work leaving the old and young in the area, or that there are different cultural attitudes to women seeking employment. The fact that these low rates are mirrored by high rates of unemployment suggests that there is a lack of employment opportunity.

Primary industry remains important in rural areas (Map 4). However, it no longer solely characterises a rural area's employment structure. Considering the dependence of any CD on primary employment we find that only 5% of divisions have primary industry jobs accounting for one third of total employment, whereas 50% of divisions have less than 10% of their jobs in the primary sector. The most frequent source of primary employment is in agriculture. In 10 CDs agriculture accounted for more than 30% of total employment in 1991 and in another 15 CDs, agriculture directly provided 20% of employment. Only 3 divisions directly rely on primary industries other than agriculture for one third of their employment while in another 6 CDs it was a fifth of their employment.

³ The gross employment rate is the percentage of total population that is employed. A lower rate is indicative that (i) a large percentage of the population is either too old or too young to work and/or (ii) for those able to work there are few jobs.

Distribution of Employment Dependence on Primary Resources

Cluster Analysis of the Percentage of Census Division Employment, 1991



Source: 1981 and 1991 Census of Canada, Statistics Canada

Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

Although there has been a general reduction in the numbers employed in manufacturing this is not true for all locations or all types of manufacturing industry⁴. For example, while hi-tech manufacturing has tended towards stability in most CDs, there has been an overall decline in lo-tech manufacturing (the mean decline in lo-tech was 2 percentage points although in Elgin County, Ontario a fall of 13 percentage points was experienced over the time period). Unfortunately, the buoyancy of hi-tech does not compensate for the number of jobs lost in lo-tech businesses. The mean percentage of a CD population employed in hi-tech manufacturing is less than 2% compared with 12% in lo-tech sectors.

The main growth sectors were consumer and business services with an average rise of 5 percentage points. Employment in this sector averages 30% although the share drops to below 20% in the more remote areas. In contrast, the share of employment in government services averages 26% but this can rise well over 50% particularly in the remote areas where the market mechanism for service provision is less evident. While consumer services rose over the decade, government service remained at a similar level reflecting the budgetary constraints of most major nations over the past decade.

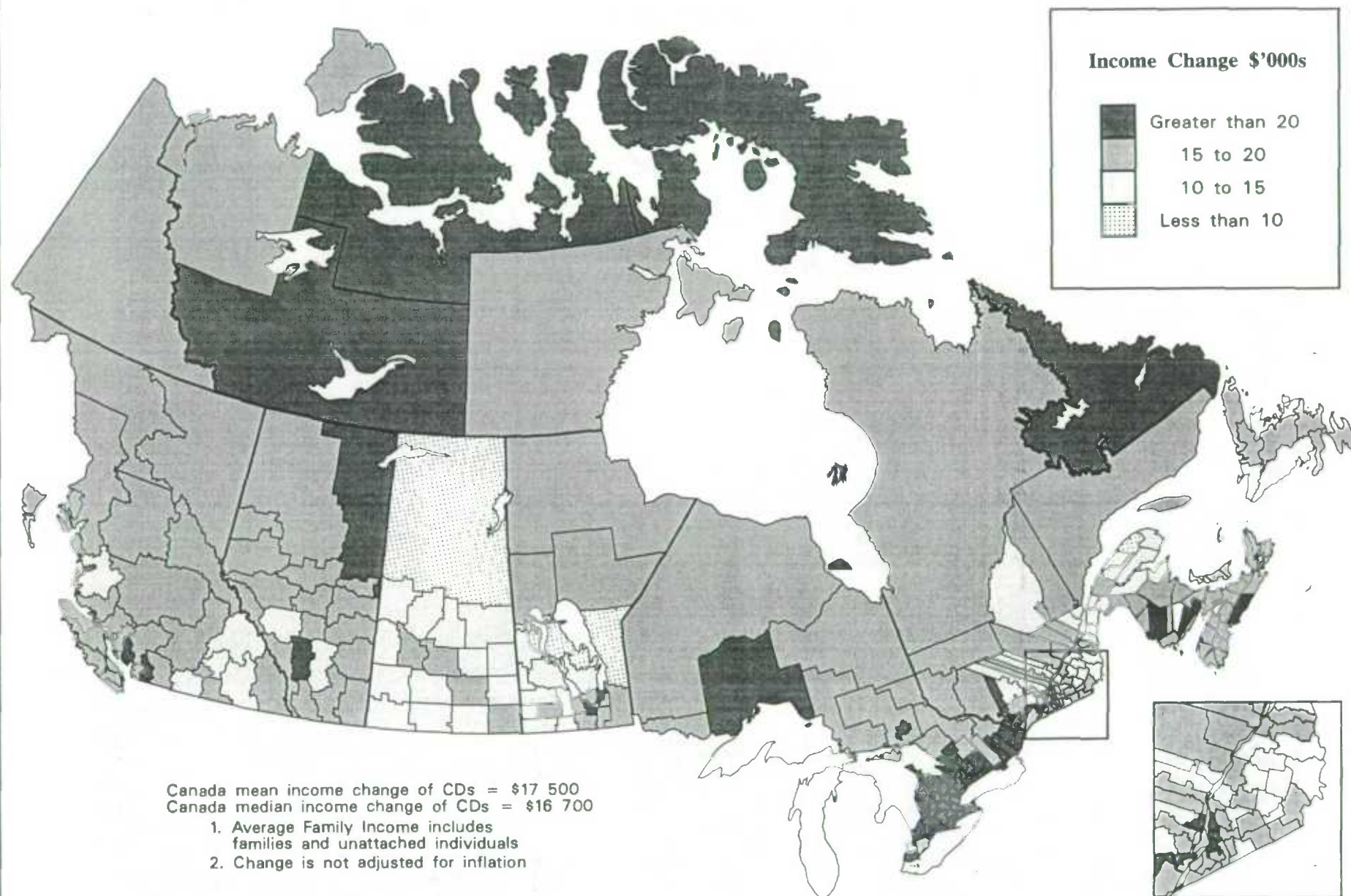
To summarise, census figures in 1991 suggest the continued importance of primary industry outside of the main towns at least in comparison with metropolitan areas. But the actual percentage of the workforce directly employed in primary industries is very low compared with manufacturing and service industries. The biggest problem seems to be the level of dependence on one industry rather than the fact that it is a primary sector. There is a concern to diversify rural structures so that towns and villages are not closed by failure in one industrial sector, but identifying either diversification or specialisation is much more complex than it first appears (Clemenson, 1992).

2.3 Income and Infrastructure

The mean change in average family income (including unattached individuals) outside of the main cities is \$17,500 over the 1981-1991 period (Map 5). Several census divisions in the prairie provinces experienced declining incomes which illustrates the changing agricultural fortunes over the past decade. Income growth areas tended to be in the golden horseshoe of Ontario, stretching down almost to the US border.

⁴ Manufacturing is divided according to value added - industries with low value added such as meat and poultry products are considered lo-tech, pulp and paper, clay products, plastics and synthetics, paint and chemicals, jewellery and other manufacturing are considered mid-tech. Aircraft, electrical products, pharmaceutical and scientific equipment is considered hi-tech. In this analysis, lo- and mid-tech are aggregated to contrast the 'established' and stable/declining with the contemporary and generally stable or expanding sectors.

Change in Average Family Income, 1981 to 1991



2.4 Communities and the Rural Idyll

The population growth outside metropolitan areas during the 1970s did not always renew economic links with the rural resource base, or increase demand for rural-based services. In the majority of cases families continued to derive their economic, and often social and service structures from metropolitan areas. For them there is a rural idyll.

Service and service provision is crucial to the character of rural areas, as is the nature of the community. Yet, this is one of the main data holes at present. Although numbers of teachers and doctors per capita can be gained from census occupation data, remaining services are more difficult to identify. The quality and access to services, not to mention their underlying role in community life, are almost impossible to quantify.

As McKie (1992, pp.433) states "*the intrinsic and intangible community based values of rural life revolved around personalism - the provision of services by identifiable human beings in post offices, co-ops and stores that assumed not merely social roles but rather a special identity which transcended the cash nexus...The fundamental values of social and community life in rural communities as they were delivered and experienced in the late 19th century in this country are changed as these communities are drawn into the distribution networks of the modern state.*"

3 METHODOLOGY

3.1 A Multivariate Approach

The preceding analysis of change variables has shown wide diversity in population, income and employment levels across Canada. This is useful in the description of different factors across Canada, but it is the combination of such factors that will provide a greater understanding of rural areas. To explore these different facets the approach to be used here is multivariate. It allows comparison of areas with similar characteristics across space and may indicate the character of each area. Although this fits the conceptual notion of rural, some problems remain:

1. This analysis is based on census divisions with fixed boundaries. It should be noted that census divisions are political boundaries of counties in some provinces (e.g., Ontario, Nova Scotia) and are boundaries solely for statistical purposes in other provinces (e.g., Manitoba, Saskatchewan).
2. The analysis will be scale specific; census divisions are high levels of aggregation which hide considerable local diversity. However they were felt to be manageable with the given time and resources.
3. Finally it should be stated that such techniques are by nature subjective, complex and temporally specific. It is an attempt to try to understand the underlying patterns of rural Canada and perhaps inform debate on defining universal and simple indicators of rural development.

With multivariate statistical techniques the quality of results obtained are a direct measure of the appropriateness of the variables used. In a typology of rural Canada there are many variables which could be of interest and relevance, but it was important to understand the implications of each variable, to consider different aspects of rural and to use variables which might best differentiate regions. The univariate consideration of census data informed this process, as did recent literature on rural affairs in Canada (Bollman, 1992; Biggs *et al*, 1993; Armstrong, 1993; Fuller, 1992) and discussion with people involved in Canadian rural studies.

Multivariate techniques were widely used and generally discredited in the 1970s because they allowed the data to provide a solution for which there was often no theoretical background. Several measures have been taken to lessen this problem including the justification of each variable and the use of two different techniques to check the validity of results. Perhaps most important is the acknowledgement that techniques are best used to search for underlying patterns and principles of rural types rather than a definitive solution.

3.2 Discussion of Variables Chosen to Develop a Typology of Rural Canada

The data were drawn from the 1981 and 1991 Censuses of Population. To achieve a consistent geographical coverage, all 1981 and 1991 data were assigned to the 266 census division boundaries defined for the 1986 Census of Population.

There are many variables which could be of interest and relevance to a typology of rural Canada. The following variables were chosen for this analysis. Crime, tourism and transport/accessibility indicators were not available.

3.2.1 Demographic Variables

The first set of demographic variables were chosen to represent the number of people present and their concentration by settlement. These variables aim to measure the traditional understanding that rural areas are less populous than urban in terms of absolute numbers and population density. It uses population counts to identify absolute population size and two settlement size thresholds to identify scattered settlement from small towns or regional centres. The latter was chosen rather than population density because it was felt that density for a census division may hide two very different sets of circumstances; one large town in the middle of a sparsely populated area may have similar population density to a census division with a number of smaller settlements. The proportion of people living in centres over 10,000 aims at identifying metropolitan areas, and proportion of people in centres under 2,500 identifies remote areas where the settlement pattern is based on village and small towns.

Total Population in CD 1991

% of CD Population in centres > 10,000

% of CD Population in centres of < 2,500

The second set of demographic variables identify age structures. For policy purposes it is interesting to know the age profile of the resident population. For example it is often felt that young people leave remote areas for the big cities threatening the long term sustainability of the settlement. It may not always be true that ageing population means a declining population, especially for retirement areas where there is a continuing in-migration of older people. However, it is necessary to understand the age distribution because the level and type of services will be very different for elderly and youthful populations. The age breaks chosen included children while they are still dependents, the young working-age population who tend to be more mobile and more likely to engage in part-time work, the older, more settled working-age population, and those nearing or already above pensionable age.

% Population in the CD in 1991 aged 0-14

% Population in the CD in 1991 aged 15-24

% Population in the CD in 1991 aged 25-54

% Population in the CD in 1991 aged 55+

The third set of variables isolate divisions with increasing population from those experiencing depopulation. Previous studies have described how population increases occurred in rural areas in the 1970s. While this remains true for some rural districts, many areas have lost population during the 1980s.

To further inform the analysis of population flows, three variables were used to measure migration. The first considers the number of people who had moved house within the last five years. A common differentiator between rural and urban areas is the mobility of the population. In remote communities, households often prefer to stay within existing villages while in larger centres and for those not born and bred in a settlement there is a greater mobility. The second variable considered specifically migration of the young. By subtracting those aged 25-34 in 1991 from those aged 15-24 in 1981, a very crude measure is provided of the attractiveness of a particular area to the youth. A similar variable considers elderly migrants. Many people move to the countryside in retirement. By subtracting the number over 65 years old in 1991 from the population over 55 years old in 1981, the aim was to identify areas more or less attractive to the retired.

Absolute population change (1981-1991)

Percentage of households who occupy the same dwelling as 5 years ago

Absolute Population change for people in the CD aged 15 to 24 in 1981 and 25 to 34 in 1991 (includes death and net migration of the young)

Absolute Population change for people in the CD aged over 55 in 1981 and over 65 in 1991 (includes death and net migration of the elderly)

3.2.2 Labour Market Variables

As discussion in section 2.2 showed, economic along with demographic characteristics are distinct and diverse among census divisions. Both the level and direction of change can be used to identify the nature of communities. The labour variables measure levels of economic activity in the population, identify sectors of employment and gauge employment change which reflects growth or decline in economic fortunes.

The first set relate to the level of economic activity in the decisions of men and women. It considers the gross employment rate - that is the level of working population who hold a job and reside in the division as a proportion of the total population. The data is split by gender to identify areas where work continues to be related to gender, to perhaps highlight areas where women through desire or social/economic constraints do not work, and more specifically to identify areas where the workforce is related to mining (usually male and transient, commuting until the resource is saturated). Finally, it shows the self-employment rate which is often found to be higher in rural and remote areas - generally because large employers do not locate in these areas and the remaining work is based on the service and trade aspects of primary industries.

Male Employment rate 1991
Female Employment rate 1991
Self-employment rate 1991

The second set relate to unemployment, where unemployment is defined as those who cannot find work but were looking in the previous week. One variable indicates the percentage unemployed from all people aged 15 to 55, another indicates the percentage of people aged 15 to 24 that are unemployed. This may indicate deficient economic opportunities or a lack of relevant skills. A low unemployment rate may not mean that the economy is fine; it may show that those without jobs have moved to places where they feel they have a better chance of getting work.

Unemployment rates 1991
Change in Unemployment rate (1981-1991)
Youth Unemployment rate (aged 15-25) 1991

The third set looks at the sectoral breakdown of the economy according to the workforce. This aims at three issues: (i) the level of dependency on one source of employment, (ii) the decline or growth by sector and, (iii) the dependence on primary employment sectors. Hence it shows the percentage of employed people that work in each industrial sector. Concentrations of the workforce may help to group CDs relying on a primary resource base, or on the more prosperous hi-tech manufacturing industries; often the more concentrated a workforce is, the more vulnerable they are to instability in one industrial sector.

% of employment and the change in % of employment 1981 to 1991 by the following industrial sectors (only for individuals of working age (25-55))

Agriculture
Forestry
Fishing, Hunting Trapping
Mining
Petroleum (extractive and refining)
Manufacturing: hi-tech
Manufacturing: lo-tech + processing
Construction
Utilities, Transport and Communication
Consumer and Business Services
Government Services/Public Administration

3.2.3 Income Variables

As earlier discussion and maps have shown there is some diversity in income levels across Canada, but also within CDs and within towns. The variables chosen to represent aspects of income help to identify overall levels of economic well-being for the CD but also identify an unequal distribution of income which may result in pockets of poverty.

The first variable is the average income per family unit (families include unattached individuals). The inclusion of unattached individuals was necessary since areas that attract single people tend to be characteristically different from others and for such areas, the income of unattached individuals represents a significant share of the region's income. Another variable indicates the change in income between 1981 and 1991.

The second set of variables looked at the issue of inequality. The first two identified the percentage considered rich and poor in a CD; the percentage of family units with an income below the defined LICO in 1991 (and its change from 1981), and the percentage of family units with income over \$50,000. The third variable looked at the income level of people over 55 to try and link with previous discussions on retirement (i.e., we would expect elderly people in settlements attractive to retiring couples to have higher incomes than elderly people in settlements suffering population decline).

Average income per family unit (families plus unattached individuals), 1991

% family units with income below low income cut-off, 1991

% of family units with total income above \$50,000, 1991

Average income for lone couples over age 55, 1991

Economic dependency - ratio of social transfer to employment income, 1991

Change in average income per family unit, 1981-1991

Change in % of family units with income below LICO, 1981-1991

3.2.4 Human Capital Variables

It is often mentioned that skill levels in remote areas prevent employment opportunities. These variables acknowledge that while the economy depends on natural and infrastructure resources, it also relies on the human resources available. Five variables were chosen from the Census to indicate human resources including education and professional occupations and the ethnic origins of the population (specifically, aboriginal origins). It seemed important to split occupations and education by gender.

Percentage of males in professional/skilled occupations
Percentage of females in professional/skilled occupations
Percentage of males with post secondary education
Percentage of females with post secondary education
Percentage of population with aboriginal ancestry

3.2.5 Infrastructure Variables

The income section considered income as a measure of well-being. Another aspect of well-being is the ability to have good access to services such as educational facilities, medical services, a power infrastructure and a telecommunications network. These variables will attempt to gauge the level of supply of these services. The only way to do this in the Census was to take the occupation of people employed in identifiable services by place of residence. Teachers and doctors could be identified assuming that the majority of teachers and doctors live in the same census division that they work.

No. of teachers per capita
No. of doctors per capita

Finally, variables on house condition and value were included as aspects of well-being. Work in Britain identifying indicators of disadvantage suggested that housing disadvantage is closely entwined within the complex, and cyclical set of problems identified as social disadvantage. The Census includes a question on the state of repair of housing. The general theory is that families living in houses of poor state of repair are generally not doing so by choice but through an inability to improve the property. Canada Mortgage Housing Corporation (CMHC) are evaluating the accuracy of this variable at present to see if it can be used as a proxy of house condition. Tenure is included not so much as a difference in well-being but as a differentiator between CDs. Some areas have much higher levels of owner occupation than others - rural places usually have more owner occupied housing. The final variable is perhaps more dubious. Again the intention was to include an aspect of asset wealth, but the census definition of a house does not include farms, and there was no distinction between value in terms of cost and value in terms of resale which is particularly important in rural areas.

% of dwellings owned
% of dwellings in need of major repairs
Average value of housing (non-farm family only)
% of households with house value > \$100,000

3.2.6 Analytical Techniques

Two multivariate statistical techniques were used in developing the rural typologies; principal component analysis (PCA) and cluster analysis (CA). The method used was to analyze the same set of data using the two statistical techniques in tandem and compare the findings (see Appendix 1). Although this was, at times, confusing, it was felt that examining the two techniques in tandem may help to reduce the risk of drawing conclusions based on results which were due entirely to the assumptions and structures that the statistical procedures impose on data, or the subjectivity of interpreting results. Thus, comparing output from the two techniques proved a useful means of testing that the results were intuitive and that the identification of groups does not represent the idiosyncrasies of one technique of multivariate analysis.

4 RESULTS

The data set was compiled and standardised. It was then examined using the two identified techniques in tandem to identify basic features of the data set.

4.1 Initial Results

The first set of results from PCA showed that 28% of the variance was explained by the first component and 12% by the second. The third component explained 10% of the variance but had only two variables with a loading greater than 0.5 which meant that it was difficult to identify exactly what the third component was explaining. These results are not very useful in terms of the variance explained, but the loadings (that is the relationship between specific characteristics) are quite strong. Table 2 shows the positive and negative loadings for the first two factors. The first shows high positive scores, and a degree of inter-relationship between the following factors; large and concentrated centres of population with high incomes, education and skill levels. The second shows high positive scores, indicating a relationship between a young age profile, low levels of economic activity and employment concentrated in government services. These results were verified by running the data with different factor procedures and rotations. Although numbers varied, the above two groupings of characteristics were always the first two factors/components.

Table 2 Initial Factor Analysis of 266 Census Divisions

	Factor 1		Factor 2	
Variance Explained	28%		12%	
LOADING	Variable	Loading	Variable	Loading
POSITIVE	Population	.60	% Population under 15 years old	.74
	% Population in centres > 10k	.76	Unemployment rate	.75
	Population Change 1981-91	.66	Unemployment rate (15-24 years old)	.77
	Professional Occupation: Male	.85	Unemployment rate: change 1981-91	.66
	Professional Occupation: Female	.79	Gov't Services (% employed)	.50
	Post-secondary education: Male	.83		
	Post-secondary education: Female	.74		
	Average Income (family unit)	.83		
	% of family units earning > \$50k	.79		
	% Change in Average Income (family unit)	.75		
	Average House Value	.85		
NEGATIVE	% Population in centres > 10k	.78	% Population aged 55 +	.65
	% Population in same dwelling	.67	Employment Rate: Male	.74
	Economic Dependency	.77	Employment Rate: Female	.68
	% Dwellings in need of Major Repair	.61	Self-employment Rate	.77

The results from cluster analysis indicated two outcomes: The first outcome was that the majority of cases could not be separated⁵. A cluster analysis asking for 20 clusters gave a solution with 6 large clusters ranging from 110 census divisions (41% of CDs) to 12 census divisions (4% of CDs) (Table 3). Of the remaining 14 clusters, 6 contained only one or two cases. No matter how many clusters were specified, the only effect was to break the small clusters, not the large one. One explanation is related to the scale sensitivity of the technique. For example, 2 census divisions may have values of one variable (total population in 1991) that are extremely large compared with all other divisions, but if population in one CD is much larger than the other, cluster analysis will separate the 2 CDs with the large values rather than these two from the rest of the population. Table 3 illustrates how, although Clusters 5 and 12 have much greater means for total population than any other cluster, the difference between these two means is still much greater than the differences between other clusters. Hence specifying more clusters will not help to split the large groups. The second outcome is that the variables which seem to be differentiating the data in cluster analysis were similar to those with high loadings in components 1 and 2 above. Variables that differentiated CDs (i.e., gave cluster means for a variable considerably above or below the population) were; population level, population change, skill, income and education levels, dependency on government services, high levels of social transfers and unemployment.

The conclusions of this first look at the data were:

- (i) that there were a number of extreme cases that seemed to hide diversity in the remaining census divisions; and
- (ii) that the two techniques had independently indicated correspondence between similar groups of variables.

As yet there was no attempt to compare the evidence to find out if any one census division was attributed the same characteristics by both techniques.

⁵ For cluster analysis, data is standardised. Rather than use the mean and variance, data was standardised by the median and inter-quartile range, a technique which had been used in Statistics Canada for identifying outliers in data sets. With hindsight it may have been better to have used the traditional mean variance combination because this will have the effect of dispersing the data rather than concentrating it.

Table 3 Initial Cluster Analysis of the 266 Census Divisions -
Values for variables identified in the first two components.

Cluster Number	5	12	7	14
Cases in Cluster	1	1	110	46
<i>Standardised Cluster Means</i>				
Population	23.8	37.6	0.3	-0.2
% Population in centres > 10k	1.3	1.3	0.1	-0.3
Population Change:1981-91	36.9	16.9	0.3	-0.3
Professional Occupation: Male	1.7	2.3	0.2	0.3
Post-secondary education: Female	1.6	1.5	0.2	-0.2
Average Income per Family unit	0.9	0.9	-0.1	-0.4
Economic Dependency	-0.7	-0.8	0.0	0.4
Unemployment rate	0.0	0.0	0.1	-0.6
Average House Value	3.6	4.3	0.4	-0.3

* Solution resulting from specification of 20 clusters, 5 iterations

4.2 Extracting the Outliers.

Returning to the above output it was possible to identify and examine the census divisions that had shown extreme characteristics in both techniques⁶. A list of divisions with had high component scores for the first component was obtained as was a list of CDs that had been allocated a cluster number identified as outliers in the above stage. When the lists were compared they were found to contain the same 7 CD identifiers, which corresponded to Toronto, Vancouver, Montreal, Calgary, Ottawa, Edmonton and Winnipeg. It is surprising then that these census divisions were outliers. This group were classified as Primary Settlements (Table 4).

This process was repeated for the second component which had indicated coincidence between youthful populations, low economic activity rates and skill levels. Again a list of divisions which high component scores for factor 2 were obtained. The cluster test had identified 10 CDs, split into 4 clusters that had characteristics similar to those identified in the second component. One variable appeared to be crucial in splitting CDs within these 4 clusters - the ethnic origin of the population. In all cases the percentage with aboriginal origins was higher for CDs in these four clusters than for the remaining CDs; however, as explained before, it was the scale of variance in this one variable that had split the group. While recognizing that one vital characteristic of these areas was the high percentage with aboriginal origins, it was also important to consider the socio-economic characteristics which were also differentiating the CDs. The ethnic variable was removed from the data and as expected, once re-clustered, the 10 CDs that had previously split over 4 clusters were now in one, but with the addition of 2 other CDs, namely Labrador in Newfoundland, and the Stikine region of British Columbia. Analysis of the cluster means for this new group and reference to texts on native and northern geography suggested that the group was meaningful, and its movement away from an ethnic clustering meant that the socioeconomic characteristics were brought to the fore. The 12 CDs were identified as one group termed the Native North. A description of the cluster statistics for these census divisions is presented in Table 5.

⁶ Estimated scores for PCA show how highly a CD scores for each component. The Cluster Analysis technique assigns each CD to a cluster.

Table 4 CANADIAN PRIMARY SETTLEMENTS
Values for Chosen Variables in the Data Set

Variable	Toronto	Montreal	Vancouver	Calgary	Ottawa	Winnipeg	Edmonton
Population (,000)	2,237	1,732	1,428	791	662	603	860
% Population in centres > 10,000	99.9	100	98	90	90	99	85
% Population aged < 25 years old	30	30	32	36	28	35	28
% Population aged 55 +	22	24	20	15	18	21	15
Population Change 1981-91 (,000)	+134	+135	+290	+136	+129	+51	+113
Young Migration: aged 15-24 in 1981 (,000)	+ 65	-0.7	+66	+19	+25	+5	+5
Elderly Migration: aged 55 + in 1981 (,000)	-152	-140	-70	-20	-28	-39	-26
% in Professional Occupations: Male	11	10	9	11	14	8	9
% in Professional Occupations: Female	10	9	8	9	12	8	8
% with Post-secondary education: Male	16	16	18	18	19	14	17
% with Post-secondary education: Female	16	16	16	15	18	14	14

Variable	Toronto	Montreal	Vancouver	Calgary	Ottawa	Winnipeg	Edmonton
Employment rate: Male	41	38	43	45	44	43	44
Employment rate: Female	38	34	37	37	39	38	37
Self-employment rate	6	6	7	7	6	5	6
Primary Sector (% employed)	0	0	1	9	0	0	5
Hi-tech Manufacturing (% employed)	3	3	1	1	2	3	1
Lo-tech Manufacturing (% employed)	13	15	10	7	4	11	8
Construction & Utilities (% employed)	11	12	16	15	11	15	17
Consumer & Business Services (% employed)	46	40	46	42	34	36	38
Government Services (% employed)	24	27	24	23	45	32	31
Average Income per Family unit	49,033	37,329	45,547	47,383	51,630	39,469	43,248
% Family units below LICO	23	33	23	21	18	26	23
% Family units earning > \$50K	36	25	34	37	43	28	34
% Family units with social transfer income	11	17	11	9	9	15	11
Change in Average Family Income (\$ per family unit)	+23,592	+15,833	+19,828	+20,494	+25,297	+17,634	+17,117
Change in % of family units below LICO (percentage points)	+3	+5	+3	+4	+1	+3	+6
Housing rented (%)	48	33	56	62	54	60	60
Average value housing (\$,000)	287	175	252	144	181	95	117

Table 5 CLUSTER STATISTICS FOR THE NATIVE NORTH

Newfoundland	Division 10
Quebec	Territoire -du-Nouveau-Quebec
Manitoba	Divisions 19, 22, 23
Saskatchewan	Division 18
British Columbia	Central Coast Region, Stikine
Northwest Territories	Baffin, Keewatin, Inuvik, Kitkimeot Regions

Variable	Cluster Mean Unstandardised	Cluster Maximum	CD with Cluster Maximum	Cluster Minimum	CD with Cluster Minimum	Standard Deviation
Population 1991	15,105	37,105	Territoire du Nouveau Quebec	1,995	Stikine BC	12,573
% Population in centres > 10k	7	46 37	Manitoba 22 Newfoundland 10	0	(10)	0.16
% Population aged < 15	34	40	Keewatin Region NWT	26	Stikine BC	0.05
% Population aged 55 +	8	13	Central Coast BC	5	Baffin NWT	0.02
Population Change, 1981-91	+ 848	+5,520	Manitoba 22	-2,865	Territoire du Nouveau Quebec	2,143
Young Migration (aged 15-24 in 1981)	-332	+ 345	Baffin NWT	-1,585	Territoire du Nouveau Quebec	622
Elderly Migration (aged over 55 in 1981)	-421	-60	Stikine BC	-1,190	Territoire du Nouveau Quebec	370
% with Post-secondary Education: Males	10	16	Stikine BC	0.04	Manitoba 19	0.03
% with Post-secondary Education: Females	8	11	Stikine BC	0.04	Manitoba 19	0.02

Variable	Cluster Mean Unstandardised	Cluster Maximum	CD with Cluster Maximum	Cluster Minimum	CD with Cluster Minimum	Standard Deviation
Employment Rate: Male	38	48	Stikine	27	Manitoba 19	0.05
Employment Rate: Female	26	30	Inuvik	19	Manitoba 19	0.03
Primary Industry (% employed)	15	42	Stikine BC (mining related) Biggest fall 17% Manitoba 23 (mining)	0	Keewatin	0.11
Hi-tech Manufacturing (% employed)	0	0		0		0
Lo-tech Manufacturing (% employed)	2	12	Territoire du Nouveau Quebec	0	All of NWT and Stikine BC	0.04
Construction (% employed)	4	8	Keewatin NWT	3	Newfoundland	0.01
Utilities (% employed)	10	24	Manitoba 23 Biggest rise since 1981 - 6%	4	Manitoba 19	0.05
Consumer Services (% employed)	19	23	Manitoba 22 Biggest rise Quebec 7% Biggest fall Keewatin 10%	7	Manitoba 19	0.04
Government Services (% employed)	43	67	Keewatin NWT (risen 17% since 1981 - no significant falls)	22	Stikine BC	13
Unemployment rate	12	16	Central Coast BC	6%	Stikine BC	3
Change in Unemployment rate (1981-1991)	+ 6%	+ 11%	Kitkimeot (new total 15%)	2%	Stikine BC	2

Variable	Cluster Mean Unstandardised	Cluster Maximum	CD with Cluster Maximum	Cluster Minimum	CD with Cluster Minimum	Standard Deviation
Average Income per Family unit	38,149	47,116	Newfoundland 10	18,047	Manitoba 19	8,319
¹ % Family units earning < LICO	9%	24%	Saskatchewan 18	0	Inuvik Kitkimeot Baffin Keewatin	0.07
Economic dependency	21	65	Manitoba 13	7	Stikine BC	0.15
Change in Average Family Income	16,623	23,000	Kitkimeot NWT	6,344	Manitoba 19	5,303
Teachers per 1,000 persons	3.2	4.4	Stikine BC	2.2	Manitoba 19	3
Doctors per 1,000 persons	0.5	1.5	Manitoba 23	0	Keewatin	0
Average House Value (\$)	74,000	152,291	Baffin	24,120	Manitoba 23	43,000
% housing valued > \$100,000	22	71	Baffin	0.2	Manitoba 23	0.27

¹

LICO are based on family expenditure data that is not available for the Yukon, Northwest Territories or the Indian reserves. Consequently, the conceptual relevance of the calculated values for the North is questionable.

4.3 Summary of Initial Results

To summarise, this first analysis of the data set indicates that:

- 1) There are two groups of characteristics, namely primary settlements and the native north, which are differentiating census divisions, and that this differentiation was not dependent on the statistical technique used, although it is bound to be a function of the variables chosen.
- 2) The extremity of these two themes would hide any other variability within the data set. To emphasise diversity within the 'middle majority' the two outlying clusters were identified and the census divisions removed from the data. Both groups will be returned to the data at a later stage.

4.4 Classifying the Remaining Census Divisions

With these 19 highly differentiated CDs now identified and extracted from the data set, it was anticipated that patterns of socio-economic characteristics would begin to emerge amongst the remaining areas. However, this was not the case. Once data were restandardized according to the new median and inter-quartile range, it remained very difficult to separate census divisions by socio-economic characteristics (see Appendix 2).

Finally, a solution was found by splitting primary industry into its component sectors. With this breakdown and using principal component analysis it was possible to extract five components which together explained 60% of the data with the first factor explaining 27%. This is not a highly significant solution, only marginally better than Stage 1 in the variance explained by lower components but, as before, the results do appear to have some validity to help to identify patterns and themes in the data.

These components are described using a table of loadings for each factor and following is a brief description of the interpretation of these loadings. Names have been assigned to the factors to try to indicate characteristics. By estimating factor scores for each census division it is also possible to map the distribution of each factor across Canada. These maps are included in the following section⁷. It should be stressed that a significant percentage of the variance in rural and remote Canada has not been identified. For Components 3,4,and 5, it is perhaps better to think of them as an 'ideal types' - that is, theoretical groups of characteristics which no one CD may fit exactly, but that many CDs will portray to a small extent.

⁷ Note that 19 CDs have already been removed from the data so there are blank CDs on the maps.

4.5 Distribution of Component Scores by Census Division

Component 1 - Yuppieville (Explains 27.5%)

Census divisions with high scores on this component are those adjacent to primary settlements (Table 6, Map 6). These are generally divisions which had experienced a large population rise, in-migration and rising incomes over the 1981-1991 period, characteristics predicted from the loadings. The components also predict a service economy with a high percentage of professional and skilled workers and a high percentage with post-secondary education. These characteristics could either relate to the outmigration of young people and families from urban centres into a 'country setting', or simply the expansion of urban fringe with new growth on greenfield sites.

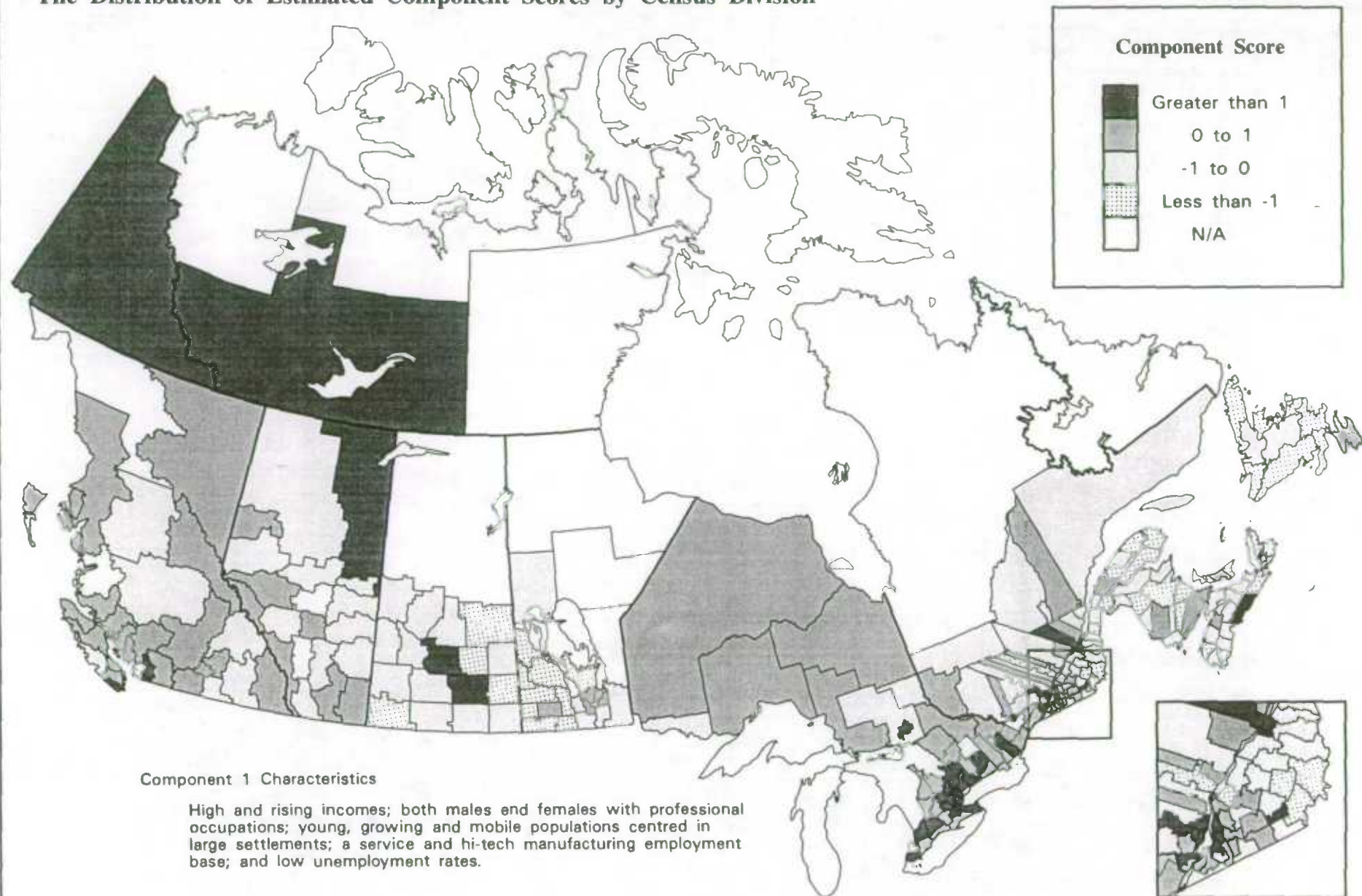
Most divisions with high loadings on this component fit this scenario. They tend to be concentrated in Quebec around Montreal and Quebec City, in Southern Ontario's Golden Horseshoe, Halifax County and in divisions neighbouring Vancouver and Victoria. However, there is also evidence of Yuppieville in the Prairie regions, where the data reflects large central settlements such as Regina and Saskatoon. In addition, there are three divisions in north-west Canada where the high scores would be related to the high incomes and educated workforce associated with the primary resource industry and/or the government sector rather than adjacency to primary settlements.

Table 6 High Loadings - Component 1 - YUPPIEVILLE

Demography		
Population	+0.7169	
Population in centres >10,000	+0.74071	
Population in centres < 2,500		-0.7587
Population Change (1981 - 91)	+0.63915	
Population aged 25 - 54 , 1991	+0.5431	
Young Migration: Population change - aged 15-24 in 1981	+0.63915	
Elderly Migration: Population change - aged 55+ in 1981		-0.4955
% Population in same dwelling		-0.7882
Employment Structure		
Professional Occupation: Male	+0.8437	
Professional Occupation: Female	+0.7709	
Employment Rate: Female	+0.5140	
Hi -tech Manufacturing (% employed)	+0.4638	
Consumer and Business Services (% employed)	+0.6161	
Unemployment Rates		-0.4384
Income & Infrastructure		
Post Secondary Education:		
Male	+0.8086	
Female	+0.7062	
Average Family Income	+0.8614	
% Family units earning > \$50,000	+0.8513	
Economic Dependency		-0.8068
Income Change 1981-91	+0.7816	
Average house value	+0.8431	

Yuppieville

The Distribution of Estimated Component Scores by Census Division



Source: 1981 and 1991 Census of Canada, Statistics Canada

Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

Component 2 - Economic Shut-down (Explains 12.7%)

This component (due to the nature of the statistical techniques) considers variance perpendicular to the first component. It has high loadings on high and rising unemployment, on a primary but non-agricultural base together with a declining manufacturing and processing sector and a high incidence of poverty (Table 7, Map 7). The term Economic Shut-down is used to reflect the apparent lack of economic opportunity.

Component 2 is concentrated in the Atlantic provinces, particularly Newfoundland and northern New Brunswick and northern regions of Quebec and Ontario. There is a similar grouping of this component in British Columbia centred on the Rocky Mountains and northern Coast. This distribution partly reflects an often declining presence of the forestry and fishing industries, coupled with a lack of economic opportunities associated with these sectors.

Component 3 - Young Resourced (Explains 7%)

This component is found in the Western provinces and to a lesser extent in northern Quebec (Table 8, Map 8). It represents areas where there are considerable resources - both natural and human. Communities with young family structures of good and stable income, highly educated residents, with a mining, oil, transportation and utilities employment base. There are few consumer or business services. The young family structure may be influenced by the high percentage of aboriginal families in many CDs with mining resources.

Table 7 High Loadings - Component 2 - ECONOMIC SHUT-DOWN

<i>Demography</i>		
% Population aged 15-24	+0.5449	
% Population aged 25-54	+0.4798	
<i>Employment Structure</i>		
Employment Rates: Male		-0.8243
Employment Rates: Female		-0.7296
Self-employment Rates		-0.8480
Agriculture (% employed)		-0.8105
Fishing/Trapping (% employed)	+0.4188	
Lo-tech Manufacturing (% employed)	+0.4556	
Change in primary employment	+0.4084	
Change in lo-tech manufacturing employment		-0.4029
Unemployment rate of 15-24 age group	+0.8176	
Unemployment rate of 25-54 age group	+0.8725	
Change in Unemployment rate: 19 81-91	+0.6108	
<i>Income & Infrastructure</i>		
% of Family units eaming below LICO	+0.4050	
Change in Family units earning below LICO		-0.8068

Economic Shutdown

The Distribution of Estimated Component Scores by Census Division

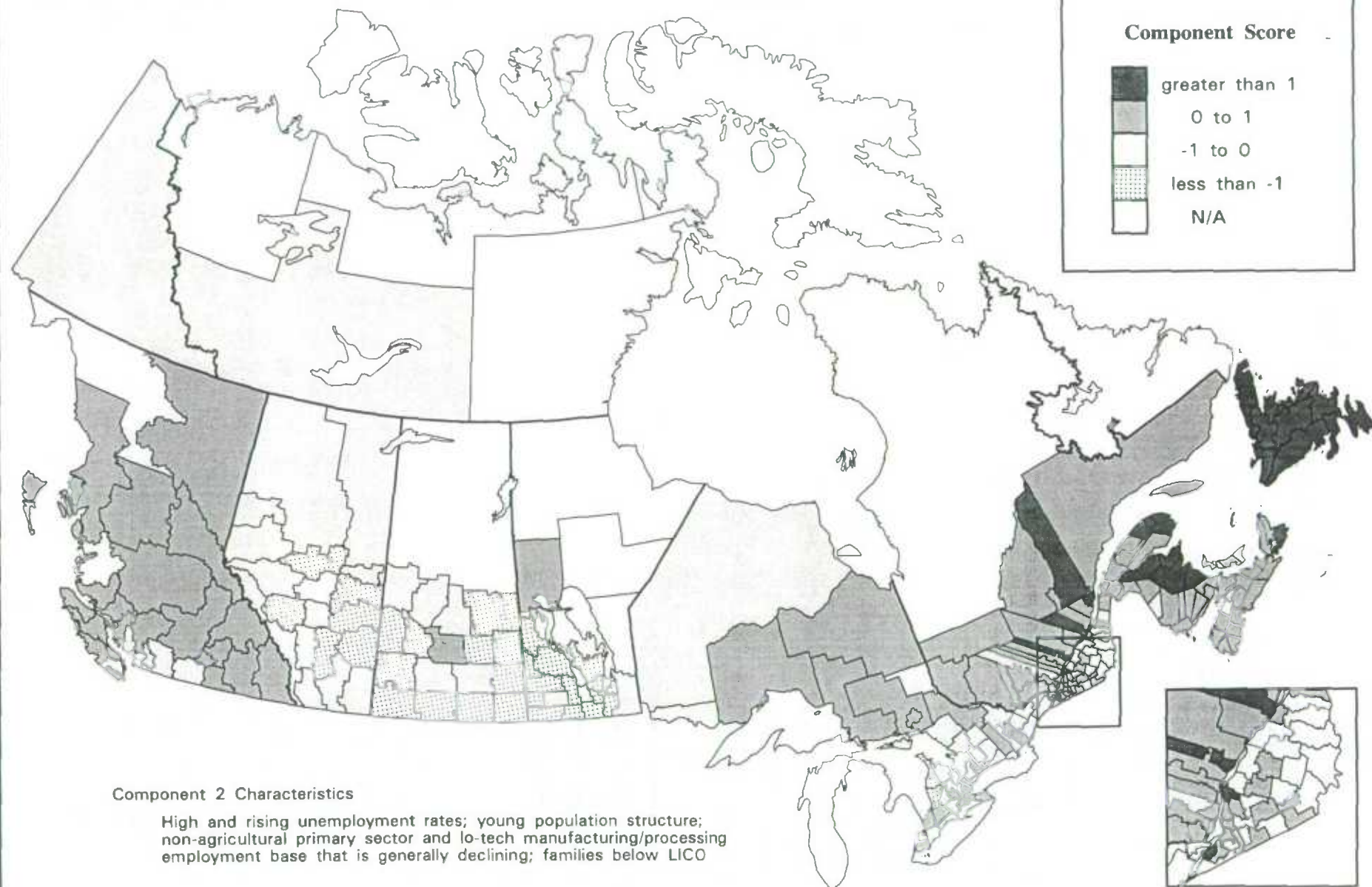
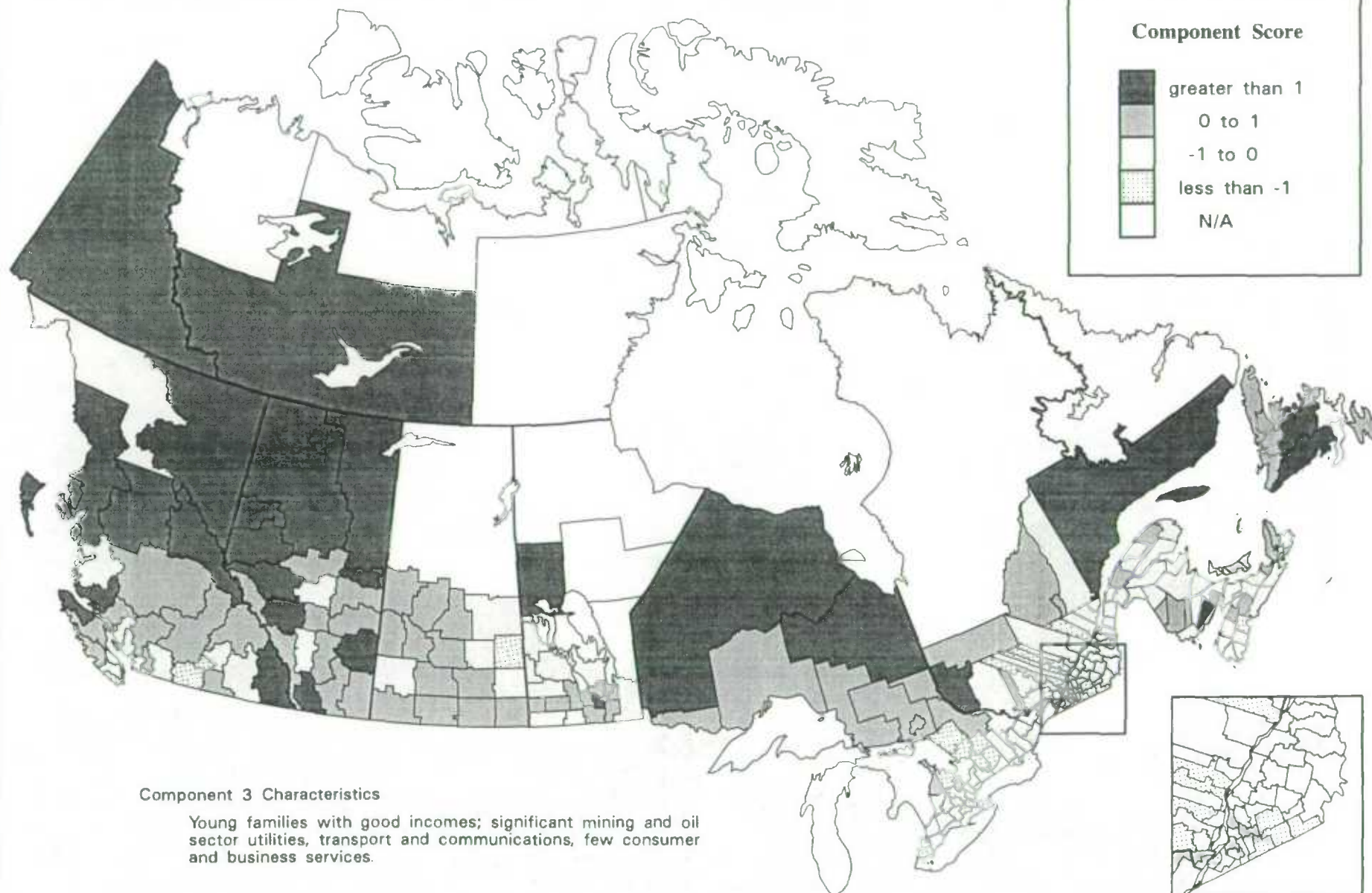


Table 8 High Loadings - Component 3 - YOUNG & RESOURCED

<i>Demography</i>		
% Population aged 0 - 14	+0.7489	
% Population aged 15 -24	+0.4882	
% Population aged 55+	-0.6501	
<i>Employment Structure</i>		
Mining (% employed)	+0.5243	
Petroleum (% employed)	+0.4593	
Hi-tech manufacturing (% employed)		-0.3620
Lo-tech manufacturing (% employed)		-0.3186
Utilities(% employed)	+0.3262	
Consumer & Business Services (% employed)		-0.3706
Change in % employed in Lo-tech Manufacturing, 1981-91	+0.3054	
Change in % employed in Government services, 1981-91	+0.3225	
<i>Income & Infrastructure</i>		
Average income per family unit	+0.3088	
% Family units earning > \$50,000		-0.3172
% Family units with income below LICO	+0.3624	
Housing in need of Major Repair	+0.3284	

Young Resources

The Distribution of Estimated Component Scores by Census Division



Source: 1981 and 1991 Census of Canada, Statistics Canada

Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

Component 4 - New Rural Settlers (Explains 7%)

This component is associated with a growing young population with good and increasing incomes (Table 9, Map 9). But it is also associated with few towns and few government services. There is a positive association with construction perhaps representing building for a growing population. Similar to Component 1, divisions with a high loading on this component occur adjacent to primary settlement. But, unlike factor one (where there appears to be a rapid expansion of an existing infrastructure) this component seems to represent a move into less inhabited, and less prepared (in terms of infrastructure) areas. It also reflects a different employment base with a combination of primary, manufacturing and non-government services rather than the high dependence on consumer and business services found for Component 1. Migration to these areas by people from large settlements seems plausible in Southern Ontario but perhaps less likely in areas of Newfoundland.

Component 5 - Rural Government Dependent (Explains 5%)

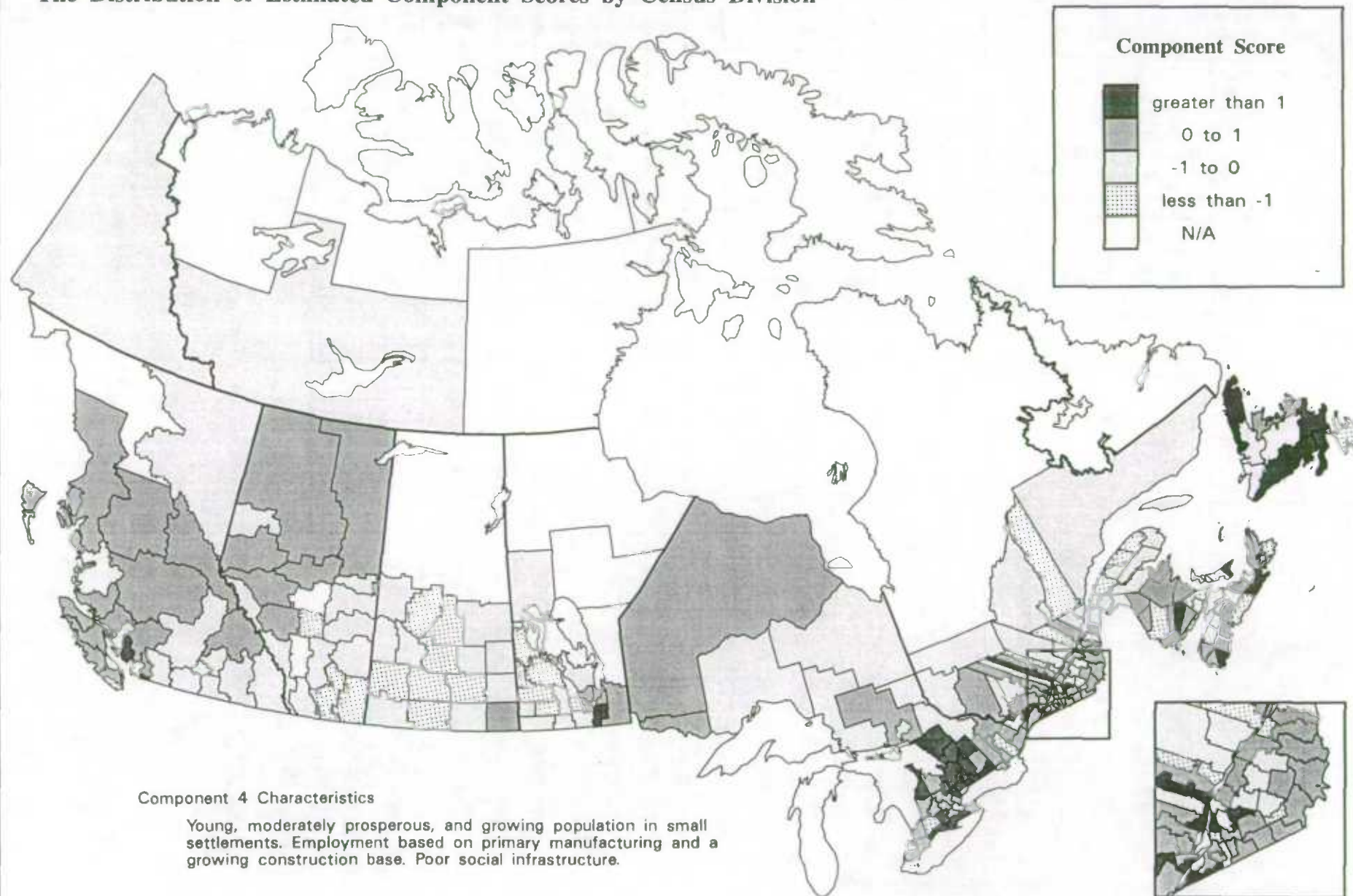
By the fifth component, loadings are becoming quite small. The most important factor is the high and growing level of employment in government services, combined with a declining primary sector, high unemployment and dependence on social transfer income (Table 10, Map 10). There is a close association between professional female employment, post secondary education for females and the supply of teachers. The factor loadings suggest a moderate association with fishing, but the concentration of the loadings in the Prairies also suggest that agricultural dependence is important. Incomes are moderate, but there has been a considerable fall in the percentage of households below the poverty line, either due to increased social transfer payments or perhaps the movement of the families below LICO from the area. This suggestion is reinforced by the declining population for most of the CDs.

Table 9 High Loadings - Component 4 - NEW RURAL SETTLERS

<i>Demography</i>		
% Population in centres > 10,000		-0.33132
% Population in towns < 2,500	+0.33137	
Population Change 1981-1991	+0.2557	
Young Migration: Population Change aged 15-24 in 1981	+0.3677	
Population change for the 55+ age group 1981	+0.3624	
<i>Employment Structure</i>		
Mining (% employed)	+0.2395	
Hi- tech manufacturing (% employed)	+0.3094	
Lo-tech manufacturing (% employed)	+0.3616	
Construction (% employed)	+0.3243	
Government Services (% employed)		-0.5324
Change in % employed in Lo-tech manufacturing		-0.2080
Change in % employed in Construction	+0.2474	
<i>Income & Infrastructure</i>		
Average income per family unit	+0.3132	
% Family units earning > \$50,000		-0.5547
% Family units earning below LICO	+0.2608	
Change in Average Income per Family unit : 1981-91	+0.4298	
Change in % with income below LICO		-0.3635
Doctors per 1,000 persons		-0.4898
Teachers per 1,000 persons		-0.4529
Professional occupation: Female		-0.2901
Post-secondary education: Female		-0.4038
% Housing owned	+0.5049	
Average House Value (\$)	+0.3356	

New Rural Settlers

The Distribution of Estimated Component Scores by Census Division



Source: 1981 and 1991 Census of Canada, Statistics Canada

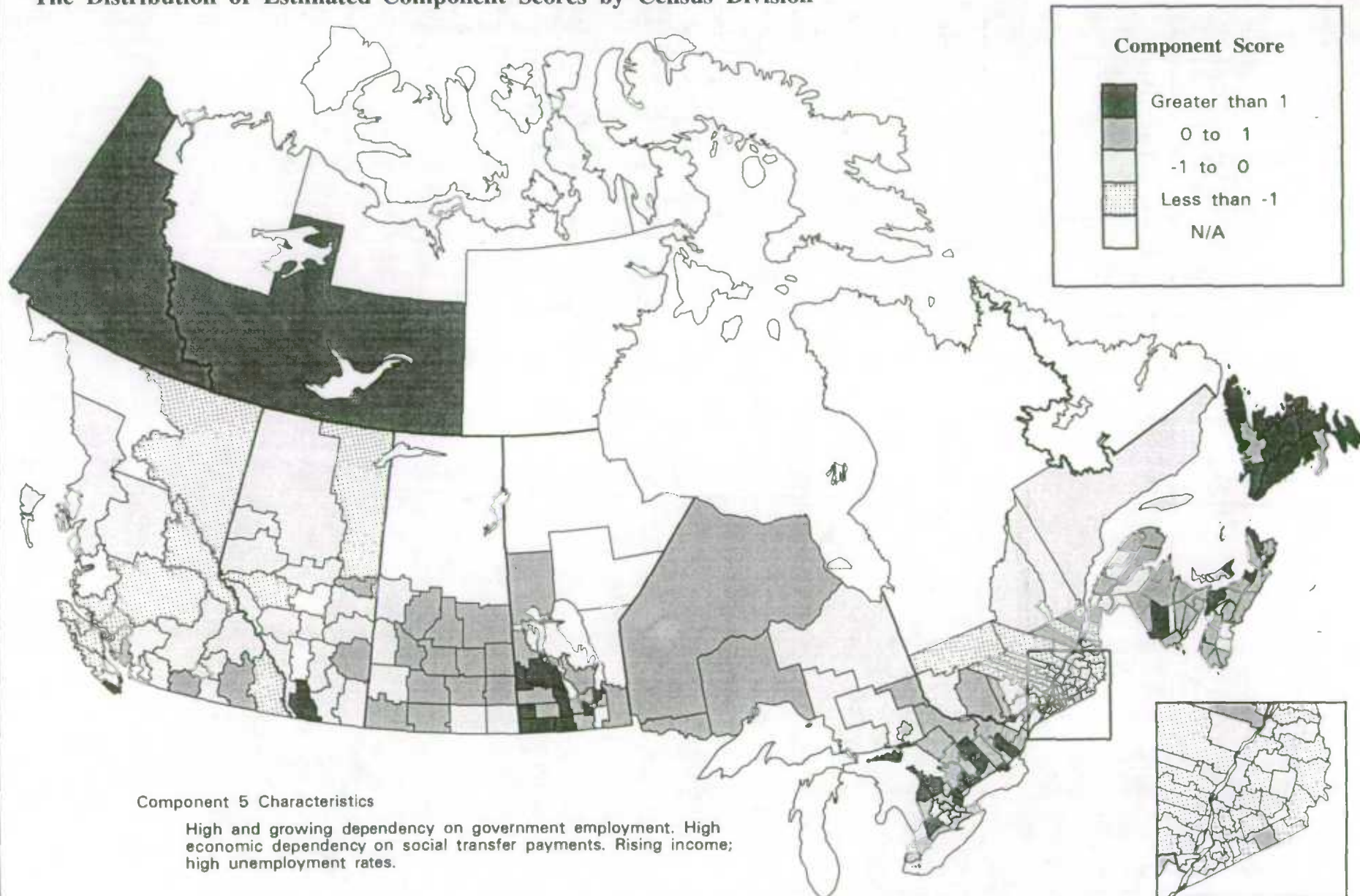
Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

Table 10 High Loadings - Component 5 - RURAL GOVERNMENT DEPENDENT

Demography		
% Population in centres < 2,500	+0.2032	
% Population aged 15 - 24	+0.2939	
% Population aged 25 - 54		-0.3929
% Population aged 55+	+0.2454	
Employment Structure		
Forestry (% employed)		-0.2168
Fishing (% employed)	+0.2967	
Lo-tech manufacturing (% employed)		-0.4304
Government Services (% employed)	+0.5117	
% Change in Primary employment: 1981-91		-0.2404
% Change in Government Service employment: 1981 -91	+0.3145	
Unemployment rate	+0.2969	
Income & Infrastructure		
Economic Dependency	+0.3089	
Change in Average Income per Family unit: 1981-91	+0.2578	
Change in % of Family units earning < LICO		-0.4514
Teachers per 1,000 persons	+0.4507	
Professional Occupations: Female	+0.3039	
Post-secondary Education: Female	+0.2082	
% of Housing Owned	+0.3403	
Housing in need of Major Repair	+0.2265	
Housing valued over \$100,000	+0.22045	

Rural Government Dependent

The Distribution of Estimated Component Scores by Census Division



Source: 1981 and 1991 Census of Canada, Statistics Canada

Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

5 A PRELIMINARY TYPOLOGY

5.1 Combining Factor Scores for Mapping

It is apparent from the component score maps that CDs can score highly on more than one component. For example, the Yukon has high component scores for Young Resourced, Yuppieville and Rural Government Dependent. This is not surprising. At such a high level of aggregation we would not expect there to be one set of characteristics within one CD.

For the purpose of creating and mapping a typology it was necessary to identify one type for each division. To do this the above component scores were combined at the census division level by clustering across the component score matrix for the identified 5 components. For each census division, five variables were inputted - the component scores of Yuppieville, Economic Shut-down, New Rural Settlers, Young Resourced and Rural Government Dependent.

The cluster algorithm was used to find groups of divisions which had similar scores for each of these 5 components. The result was that five clusters were identified each with specific component combinations (Table 11). For example, Yuppieville figures three times positively and twice negatively. In the first case, Economic Shut-down also figures positively while all other factor groups were negative. This suggests that CDs in this cluster have a combination of the characteristics of Yuppieville and Economic Shut-down, maybe reflecting the employment/unemployment split in larger settlements. In the second case, it figures positively with New Rural Settler and Rural Government Dependent. Here the high income, educated households are found in areas where there is a more dispersed population with poor infrastructure and dependence on government services. These may or may not contain a service centre.

The result was a classification of 7 types - the 2 identified initially as Primary Settlement and Native North and 5 from the combination of factor scores. Table 11 presents the number of cases in each cluster and the cluster means. In Appendix 3, graphs of the distribution of variables by rural type are presented to check the validity of the typology and to help interpret the characteristics of rural. Names have been assigned to the clusters to help interpretation. However, it should again be stressed that these results are not conclusive - the component analysis on which this analysis is based creates, at best, ideal types. Again the only test of validity will be whether the final typology makes sense to those who are familiar with the different areas in Canada, and its value will be if the typology adds to the discussion of processes of rural change.

Table 11 New Combined Factor Scores for Mapping

Classification	No. of CDs	Mean of Factor Score within Cluster					Description of Classification
		Yuppieville	Economic Shut-down	Young Resourced	New Rural Settlers	Rural Government Dependent	
Primary Settlement	7	Stage One Outlier					
Urban Frontier	64	+0.48	+0.41	-0.16	-1.09	-0.16	Yuppieville - not primarily rural
Rural Enclave	35	-1.16	+1.25	+0.05	0.39	+0.83	Economic Shut- down and high government dependency
Rural Nirvana	48	+1.00	-0.31	-0.48	+1.00	+0.39	Yuppieville in predominantly rural areas with significant government employment
Agro-Rural	69	-0.66	-0.86	-0.36	-0.00	-0.28	Middle rural - not Yuppieville and not Economic Shut-down
Resourced Areas	31	+0.24	+0.12	+1.8	+0.27	-0.58	Young Resource Areas - not government dependent
Native North	12	Stage 2 Outlier					

5.2 Profiles of the Rural Types

The geographic distribution of the 7 typology groupings is presented in Map 12. The characteristics are summarised in Table 12. The distribution of Census divisions by size of major variables within each typology is illustrated in Appendix 3.

Primary Settlements

Primary Settlements are CDs containing the major metropolitan areas of Toronto, Montreal, Vancouver, Edmonton, Winnipeg and Ottawa⁸. Characteristics of the Primary Settlements are extreme compared with all of the other types, but they will be described here for comparative purposes. They are centres of large populations which have risen in absolute terms, although as explained earlier, growth in these settlements lag behind many of the adjacent Divisions. There appears to be some dynamism to the population, with high in-migration of the young accompanied by outmigration of the elderly: the net effect being to concentrate population in the young and middle-aged groups.

Economic activity tends to be high for both men and women. Unemployment in 1991 was below average, hovering around 8%.

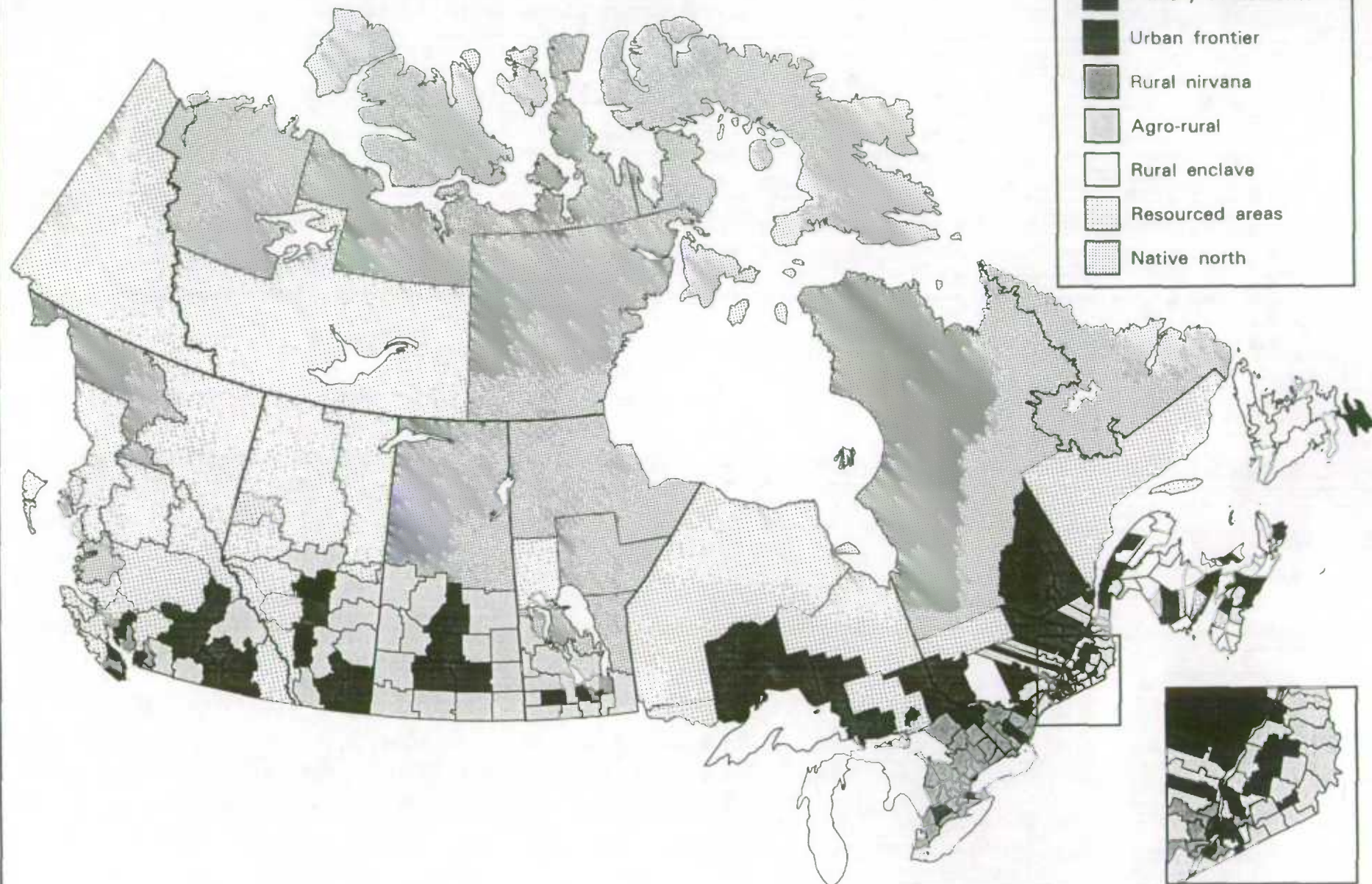
There is a small percentage of primary sector employment in the Primary Settlements of Calgary and Edmonton. This is probably related to resource activity on the edge of the cities (the two CDs cover larger areas than other Primary Settlements), or associated administrative and research facilities. The biggest employment sector for all CDs is consumer and business services with all 7 CDs employing more than one third of the workforce in this sector, which rises to almost one half for Vancouver and Toronto. Hi-tech industry is also concentrated in this settlement type, despite accounting for a very small percentage of overall employment (2-3%). The Government employs one quarter of the workforce (except in Ottawa where government employment rises to 45%) but this figure is near the Canadian average (Table 13).

For both males and females, the highest levels of education and the highest percentage of professional workers are found in Primary Settlements. The differences between the rural types on these variables are quite stark, no types approach the figures for Primary Settlements. This is supported by the prominence of business services and hi-tech manufacturing.

Given the level of education and skilled workers and the prominent employment sectors, it is not surprising that households in the Primary Settlements have the highest incomes (the majority are in the top quartile with means varying from \$51,000 in Ottawa and \$49,000 in Toronto to \$39,000 in Winnipeg and \$37,000 in Montreal).

⁸ This group were extracted from the data in Stage 1. Table 2 can be used in conjunction with the graphs to describe the characteristics.

A Preliminary Typology of Rural Canada



Produced by: SAGA, Agriculture Division, Statistics Canada, 1994

Table 12:

Primary Settlements	CDs containing the major metropolitan areas of Toronto, Montreal, Vancouver, Edmonton, Winnipeg and Ottawa. Characteristics include a large urban population, high incomes and education levels, a skilled workforce and service-based economy.
Urban Frontier	CDs which either contain a larger city such as Quebec City or are adjacent to a Primary Settlement. They have similar but less extreme characteristics to the Primary Settlements.
Rural Enclave	CDs where there appear to be few economic opportunities. Sectors that do exist such as manufacturing, fishing or forestry tend to be in decline. This is coupled with low income levels, a high percentage of families below the low income cut-off and a high rate of dependency on government transfer income. Education levels tends to be below average but there is a good demographic structure and young people appear to remain within the census division.
Rural Nirvana	CDs which seem to represent outmigration of city dwellers to the countryside. Skills and income levels are high. They are likely to commute to work and remain economically and socially integrated to nearby cities, suggesting that an apparent lack of schools and hospitals is initially less important.
Agro-Rural	CDs characterised by rapid population decline, out-migration of the young moderate incomes but a high degree of dependence on government services for employment and transfer payments for income. They are found predominantly in agricultural areas and may fit the scenario of farmers in the Prairies where the spouse is employed as a teacher or in the local hospital.
Resourced Areas	CDs dominated by the presence of mining and oil. There are young family structures, good and stable income and a high percentage of the population with post-secondary education. A prime example is CD #16 in Alberta (north-east corner) where one- third of all employment is in oil.
Native North	CDs dominated by a very young population structure with population either centred in settlements or in remote areas. These CDs also have mining resources, but this employment is generally second to government services. There are few people with post-secondary education, low to moderate but apparently rising incomes.

Table 13
Distribution of Census Divisions
by the CD average value for 6 Key Variables
for each Rural Typology Cluster

1 Population, 1991

Cluster	% of Cluster Cases in each Total Population Quartile				
	<22,860	<40,440	<81,275	>81,275	Total CDs
Primary Settlement	0	0	0	100	7 (100%)
Urban Frontier	4.7	10.9	39.1	45.3	64 (100%)
Rural Enclave	42.8	37.1	17.1	2.9	35 (100%)
Rural Nirvana	14.5	8.3	27.1	50.0	48 (100%)
Agro-Rural	39.1	43.5	15.9	1.5	69 (100%)
Resourced Areas	22.5	25.8	38.7	12.9	31 (100%)
Native North	66.7	33.3	0	0	12 (100%)
Total	25%	25%	25%	25%	266 (100%)

2 Unemployment rate, 1991

Cluster	% of Cluster Cases in Each Unemployment Quartile				
	<6%	<8%	<10%	>10%	Total CDs
Primary Settlement	28.6	57.1	14.3	0	7 (100%)
Urban Frontier	18.7	23.4	37.5	20.3	64 (100%)
Rural Enclave	0	0	8.6	91.4	35 (100%)
Rural Nirvana	43.7	39.6	16.7	0	48 (100%)
Agro-Rural	40.5	27.5	26.1	5.9	69 (100%)
Resourced Areas	9.7	29.0	38.7	22.6	31 (100%)
Native North	8.3	0	8.3	83.4	12 (100%)
Total	25%	25%	25%	25%	266 (100%)

3 Average Income per Family unit, 1991

Cluster	% of Cluster Cases in Each Income Quartile				
	<34,000	<37,500	<42,180	>42,180	Total CDs
Primary Settlement	0	14.3	14.3	71.4	7 (100%)
Urban Frontier	12.5	35.9	31.3	20.3	64 (100%)
Rural Enclave	62.9	28.6	8.6	0	35 (100%)
Rural Nirvana	0	4.2	31.3	64.5	48 (100%)
Agro-Rural	49.3	37.7	13.0	0	69 (100%)
Resourced Areas	0	9.7	48.4	41.9	31 (100%)
Native North	25.0	8.3	33.3	33.3	12 (100%)
Total	25%	25%	25%	25%	266 (100%)

4 Population Change, 1981-1991

Cluster	% of Cluster Cases in Each Population Change Quartile				
	<-530	<1,640	<7,260	>7,260	Total CDs
Primary Settlement	0	0	0	100	7 (100%)
Urban Frontier	21.9	12.5	29.7	35.9	64 (100%)
Rural Enclave	48.6	48.6	2.9	0	35 (100%)
Rural Nirvana	0	6.3	33.3	60.4	48 (100%)
Agro-Rural	39.1	33.3	21.7	5.8	69 (100%)
Resourced Areas	22.6	25.8	41.9	9.7	31 (100%)
Native North	25.0	50.0	25.0	0	12 (100%)
Total	25%	25%	25%	25%	266 (100%)

5 Housing in Need of Major Repair, 1991

Cluster	% of Cluster Cases in Each Housing Repair Severity Quartile				
	<8%	<10%	<13%	>13%	Total CDs
Primary Settlement	86	14	0	0	7 (100%)
Urban Frontier	52	27	19	3	64 (100%)
Rural Enclave	3	8	20	69	35 (100%)
Rural Nirvana	48	35	16	0	48 (100%)
Agro-Rural	4	30	45	20	69 (100%)
Resourced Areas	3	22	29	45	31 (100%)
Native North	0	0	0	100	12 (100%)
Total	25%	25%	25%	25%	266 (100%)

6 Agriculture - % of total employment, 1991

Cluster	% of Cluster Cases in Each Agricultural Employment Quartile				
	<1%	<4%	<9%	>9%	Total CDs
Primary Settlement	71.4	28.6	0	0	7 (100%)
Urban Frontier	29.7	26.6	32.8	10.9	64 (100%)
Rural Enclave	48.6	28.6	17.1	5.7	35 (100%)
Rural Nirvana	12.5	39.6	31.3	16.7	48 (100%)
Agro-Rural	0	7.2	27.5	65.2	69 (100%)
Resourced Areas	29.0	41.9	16.1	12.9	31 (100%)
Native North	91.7	0	8.3	0	12 (100%)
Total	25%	25%	25%	25%	266 (100%)

Family incomes in the top quarter of census divisions average \$42,000 per year, the bottom quarter average less than \$34,000, less than \$8,000 difference. Despite the high levels of aggregation already achieved at the CD level, and the obvious income inequality that will be hidden, this is a narrow margin, at least in European terms. However, the most unequal income structures appear to be within Primary Settlements: the highest incomes are found here, but 6 out of the 7 indicated that one fifth of the population were below the low income cut off (LICO).

Incomes had generally experienced an above average rise between 1981 and 1991; the highest absolute rise being in Ottawa (\$24,000 increase including inflation), followed by Toronto and Calgary (\$23,000). However the inequality has persisted over the decade with a rise in the proportion of households falling below LICO of only 1% for Ottawa, but 3% for Toronto & Calgary and rises of 5-6% in Montreal and Edmonton.

There is nothing surprising in this profile of Primary Settlements. They show areas of dense population, with a generally buoyant economic situation although there are some households who are unable to benefit from this prosperity. Concentration of employment in the growth sectors of consumer and business services and hi-tech manufacturing suggest that the economies of these areas will fare better than most through periods of recession. It is the classification of the remaining areas which is the most interesting to this study.

Urban Frontier

Urban frontier, like Primary Settlements and Rural Nirvana tend to be census divisions with concentrated populations - half of the CDs in this type have a population greater than 81,000, and similarly half of the census divisions have a metro Beale code, the remainder being agglomerated in the OECD sense (although 5 census divisions in this type did not contain a settlement of more than 10,000 people). Population change was also less clear cut - while 36% of census divisions had experienced increases of more than 8,000, 22% had experienced population declines. Age structure in these areas is very slightly biased towards 15-55 age groups. Migration features suggest that although some census divisions have successfully retained or attracted young people, almost half had seen outmigration of the young, while all had been unattractive to the elderly.

Education levels and number of professional and managerial workers tended to be well above average although lower than Primary Settlements, suggesting that there is a well-established infrastructure.

The employment profile is similar to Primary settlements with a generally high level of consumer and government services. There is some evidence of new industry in the form of hi-tech, but there is also a dependency on the traditional processing and manufacturing industries which have experienced decline over the past decade. Unemployment rates are slightly above average at 10%.

The average income and the distribution of income show households to be generally prosperous although with incomes below those of Primary Settlements. There is also a considerable concentration of households below LICO. These results are consistent with the diverse employment structure which includes both high skilled and manual work and above average levels of unemployment. The combination of growing and declining economic sectors may also be reflected in the fact that income change has risen in some CDs and remained relatively static in others, but there is an increasing number of households falling below LICO. Houses are generally in good condition.

The profile of Urban Frontier suggests large settlements which have smaller scale consumer and business centres. They give the impression of being the manufacturing and primary processing boom areas of the late 1970s. The past reliance on manufacturing industry which has been hit by recession has brought about small rises in unemployment and poverty in some CDs coupled with out-migration. The business and service centre, along with some hi-tech manufacturing, and the distance to Primary Settlements have perhaps helped most CDs to remain relatively stable over the 10 year period. There is little evidence to predict future growth.

Rural Nirvana

Rural Nirvana is the third type with large population totals - 40% of the CDs being in the top quartile. In this case, a smaller percentage of the population is in large towns; 14% of the CDs have less than a quarter of their populations in towns. All CDs in this type have experienced population increases far in excess of any other type except the Primary Settlements. Moreover, in percentage terms population growth was the highest of any type. There is a slightly below average number of young people, with a slightly above average number of elderly. Migration patterns shown in Map 3 suggest that this type is the most attractive to young migrants which may reverse the age profile in the future.

There appears to be an economically active population in Rural Nirvana. It shows the second highest rates of economic activity for men and women, and the lowest rates of unemployment. Employment in the primary sector is generally low although there is evidence of agriculture and mining. Government services and lo-tech manufacturing are also under-represented in this type. The main employment sectors appear to be consumer services, hi-tech manufacturing and construction - all sectors suggestive of growth.

Education levels are above average, but not as high as in the Urban Frontier. There is an above average number of professional and managerial workers.

Across the identified types, Rural Nirvana experienced the second highest incomes - 65% of the CDs in this type fell into the top average income bracket. But, in contrast to Primary Settlement, this income is more consistently high with the proportion of households falling below LICO well below average. The type shows a large increase in average income over the last decade.

The profile of Rural Nirvana is thus one of the areas growing in terms of buildings, population, income and economic opportunity. Given the concentration of Rural Nirvana in Southern Ontario, it is perhaps worth questioning the extent to which this opportunity and growth is generated from Primary Settlements while some of the beneficiaries reside in 'Rural Nirvana'.

Agro-Rural

The Agro-Rural type tends to be characterised by smaller populations in dispersed settlements with an ageing population. Over 50% of the CDs in this type had more than 23% of the population over 55. The type is also characterised by declining or stable populations. High levels of outmigration of the young can only aggravate this situation.

There are very high levels of economic activity in Agro-Rural coupled with a low, although increasing level of unemployment. Agricultural industry is concentrated in this type, where over 60% of census divisions had more than 9% of the workforce in agriculture, compared with a Canadian average of 3.5%⁹. Comparison of these results with the earlier discussion of economic activity indicates that these two results may be related. The presence of agricultural industry has been widely acknowledged to absorb unemployment so this may not show the true economic state of the area.

Indeed this is suggested by the remaining employment structure; there is little non-agricultural primary employment except some forestry. Consumer services and government services tend to be below average and there is a relatively high rate of economic dependency on social transfer payments. Income figures show that this type is one of the poorest with 50% of the CDs having the average household income in the bottom bracket. However the majority of the population, although not gaining high incomes, manage to stay above LICO. However, trends from 1981 have shown a below average rise in income.

The summary for Agro-Rural may depend on future agricultural policy. It is quite evident from this analysis that the CDs have suffered from the declining world prices and status of agriculture in the 1980s which has been reflected in lower incomes if not growing unemployment. Alternative opportunities in the areas may be scarce which has encouraged the outmigration of the young leaving an ageing and declining population which, in turn, reduces demand for services and the employment they create.

⁹ The other primary sectors have lower levels of employment and tend to be dispersed amongst the types. Forestry, for example, is found in Rural Enclave, Resourced Areas and the Native North. Fishing and hunting is located in Urban Frontier, Rural Enclave, Resourced Areas and Native North. Mining and petroleum are represented mainly in Resourced Areas and the Native North although mining is also found to a lesser extent in Agro-Rural, Rural Closure and the Urban Frontier

Rural Enclave

The Rural Enclave type is almost exclusively found in the Atlantic Provinces. It is characterised by smaller population totals: 40% of CDs have less than 20,000 people, and 80% of CDs have less than 25% of their constituent population in large settlements. The census divisions are also less likely to be near to metro areas. There remains a youthful population (0-15) although migration rates suggest that there is a small outflow of young people when they reach working age. Overall the population has tended to decline or remain stable over the 10 year period.

The most prominent features of this type are the low rates of economic activity for men and women and the extremely high rates of unemployment. Over 90% of CDs in this type fell into the highest unemployment bracket (over 10%) with rates sometime reaching 30%.

Rural Enclave has some primary sector employment. Forestry is well represented, as is fishing. Fishing areas have suffered real declines as the fish catch has declined. Given that 83% of the CDs in this type had significant fishing employment this obviously had drastic effects on the local economy. Other sources of employment appear to be lo-tech manufacturing (including fish processing) which is another sector in decline, and government services. The growth sectors of consumer and business services and hi-tech manufacturing are under-represented in this type.

Not surprisingly, this type has the lowest average household income, with 60% of CDs in the bottom income quarter, and a very high rate of economic dependency. Although proportionately less than Primary Settlements there are a substantial number of households below LICO. Income growth was below average over the last decade, but there was no significant change in the share of households below LICO. This suggests that the lack of economic prosperity in this type may be less recent than, for example, that in the Urban Frontier. This suggestion is substantiated by the large amount of housing stock that is in need of repair. This variable is often a good measure of rural poverty or disadvantage, because generally if household owners believe their houses are in need of repair, they will instigate those repairs when they have access to the materials and income.

Human resources are also quite low, the areas have the lowest levels of education and professional employment.

This paints a rather gloomy picture for many CDs where high unemployment, low incomes, closure or scaling down of traditional sources of employment and a lack of skilled workforce are apparent. However, there is a youthful population which brings with it the opportunity to retrain and stimulate new economic opportunity to reverse the trends in the future.

Resourced Areas

Resourced Areas tend to include a wider variety of CDs in terms of population totals with most in the 40,000-80,000 range. Linked to this there is a clear dichotomy between metro and non-metro localities shown by both Beale codes and the percentage of population in towns. For example, 25% of CDs have more than 60% of their population in towns, while 39% have less than 25% of the population in towns. One reason may be that the location and extraction of minerals and petroleum tends to be timebound and geographically haphazard. However the fact that these CDs then cluster together suggest that the resource brings with it a number of social and economic characteristics which form another layer on the existing socio-economic patterns.

Resourced Areas have very high numbers of young people (0-15 years of age) and a very low proportion of elderly. They have experienced population growth with both in-migration of young and a stable elderly population.

The employment structure of the Resourced Areas is strongly influenced by mining and petroleum although there is a small percentage of forestry. Both consumer and government services are under-represented, although levels vary by size of settlement. The predominance of traditionally male activities is perhaps reflected in the higher levels of education among males and the greater number of male professional jobs found in this area. But, the youthful population and the average level of education suggests that there are human resources to develop in these areas.

Resourced areas have the third highest average income behind Primary Settlements and Rural Nirvana. Income has also risen at an above average rate between 1981-1991. These figures are probably directly related to the high incomes of resource extractive work. However, income does appear to be relatively equally spread - there are few people below LICO in many areas, but this may just indicate that there are few residents not active in extractive resource endeavours.

In summary, resourced areas are those with both extractive natural and human resources. Employment is secure within the life of the resource, although alternative employment seems scarce and may imply problems when the resource is fully exploited. However, for mineral rich areas and those with larger settlements, the future, at least at this aggregate level, looks stable.

Native North

The Native North type is in similar areas to Resourced Areas, but has different characteristics. Population totals are much smaller (less than 20,000 per CD) and more dispersed. Earlier evidence described how populations have grown in these northern territories. But, the small absolute numbers involved mean they do not show clearly in this data. The fact that all CDs came into the top quartile for percentage of the population under 15 indicates the population explosion is based on high natural birth rates.

In terms of economic activity and unemployment, Native North is very similar to Rural Enclave. Although there is some primary employment in fishing and hunting, forestry and some mining, the communities do not appear to have benefitted from the latter as much as Resourced Areas. The main source of employment is in government services. Native North has average levels of professional workers for both males and females. These professional jobs would largely be in the government sector (e.g., teachers, medical professionals) as well as in the resource industry (e.g., engineering).

There appears to be a high supply of teachers, although educational attainment remains low. Care is required in interpreting this result: on one hand the high birth rate has provided a rationale for an increase in the supply of teachers. On the other hand, the large land mass covered by Native North areas and the low population density suggests that there will be a smaller pupil to teacher ratio. Of course, the data used here cannot gauge the quality of teaching facilities, or the relevance of the educational achievement to the life and tradition in areas where the majority of inhabitants have a well-defined ethnic background.

The lack of amenity is interpreted again through the access of the population to medical care. Native North stands out as being very poorly served in terms of local care. Again this cannot indicate overall access, nor quality or preference for local versus perhaps better equipped medical care in a large city hospital.

The number of dwellings in need of major repairs clearly shows that Native North property is below standard. All census divisions in this type have more than 13% of its stock in need of major repair. This is usually a sign of poverty or disadvantage, however it is not one reflected in income terms. The average income is very similar to the Canadian average and only one CD has more than 20% of population below LICO. This may be related to data shortcomings¹⁰, high cost of living in these areas (northern work subsidies exist to offset this) or, on a more optimistic and perhaps less realistic note, the success of social welfare policy in these remote areas.

The final areas of Native North had characteristics which were generally different from the remainder of the population. It was extracted near the beginning of the analysis, and may represent the real split in Canadian rural areas. However each type described here does have some different trends and patterns. Native North in many ways is similar to the Rural Enclave, but does not seem to have suffered the same income effects. The Rural Enclave appear to be an area that has suffered a long term decline, while the Urban Frontier and Agro-Rural types have more recently felt recession. In contrast, Rural Nirvana is growing in economic and population terms. The key is perhaps diversification - those areas most susceptible to decline are those dependent on one sector of employment, whether agriculture, fishing or lo-tech manufacturing. Unfortunately the identification, let alone the implementation of any practical corrective policy is fraught with difficulty.

¹⁰ LICO while standardised to 5 urban size classes is not designed to accurately reflect conditions in the rural north. The north is included with all other rural areas and probably does not influence the national rural LICO to any great degree.

5.3 Between Type Variation

Within every CD there is likely to be aspects of many types, similarly within each set of CDs marked as one type there will be different reasons for their inclusion. This section gives a brief look at the level of variation found in the results. In 1986, Savoie wrote that *"Subregional differences in economic well-being in Canada are substantial. Income disparities within the Atlantic region, for example are greater than those between the Atlantic region and the other regions of Canada"*.

The discussion of population, employment and income characteristics in Section 2 highlights the vast difference in circumstances often found between neighbouring CDs. It also brought attention to the amount of diversity that data aggregated to the CD level could hide (Section 2.1).

In terms of the typology itself, Table 11 describes the means within cluster factor scores. For example, the mean score for New Rural Settlers varied from -1.09 (strongly negative) to +1.0 (strongly positive); while the mean score for Economic Shut-down varied from +1.25 (strongly positive) to -0.86 (strongly negative). Likewise the standard deviations for New Rural Settlers varied from 0.49 (medium) to 0.76 (high) and the standard deviations for Economic Shut-down varied from 0.5 (medium) to 0.95 (high). Where the standard deviation is low for a particular factor there will be less variation within a cluster. For example in the case of the cluster Rural Enclave the mean for Yuppieville is strongly negative and the standard deviation is low which suggests that it is very unlikely that the features of Yuppieville will be found in Rural Enclave areas. However, both Economic Shut-down and Rural Government Dependent components are strongly positive in the Rural Enclave cluster, but in both cases this is coupled with a high standard deviation. Hence the Rural Enclave cluster is likely to show the characteristics of Economic Shut-down and Rural Government Dependent components, but there will be considerable variation in the extent to which the CD exhibits such characteristics. In all cases except Rural Government Dependent, the within cluster variation for a factor is lower than the population variation for a cluster.

Table 13 shows the distribution of 6 key variables by cluster. These tables show that there is a concentration or grouping of variable values by cluster - but that there are also a significant number of cases that fall outside of the grouping. It appears that the within cluster variation is slightly less than the between cluster variation.

The Northern CDs appear to be one of the most coherent types. Table 5 describes the range of values for key variables between the member CDs. This variance is often quite large. However, in most cases CD values within this type are of a different magnitude to any other CDs: there is considerable variation within the type, but the type is markedly different from any other. The same can be said of Primary Settlements where again the variable values differ considerably within the type, but each constituent CD is markedly different from the rest of the population.

In part this work follows a methodology by SEGESA (1993) to categorise areas of rural France using the cantons division. The procedure they followed was to select 25 critical variables to be used in a factor analysis. The paper identifies 8 types of rural France including peri-urban, suburban, tourist, good agricultural structures, stable and stagnating, industrial decline, fragile rural and finally rural crisis areas. This typology appears to have been more precise than the Canadian case. One reason for this is that the canton is a much smaller sub-division - unlike the CD it is probable that one canton will show one overall set of characteristics. Another explanation is that there is not the huge physical and climatic variation nor the population dispersion in France as experienced in Canada.

6 CRITICISMS OF THE APPROACH

6.1 How Useful Was the Approach

This work began from the premise that a multivariate analysis was required to gain understanding of the many different aspects which comprised rurality. In hindsight, I still believe this to be the best way of differentiating among rural areas. But this paper makes only a start on the process.

There are many different typologies. The one attempted was an empirical typology, one which 'lets the data speak' to inform results and processes. Although care was taken in the choice of variables, there is still a lack of theoretical basis to the development of the typology. The alternative would have been a relational typology which looks for theoretical classes and then measures to see how many cases fall into each theoretically derived class. To enable this to work, it has to be grounded in a conceptual framework, focused in relations and processes of rural space. The theoretical typology restricts data but, in contrast to the empirical typology, it can be more easily criticised because the solution can only be a result of the theory (and subjective beliefs of the researcher). Further, at the project's early stage there was not enough information and understanding to be able to develop the theoretical classes. An empirical typology was chosen which would hopefully illustrate some of the trends and processes in rural Canada in order to inform theoretical debate and the future development of a conceptual model.

I also adopted a complicated set of steps to derive the typology. In hindsight, it may have been better to have removed the major cities initially and then completed one Principal Component Analysis on the remaining CDs (including the Native North), the scores of which could be clustered to identify the final typology. Due to the problems encountered in separating rural CDs, the technique I used was to identify and extract outliers - which were found to be a coherent group - so as to allow the remainder to be split more easily.

6.2 How Useful were the Chosen Variables

The results of this analysis are entirely dependent on the variables chosen. Not all variables were as useful as expected - that is, they did not help differentiate or explain components or clusters. This section discusses which variables were more or less useful to the analysis.

DEMOGRAPHIC

Population variables have traditionally been used to define rural areas and in this analysis they proved to be very useful in differentiating not only between Primary Settlements and the rest of Canada, but between each identified type. Particularly useful were variables of total population (although the scaling effect should be noted) and the demographic profile of children and the elderly. But, it is probably advisable to use the full demographic profile for balance. Population in small and large centres were useful differentiators in the data as was absolute population change but, given the discussion on demographic change in the Native North, it may be important to use either percentage change, or to use both absolute and percentage change.

The three migration variables did not feature in the analysis. The aim behind the variables was to consider youth out-migration to cities, elderly migration to retirement areas and the general stability of the population. These issues would seem to be influential so the result may be due to the variable definitions used. Further investigation of derived variables to interpret the migration question is required.

EMPLOYMENT

All of the employment variables were useful in differentiating among rural areas and served the purpose for which they had been chosen. As stated earlier, the breakdown of primary employment was felt to be necessary because of the close links between rural characteristics and primary industry, despite the low numbers of people working directly in the sector. It was useful breaking services into consumer, business and government services, although in a repeat analysis it may be necessary to further separate consumer and business services into three variables.

INCOME

Income variables were also useful in the analysis, but income data has only recently been collected in the northern territories and hence may be liable to greater inaccuracies. I remained unsure of this data despite confirming average incomes with the published Income Profile data and would recommend careful investigation. Using average income and the percentage of households with very high and very low incomes gave a reasonable picture of the income inequality as a whole. The income for lone couples over 55 was not significant, but the variable may have been valid at a lower level of aggregation.

HUMAN CAPITAL

Skills and educational levels were good differentiators in the data set, but apart from Resourced Areas the difference between males and females were negligible. Ideally the skilled occupation variable would include trades as well as professional employment but this was not available at the time of coding.

INFRASTRUCTURE

This area is the one which would require more information collection. Although the two variables, doctors and teachers, worked to a certain extent, service provision and accessibility is such an important factor in rural areas it would have been better to provide a wider range of variables from different sources (e.g., the presence of a hospital with certain specialised services, or the number of primary schools, school and plant closure, presence of road, rail, and air links, cost of return ticket to nearest town of more than 50,000 people and so on). This topic is very difficult to access with statistical data and issues of quality and community are unlikely to be addressed in this way.

Finally, I felt housing variables to be very useful. Both house value and house condition presented clear differences by rural type. The validity of the repair question in the Census of Population and, more specifically, in the Household Repair and Renovation Expenditure Survey is being investigated at present by Statistics Canada and CMHC.

6.3 How Useful Were the Techniques

The statistical techniques are very complex, both to interpret and to explain. Component analysis is the more statistically significant technique but in this case significance was very low. It did illustrate some patterns, but these have to be treated with great care. Likewise cluster analysis was useful for grouping some cases and for supporting some results of the component analysis. Due to the data structure neither technique worked particularly well. Different variables or technical specification may improve on the solution.

Ultimately, it would be better to develop some scoring system perhaps using statistical techniques to inform decisions on which variables to use and the thresholds.

7 CONCLUSIONS

This project has been successful in that the final solution has illustrated the diversity of rural Canada and highlighted some interesting trends in demography, employment, income and infrastructure. However it was only a partial success and the following points should be made.

- (i) These results are not conclusive. The CDs of Primary Settlement and Native North were highly differentiated in the data set, but even with these removed it was difficult to find significant groupings of demographic, employment and income characteristics amongst the rest. (Perhaps the true diversity and greatest challenges of rural Canada is indeed the split between Canada outside the Primary Settlements and the Native North.)
- (ii) At the census division level, and once the primary settlements and northern territories have been excluded, there is very little differentiation in the socio-economic characteristics of rural areas.
- (iii) The results are a product of the variables used in the analysis - using different variables may produce different results.
- (iv) The results are a product of the scale of analysis - using different boundaries may produce different results.
- (v) The same variables were used throughout Canada and may not hold equal relevance to all communities. This may affect the ability to find a significant grouping and to find an appropriate description of such communities.
- (vi) The analysis makes no attempt to value one rural type against another.
- (vii) It is an aggregated picture and obviously hides considerable variation at a smaller scale.
- (viii) It is a complex technique which is neither universal, predictable, or open to longitudinal study. Its advantages lie in the illustration of issues and patterns which may be used to inform the development of simple and more practical indicators of rural diversity or perhaps as a framework for locally based studies.

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Appendix 1

Interpreting Statistical Data

The methodology used in this study involves the subjective interpretation of the data. This Appendix tries to explain the way that the data has been analyzed and the terms used in the report, so that others are able to interpret the data.

Cluster Analysis

Cluster analysis looks at the combination of values for all variables and groups census divisions together depending on how close the combination of values are.

For one variable this is perhaps easier to understand. If Wolverhampton has 256,000 people, Inverness has 25,000 and Orkney has 12,000 people and these three were to be grouped into two classes, it would seem likely that Inverness and Orkney would be classed together and Wolverhampton separately. However if another variable is added - houses in need of repair, and we find that Wolverhampton has 13 %, Inverness 2 % and Orkney 15 %, it becomes problematic as to whether to group Orkney with Wolverhampton or with Inverness. It becomes even more problematic when more variables and cases are included.

With many different variables the computer works out points in the data set called 'cluster centres'. The user defines how many cluster groups are required for the solution and this determines how many cluster centres are defined. To find the position of a cluster centre the computer takes a number of random CDs, calculates the mean of each variable and locates a point in hypothetical space. It then measures the distance from an individual CD to each cluster centre and assigns the CD to whichever centre is nearest. The cluster centre is now revised by adding the values of the new variable and recalculating the means. This continues until all CDs have been assigned to a cluster centre. The cluster centres at the end of the process will rarely be in the same position as at the start. The process is reiterated until the solution is stable - the addition of new CDs to clusters makes no significant change in the position of the cluster centre.

In the interpretation of clusters the following evidence was used:

1. *the number of CDs allocated to each cluster.* If a large number of CDs are together in one cluster and there are a number of clusters with only a few cases this signifies that there are outliers in the data set - areas for which values are extreme. The ideal would be for data to split into equal groups - but this is unlikely to happen.

2. *cluster means.* For each variable in the data set the computer calculates the mean for all census divisions in one cluster. For example if one cluster has 10 CDs, the cluster mean for total population will be the mean of population of those 10 CDs. Cluster means are useful:
 - i) to identify the characteristics of the cluster - which variables are high, which ones are low;
 - ii) to identify which characteristics are differentiating the CDs and which ones are standard.
3. *cluster standard deviation.* This shows the variance around the mean, the lower the number the more likely it is that a value could be predicted from the mean. The computer printout usually gives standard deviations within clusters and between clusters. The smaller the within cluster deviation and the larger the between cluster variation the better the differentiation of the cluster patterns.
4. *case listing of clusters.* This is a printout of all CD identifiers with their respective cluster number.

Principal Component Analysis (PCA)

Unlike cluster analysis which is based on measured distance, PCA relates to the correlation between variables. Its aim is data reduction - to find out if variables relate to each other such that one new variable could explain as much or more than the single ones. Again taking a two dimensional case of height and weight, we would generally expect weight to increase proportionately with height, so instead of using both variables in the data set it may be possible to use one variable called physique. If 'physique' is a good predictor of height and weight it will be said to explain a lot of the **variance** of the two variables, height and weight. In the extreme case of exactly the same ratio between height and weight for every case, 'physique' would explain 100% of the variance in the data set. The lower the variance explained by 'physique' the less reliable is the variable 'physique' as a predictor of height or weight. Although variance thresholds are subjective, a good solution should identify over 80% of the variance within the first four components.

These new variables are called **components**. PCA works by looking at correlation between all the different variables and identifying the first or strongest component, that is the one that explains the most variance. It then looks for a second component which has to be perpendicular to the first in the data set. If the relationship between height and weight increases from left to right, the second component would be one which decreased from left to right. The third component is perpendicular to the first and second and so on.

To understand what each component is derived from, it is necessary to look at the **component loadings**. A high positive component loading (near to +1) shows that there is a good positive relationship between a variable and the component, a high negative loading (near to -1) shows

that there is a good negative relationship between the variable and the component. For example, if component 1 showed a loading of $+0.9$ for education level and -0.9 for unemployment we could say that component one indicated that a high education levels and low unemployment often occurred together (note this does not imply causality). A low component loading (less than 0.5) shows that this component is not effected by the variable - its effect is neutral.

It is possible for a component to have high variance and low component loadings. The component explains a lot of the variance in the data set but the low loadings mean that it cannot be interpreted¹¹ - we cannot say what the component is relating to. Likewise it is possible to have low variance and high loadings. Some variables relate together strongly and the component can be interpreted in terms of its characteristics, but the ability of the component to predict values within the data set is low - it is in effect creating an 'ideal type'.

¹¹ There are a number of statistical techniques which can be used to make sense of such results - for example, a Varimax Rotation.

Appendix 2

Developing the Typology

As discussed in section 4.2, 7 CDs representing Primary Settlements and 12 CDs representing the Native North were identified and removed from the subsequent analysis. It was anticipated that the remaining areas would break according to different socio-economic characteristics. The following steps show the different attempts that were made to split rural Canada in a meaningful way.

1. Re-clustered original data - specifying 5, 10 and 20 clusters. Even with 20 clusters, 199 of the remaining 247 CDs clustered together.
2. Re-standardised the data without the outliers to get a better spread of data. Again 206 of the 247 CDs remained within one cluster.
3. Analyzed using Principal Component Analysis - although first component explained 27% of the data, interpreting the eigen scores showed that this component could not be easily explained.
4. From the description of change variables in section 1, large differences were identified among different areas in terms of migration and income change. The change variables (rather than situation variables) were clustered again with little success.

By this point there seemed to be a number of conclusions. One was that although individual changes were apparent by census division, the result of multivariate analysis was to hide all the individual change so that the areas appeared the same. Secondly, although change existed at the local level, when aggregated to the census division, again the results were hidden - all variability was within counties rather than between counties. Third, the right variable combination had not been considered in the data.

The only variables in the data set which had not been used in the analysis was dependence in terms of employment on agriculture, forestry, fishing and hunting, mining or oil extraction and refining. These had not been considered because it was hoped to reach a solution that looked at common socio-economic characteristics which disregarded whether a CD concentrated on fishing or farming. The next stage was to consider incorporating them into the analysis.

5. First they were clustered on their own - and it was found that again most CDs did not differentiate - they had very small proportions of forestry and farming, and no significant employment in any other primary sector. Other CDs did appear to cluster - the agricultural area of Prairies, dairying areas in Quebec and the mining

and oil CDs. These are shown on Map 4. It is perhaps worth noting here that areas with very high dependence on agricultural employment do not necessarily relate to an area of favourable agriculture - it may relate to a lack of alternative job opportunities.

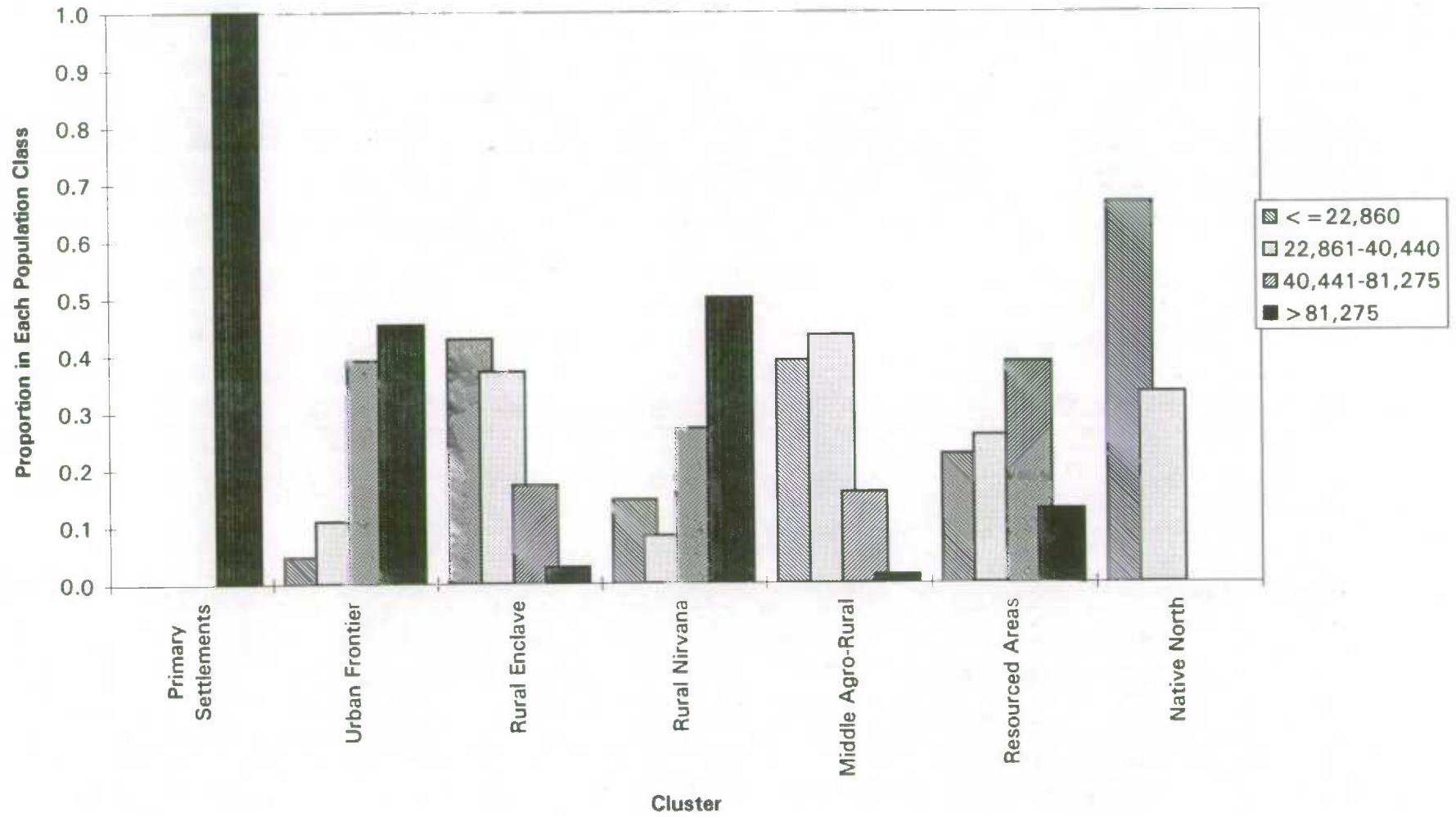
6. The general variable for primary industry was replaced with the 5 sectors and when component analysis was used some information emerged. Although some further insight into the structures of rural areas was gained, it was deemed necessary to stop and consider the theoretical implication of this move. The overall objective of the typology was to identify socio-economic properties which appeared to differentiate one census division area from another. This has proved very difficult unless primary industry is brought into the data.

The solution as described in the main body of the paper did not explain a particularly high percentage of variance. It was particularly interesting that despite removing 17 CDs from the data set, the scores on the first 2 components were very similar to the original factor analysis. Given this result, an alternative approach would have been to continue with the original solution and cluster scores for all CDs - however this was not the approach that had been used to tackle the problem. The solution given is thus only one set of results - **towards** a typology of rural Canada.

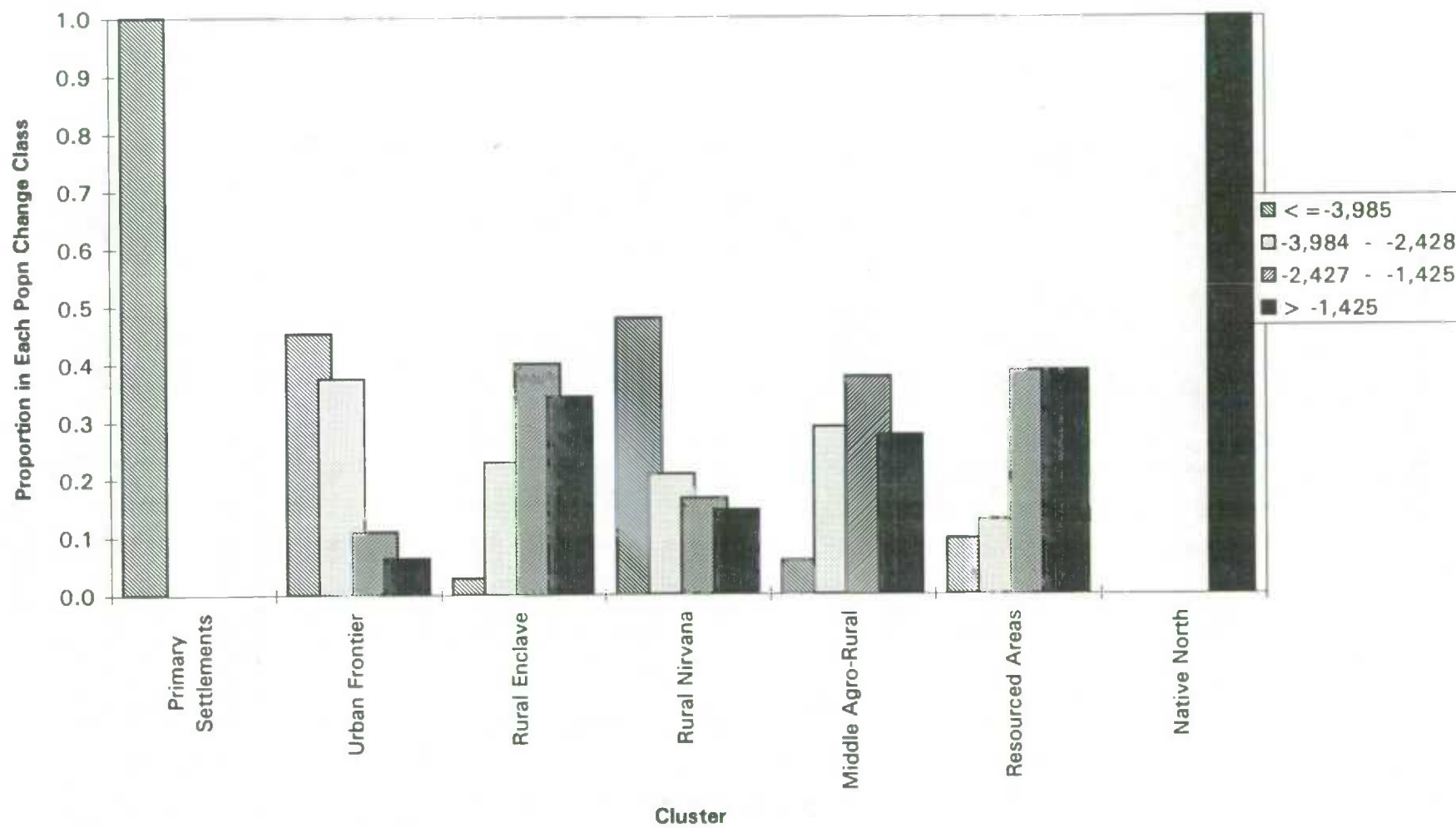
Appendix 3

Graphs

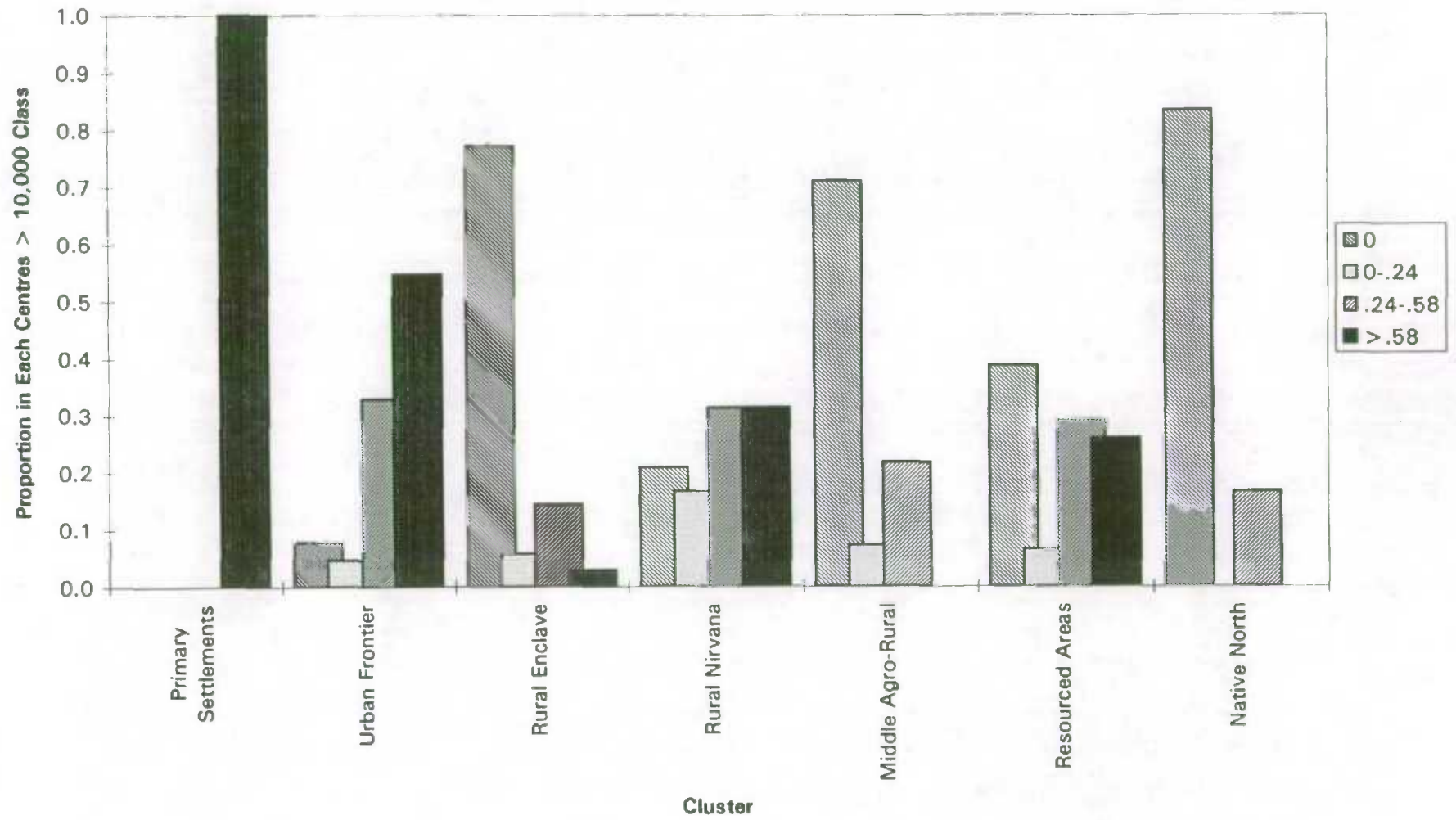
Population Size



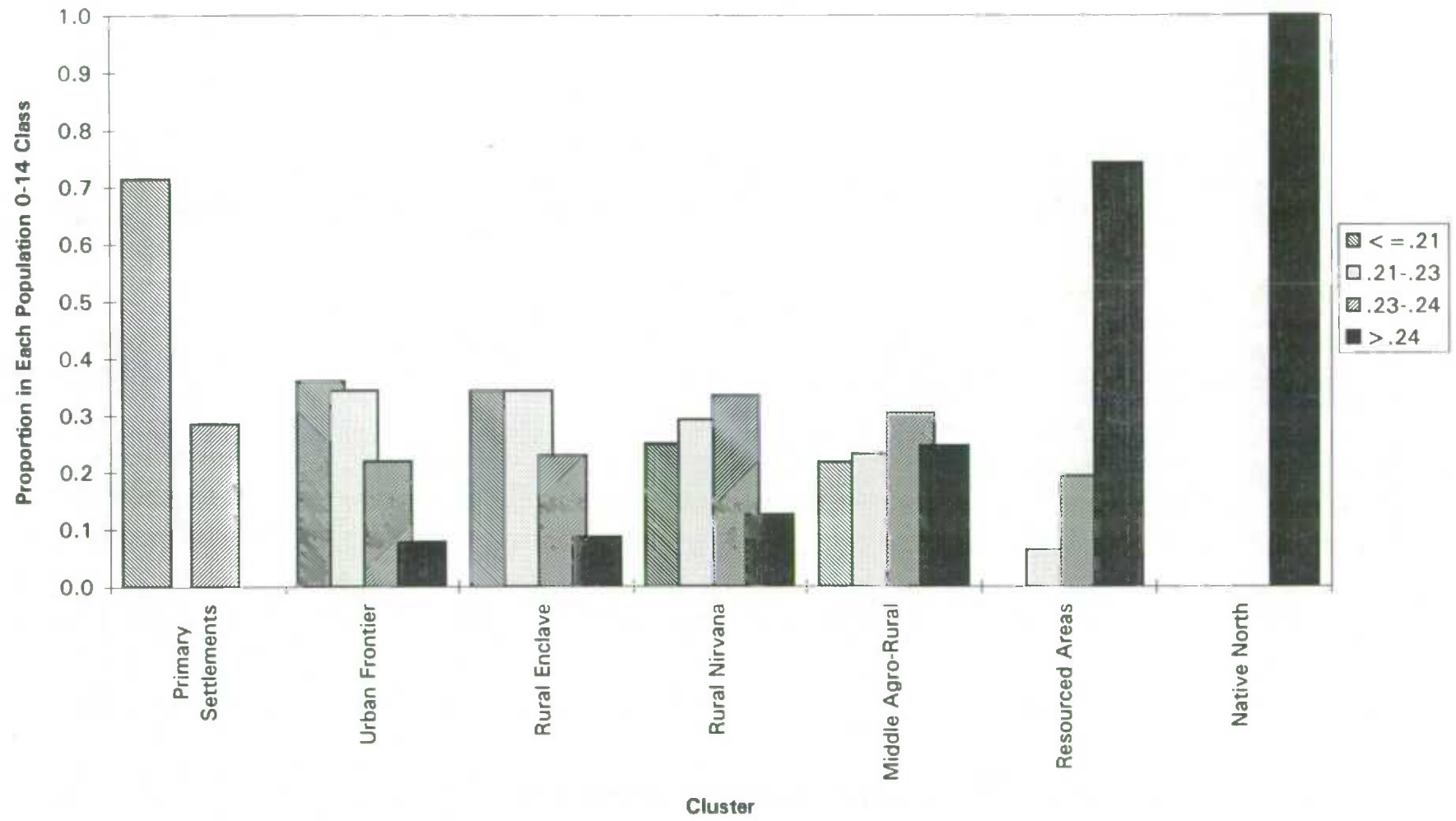
1981-1991 Population Aged 55 + Change (Absolute)



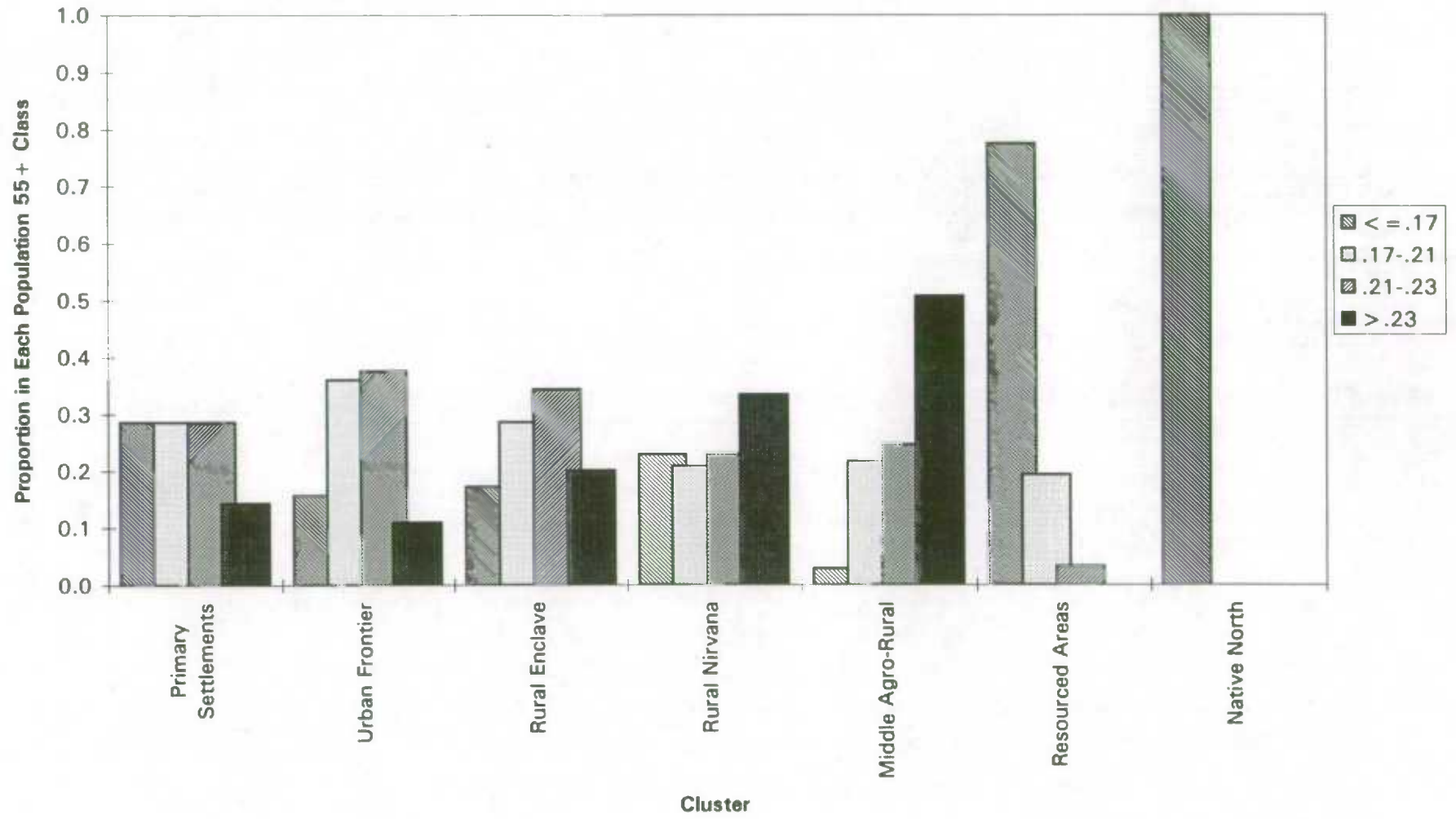
Population in Centres > 10,000



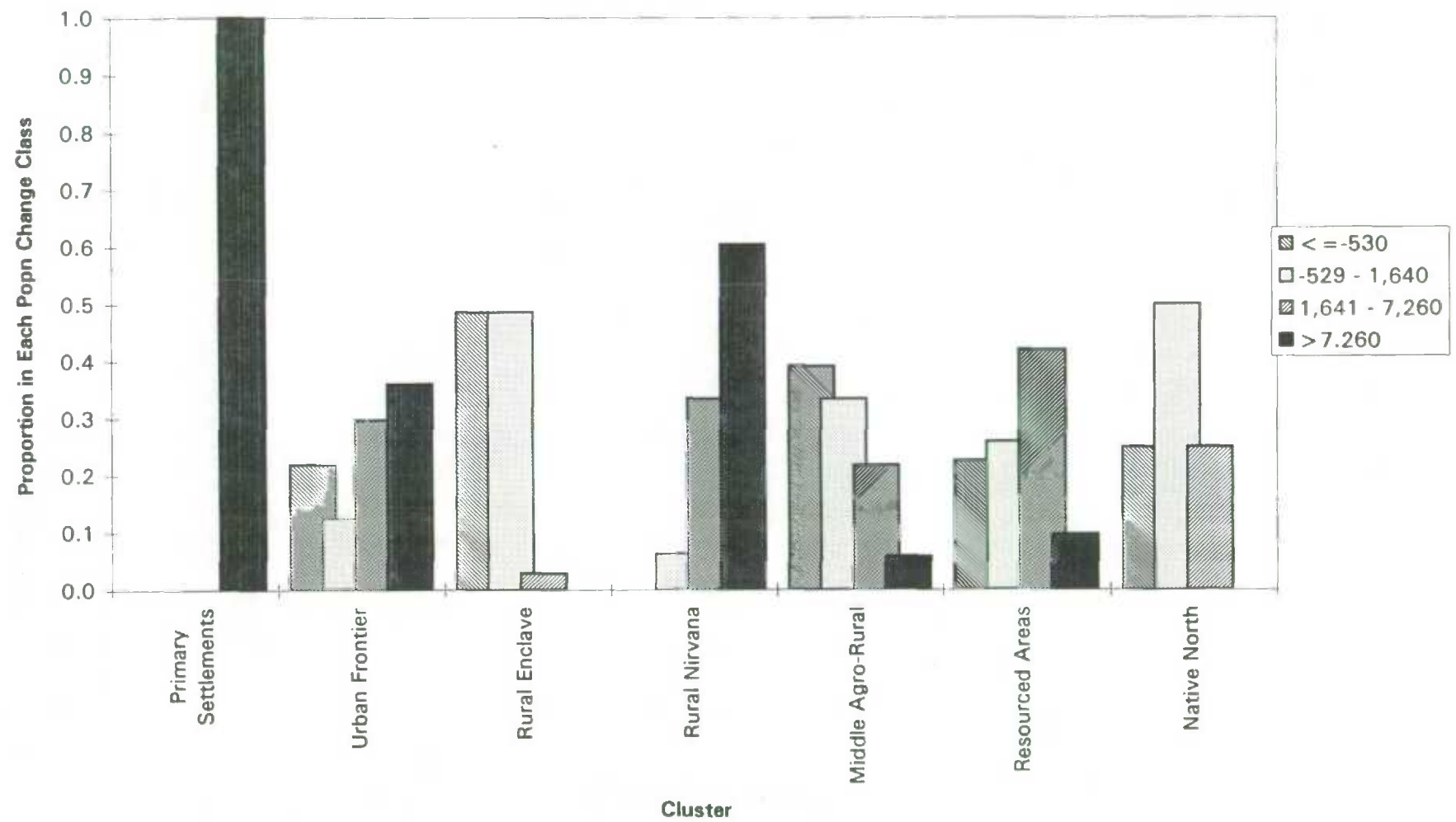
Population Aged 0-14



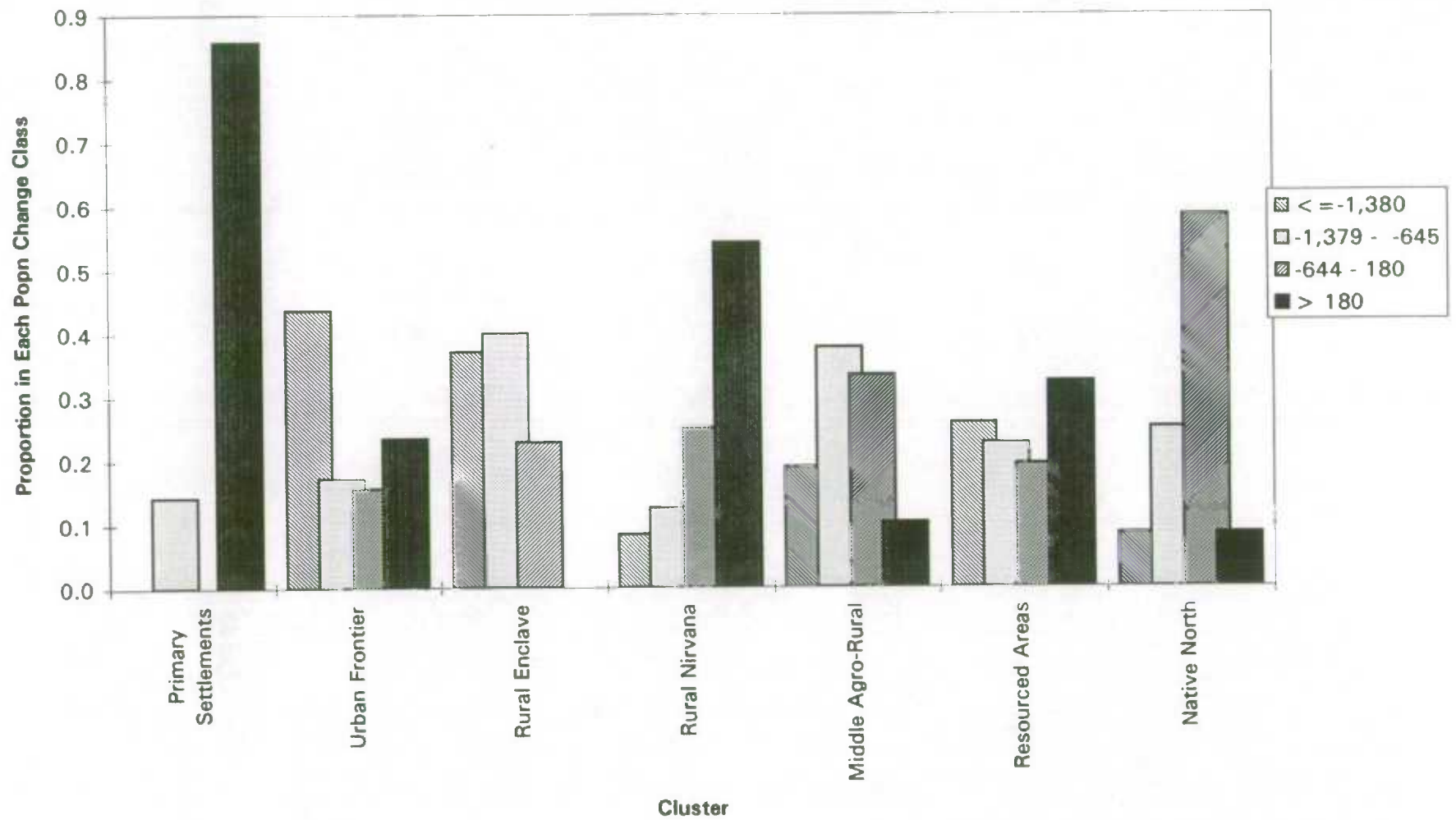
Population Aged 55 +



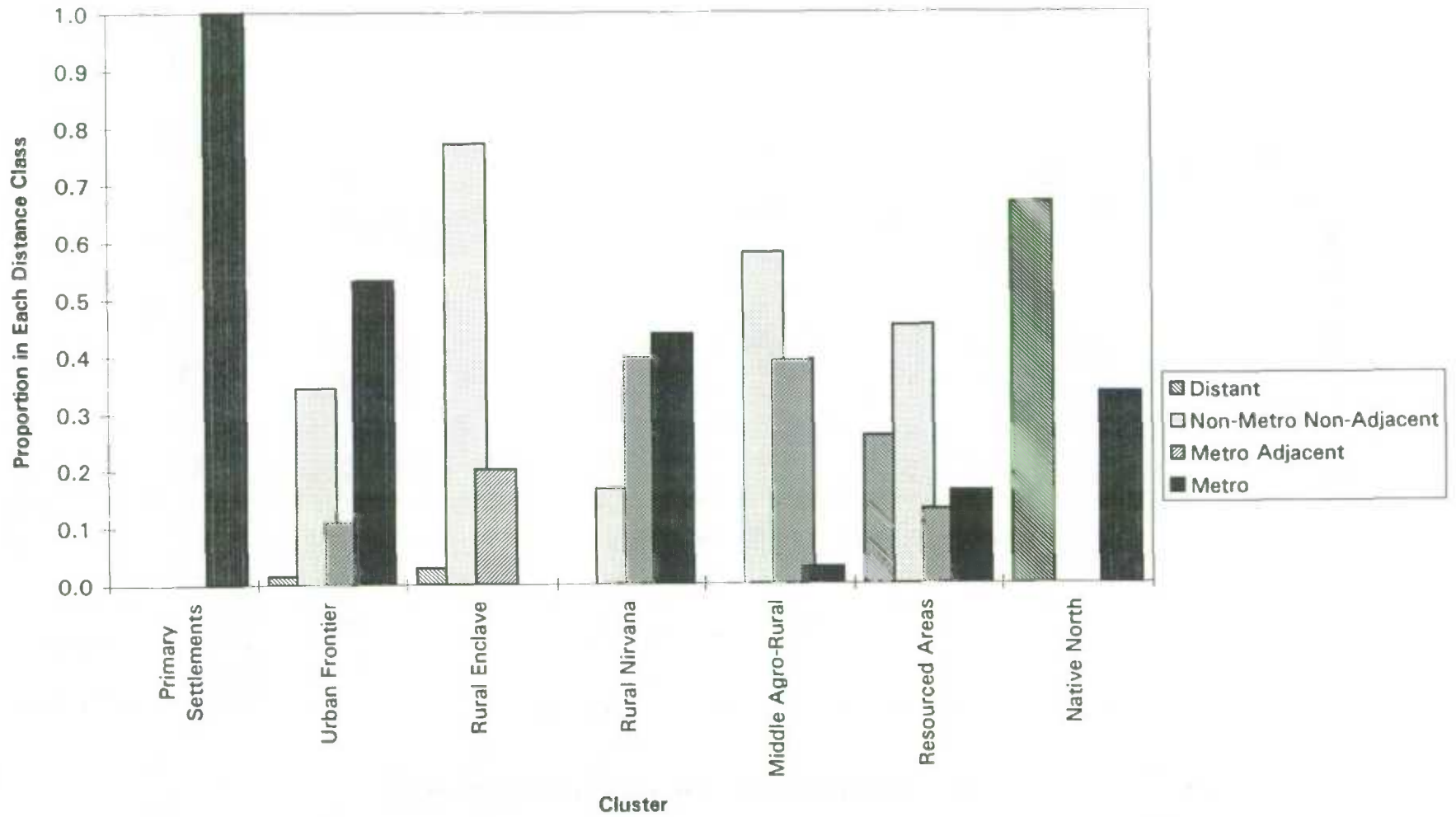
1981-1991 Population Change (Absolute)



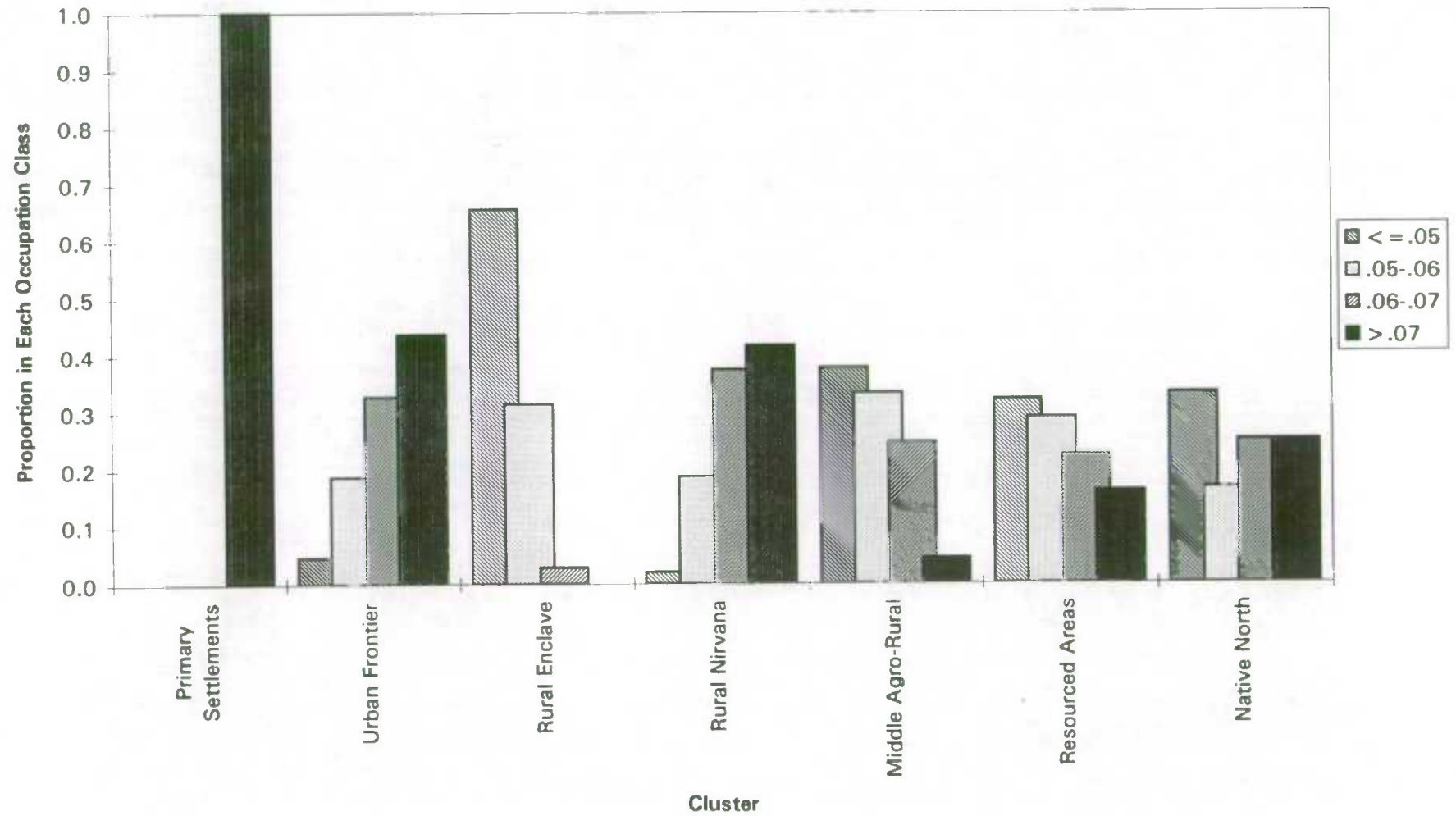
1981-1991 Population Aged 15-24 Change (Absolute)



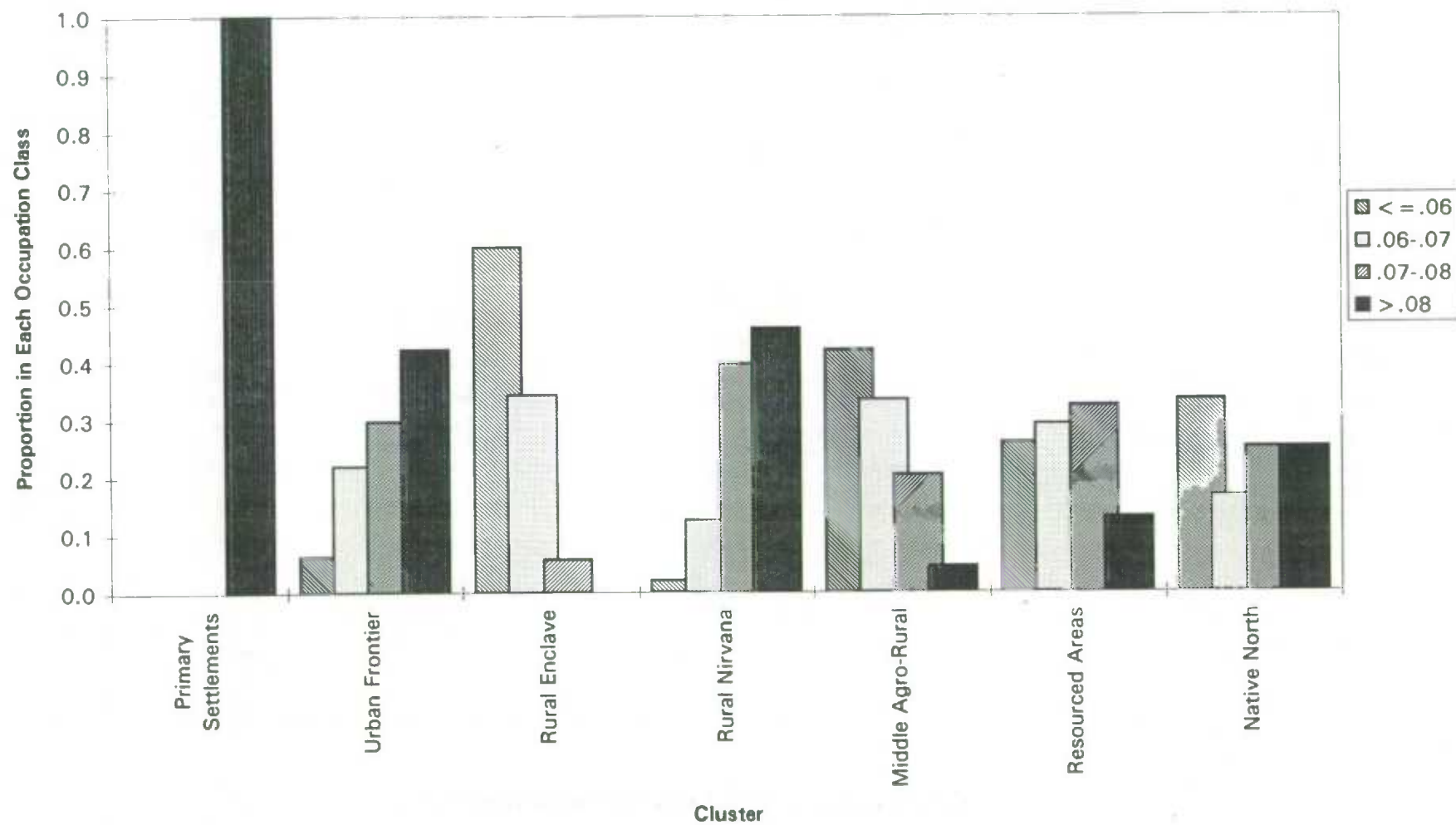
Distance to Metropolitan Centre



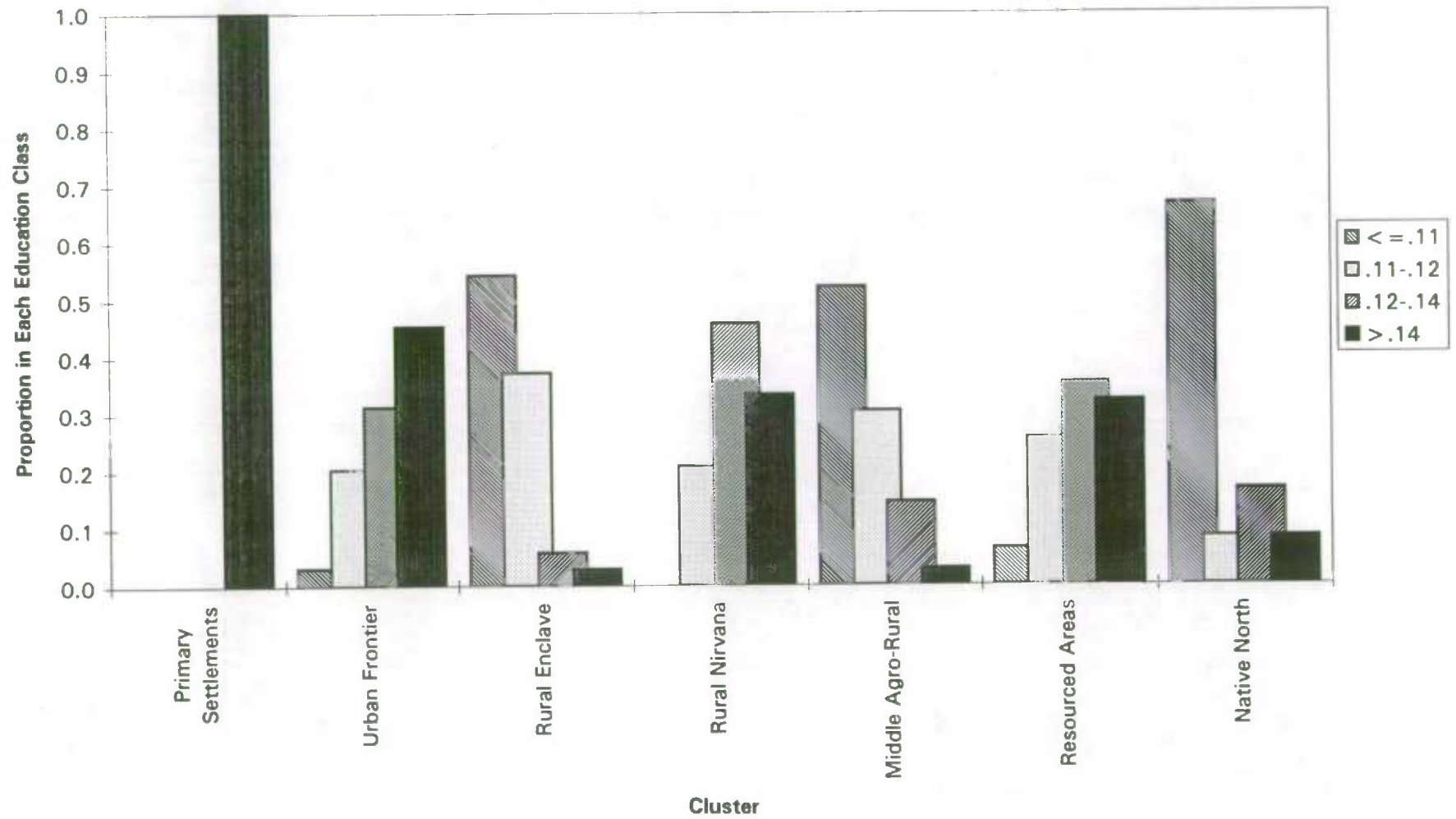
Proportion of Males in Professional Occupations



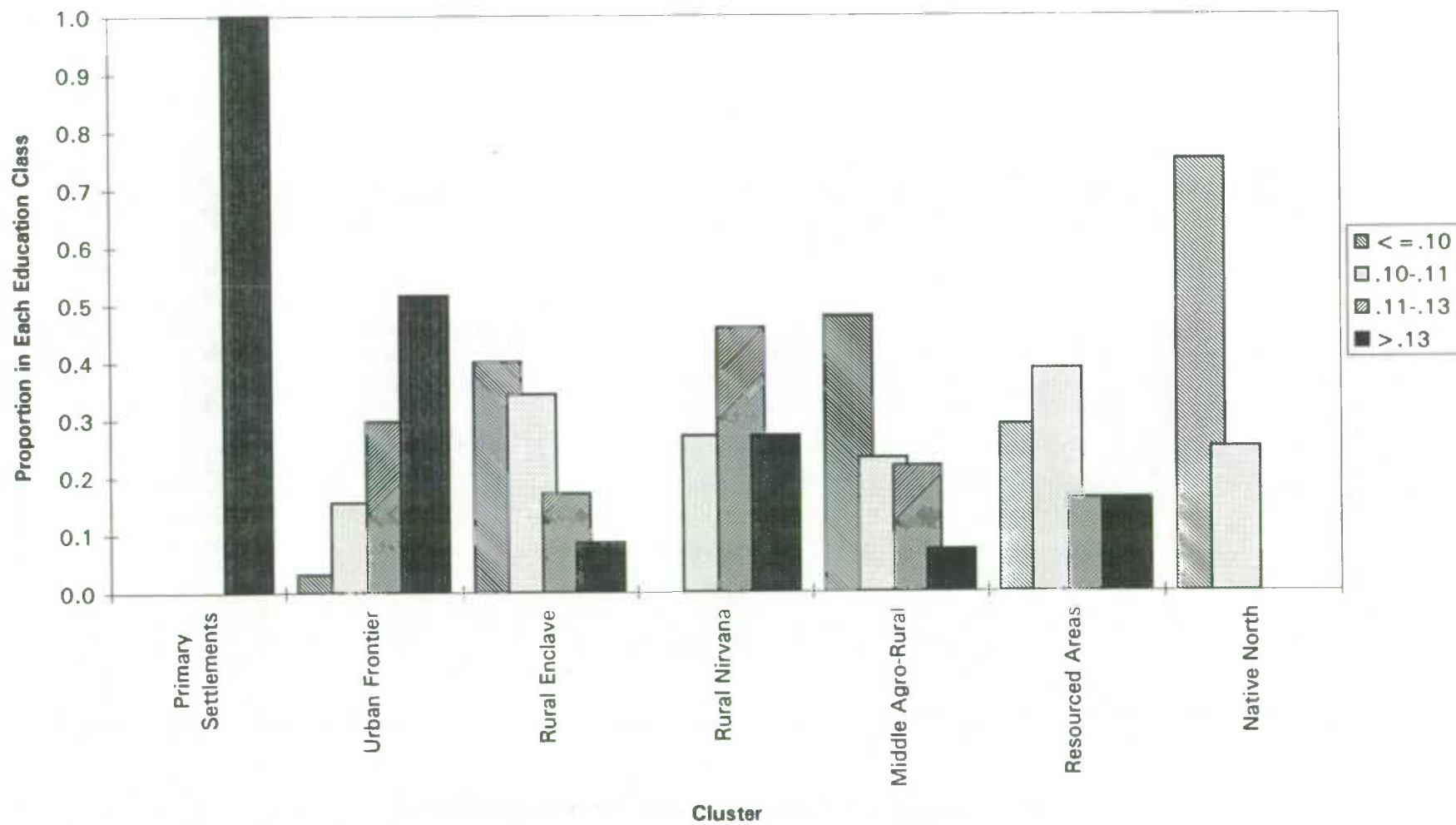
Proportion of Females in Professional Occupations



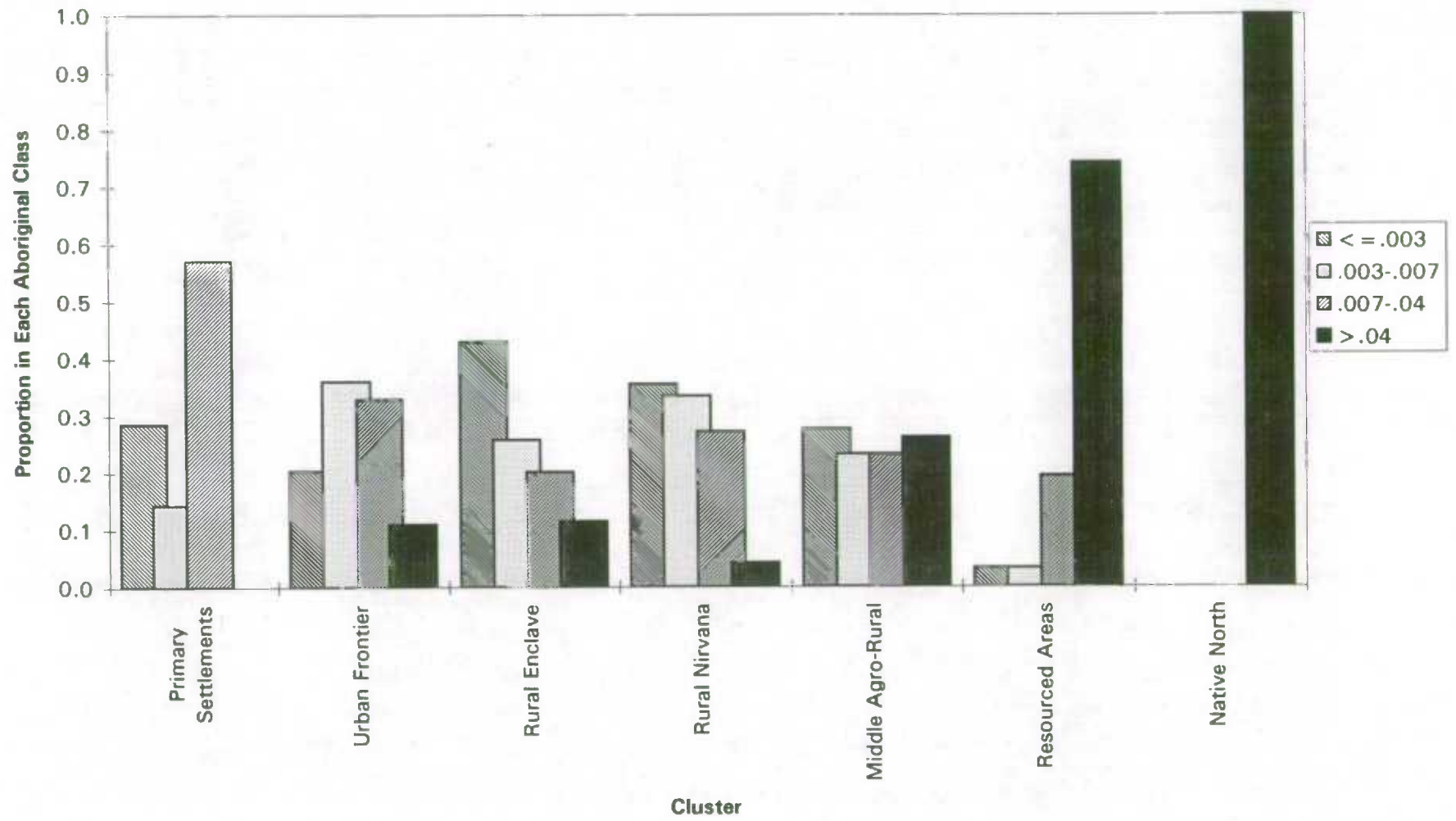
Proportion of Males with Post-Secondary Education



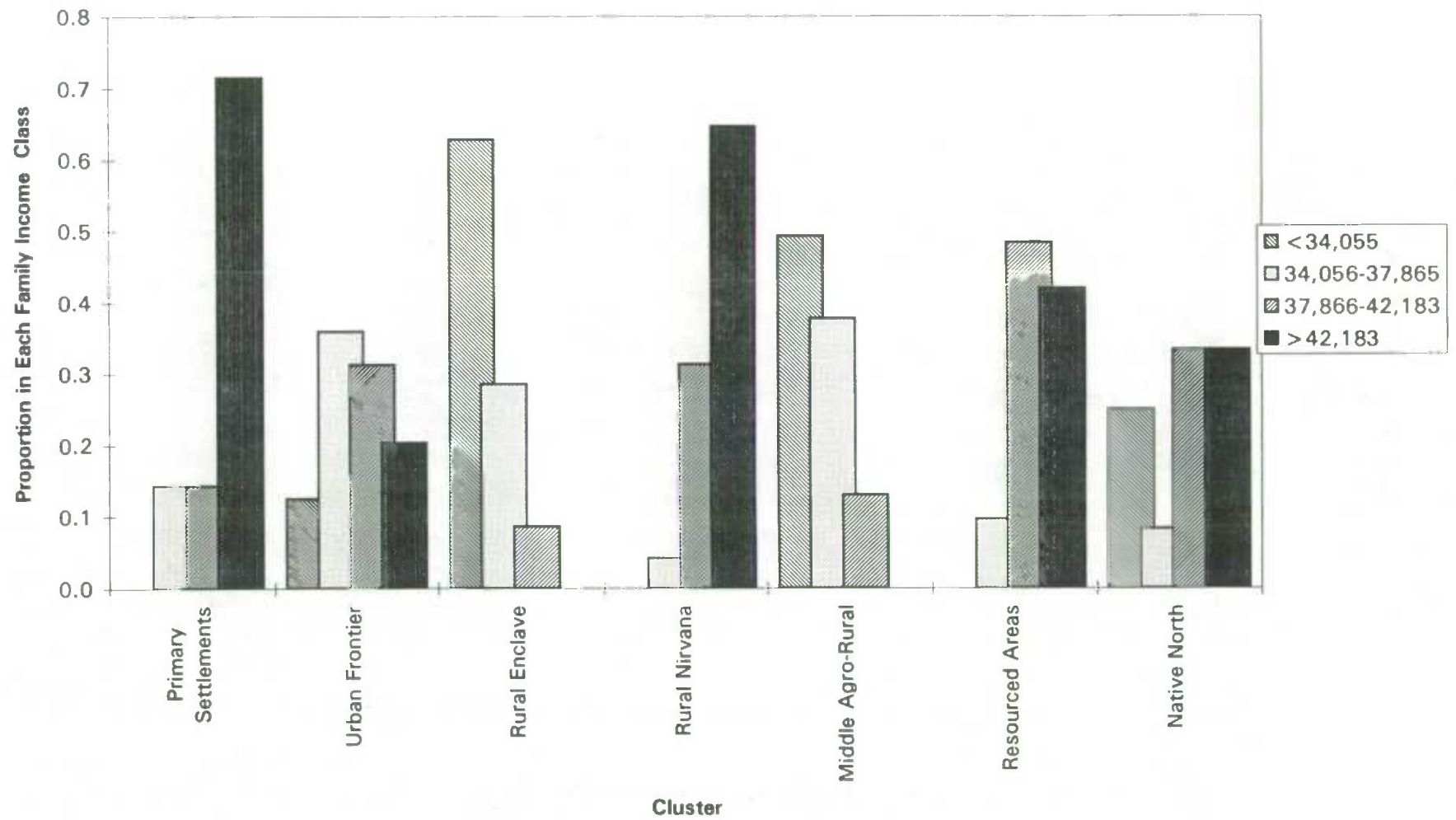
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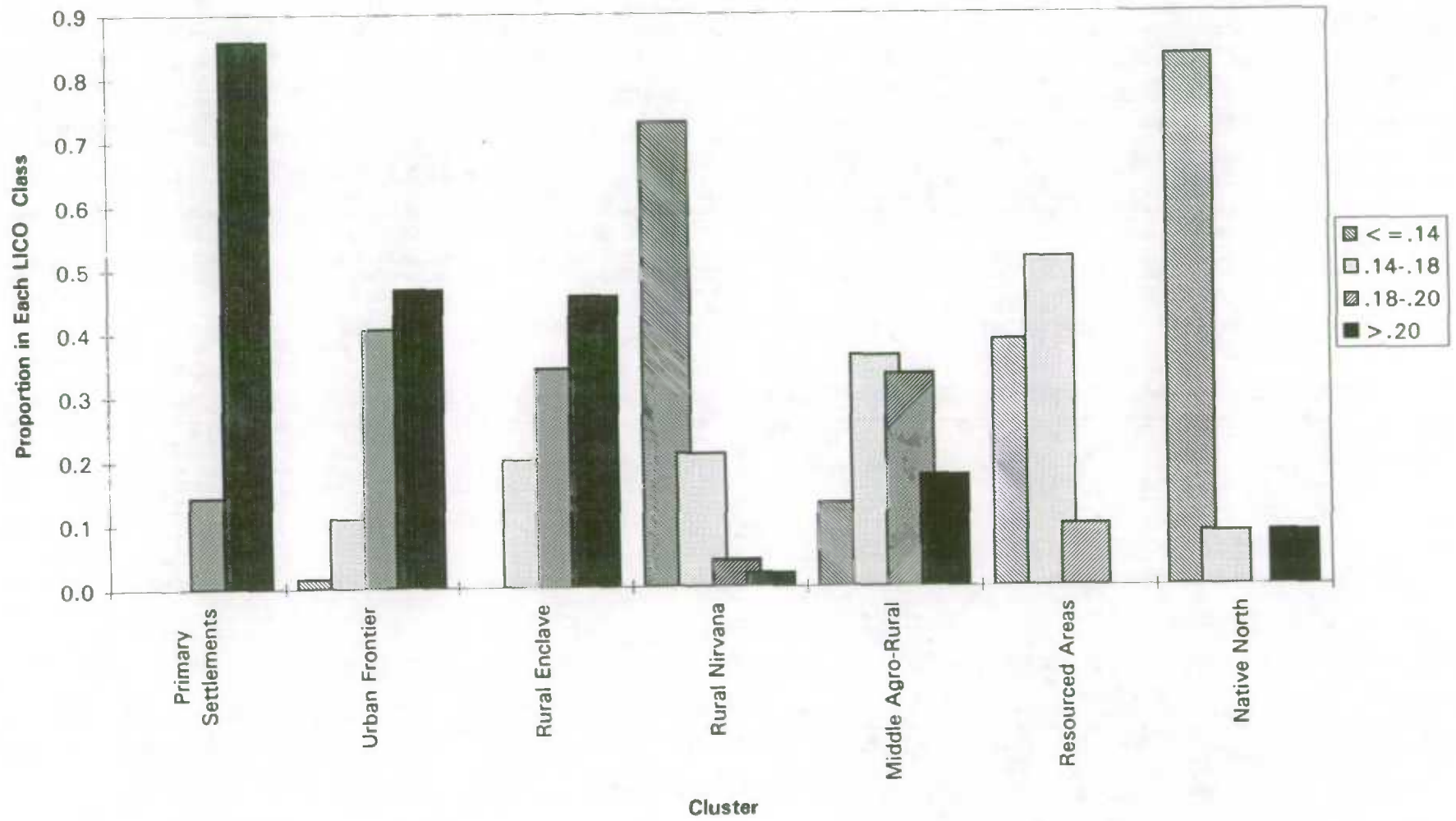
Proportion of Aboriginals

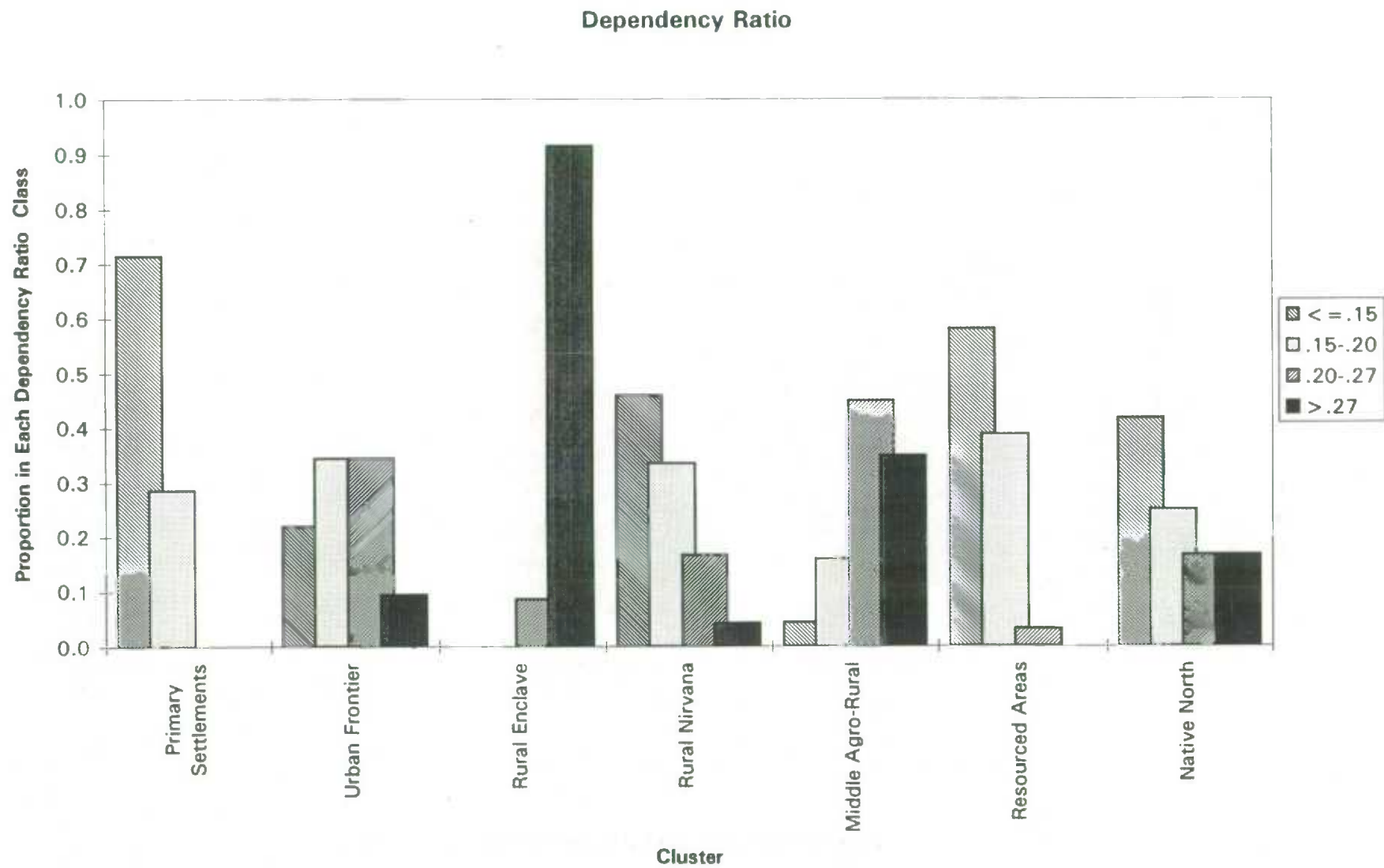


Average Family Income

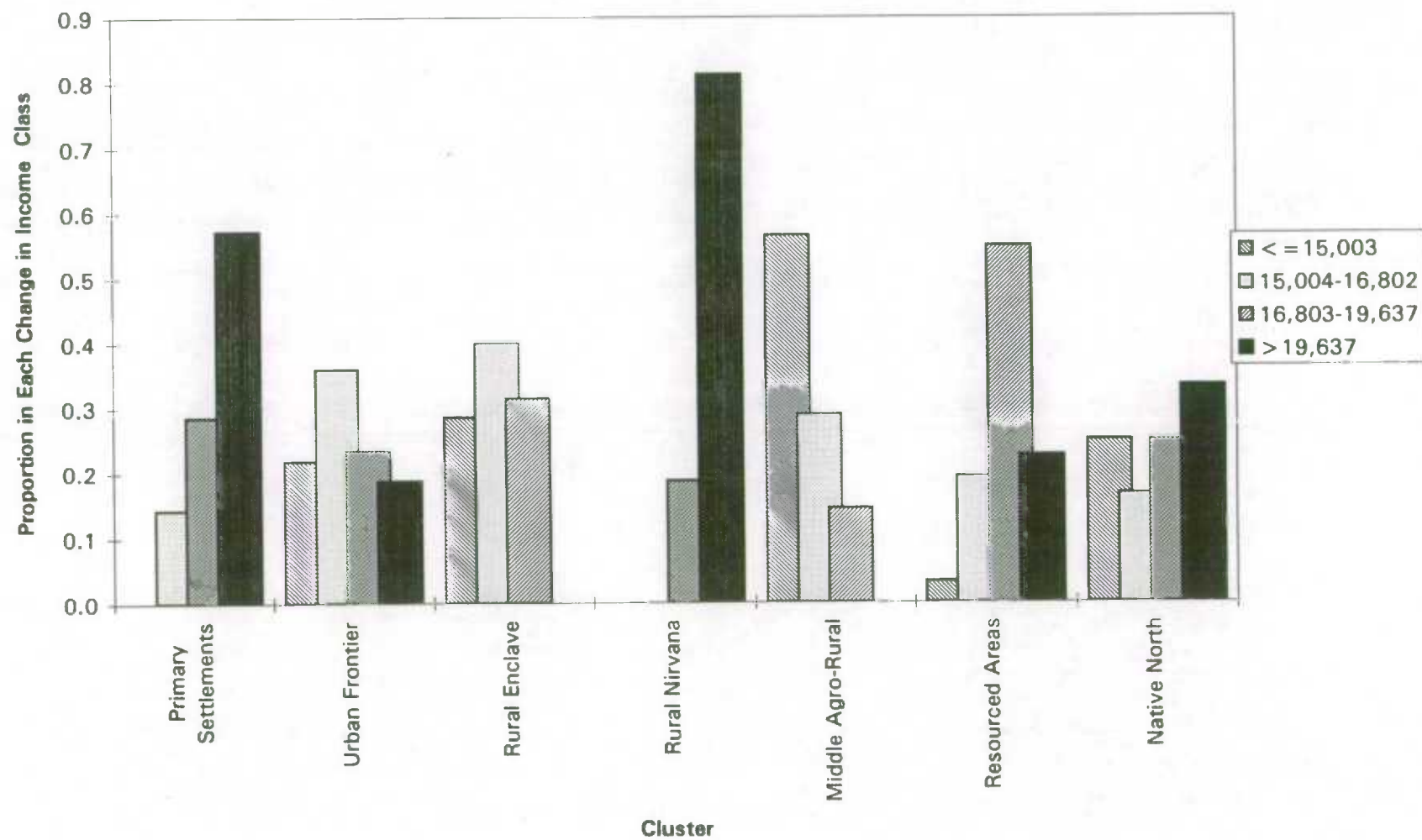


Proportion of Families Below LICO

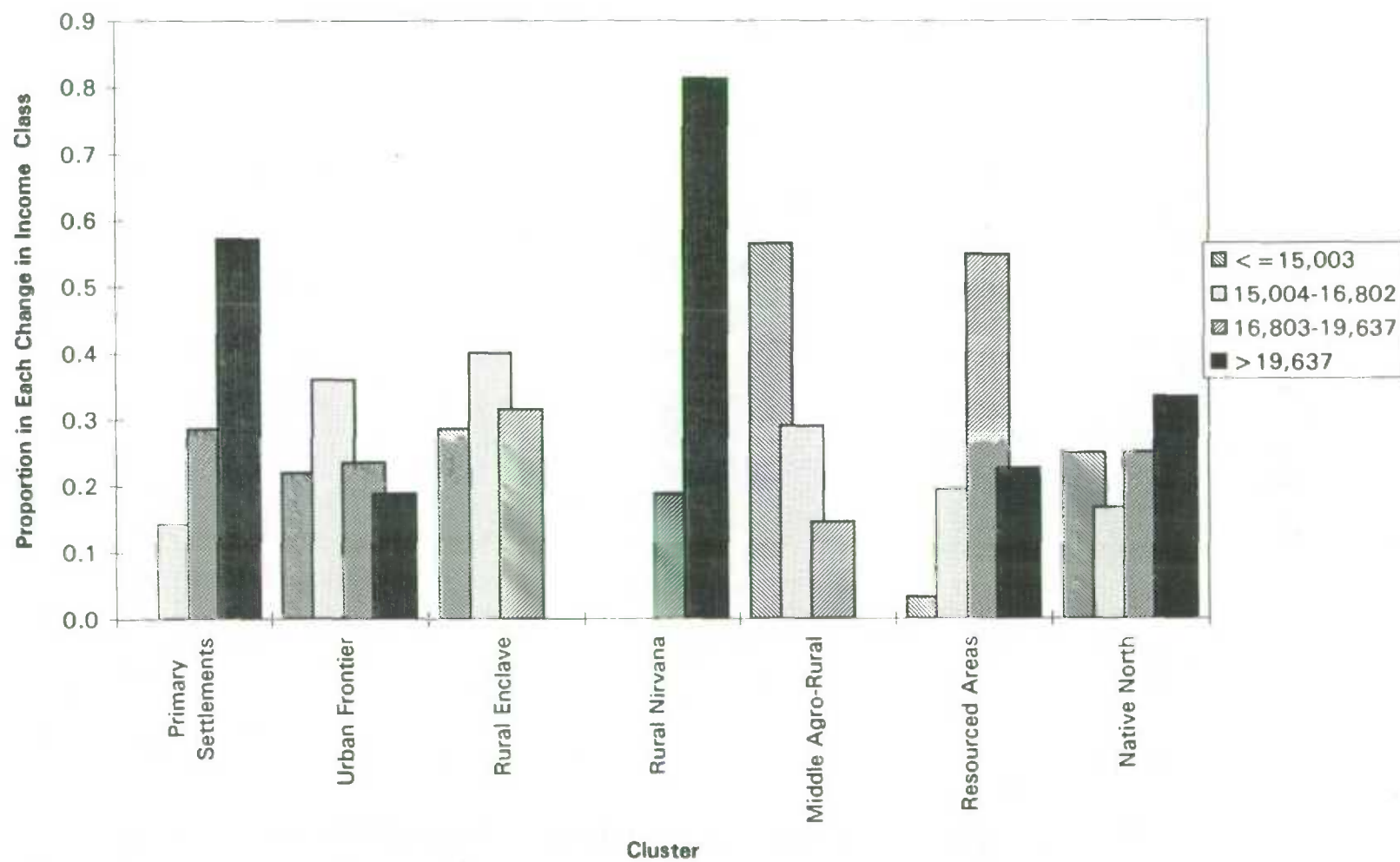




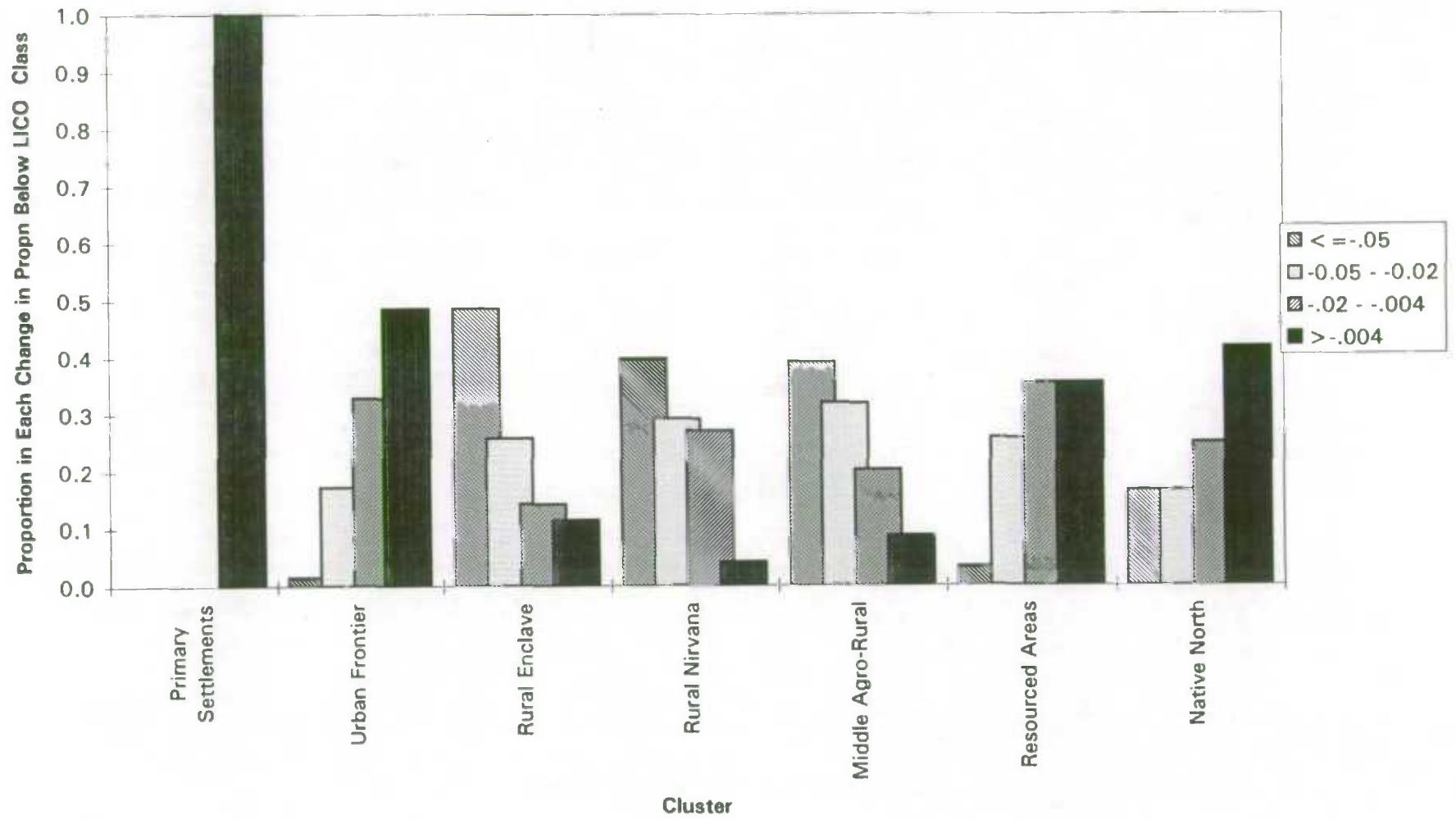
1981-1991 Change in Average Family Income (Absolute)



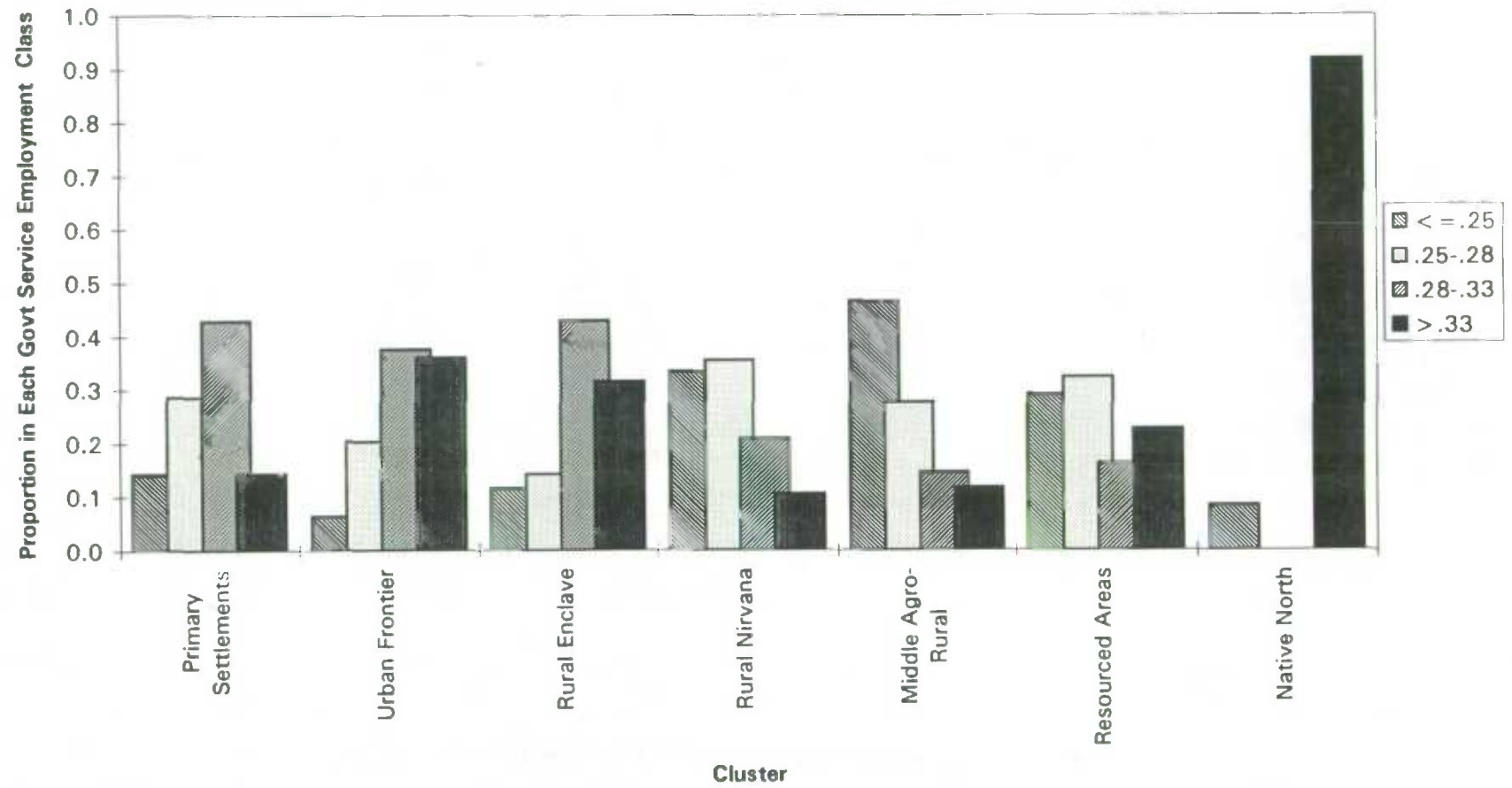
1981-1991 Change in Average Family Income (Absolute)



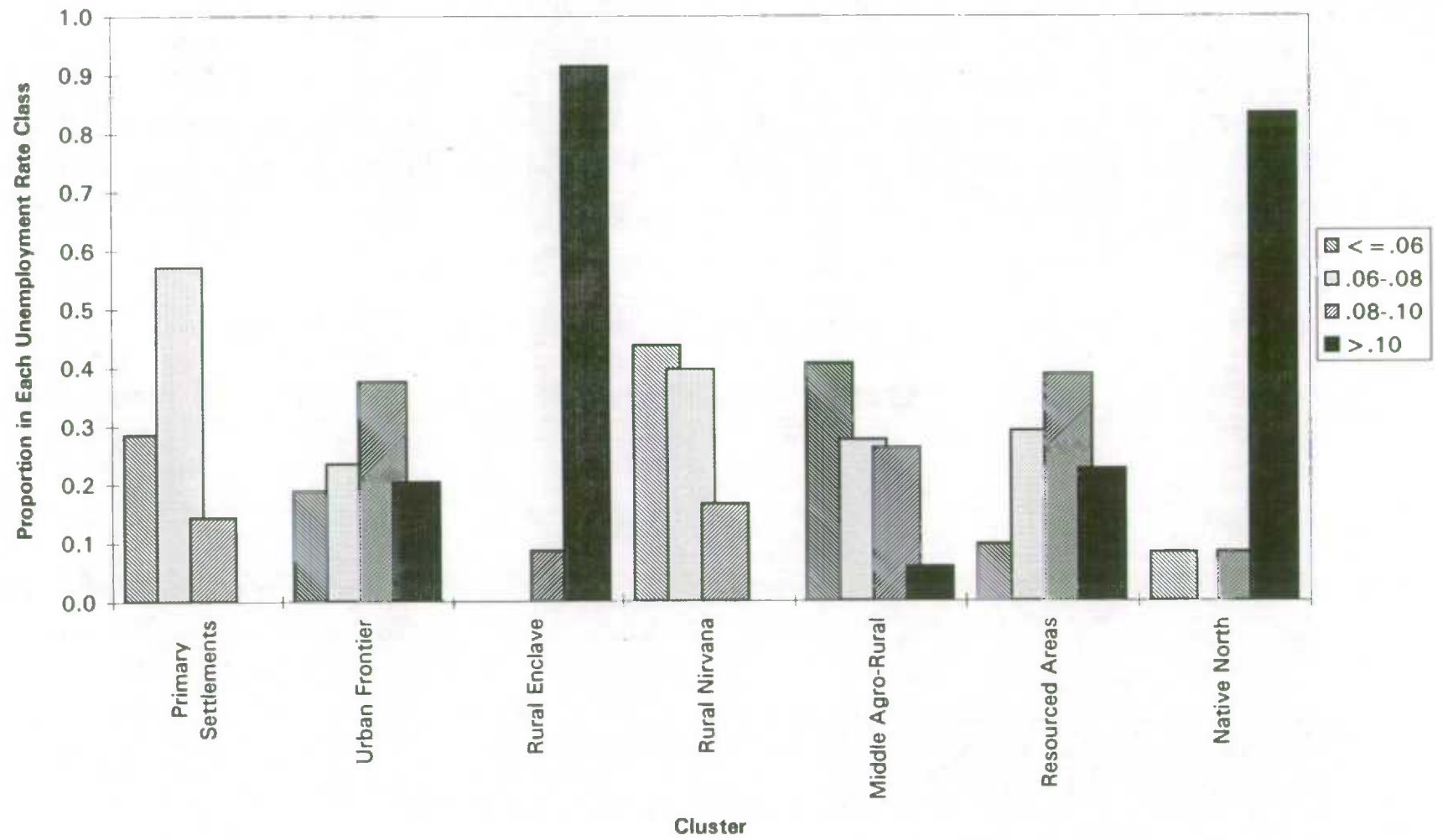
1981-1991 Change in Proportion of Families Below LICO



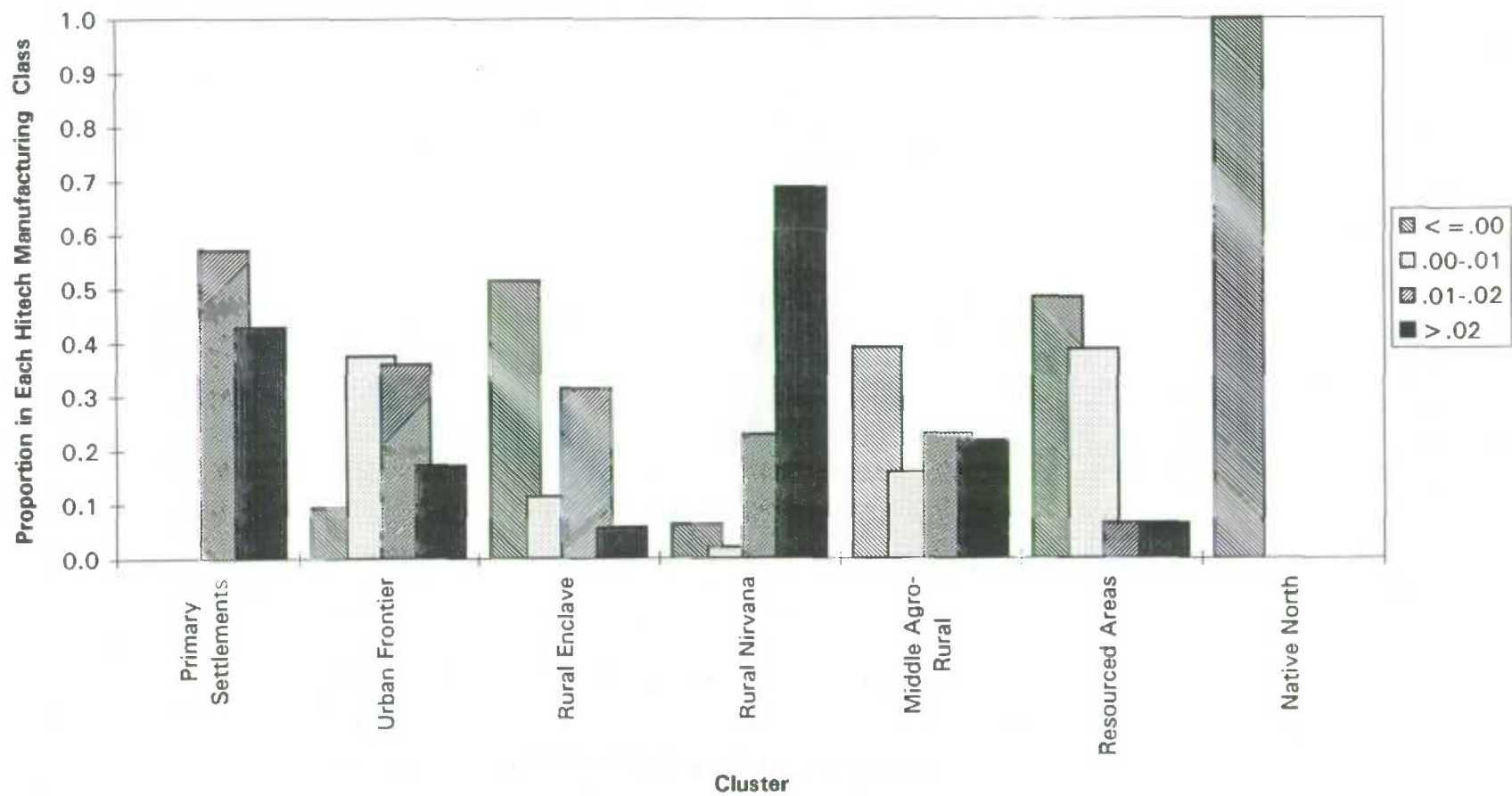
Proportion Employed in Government Services



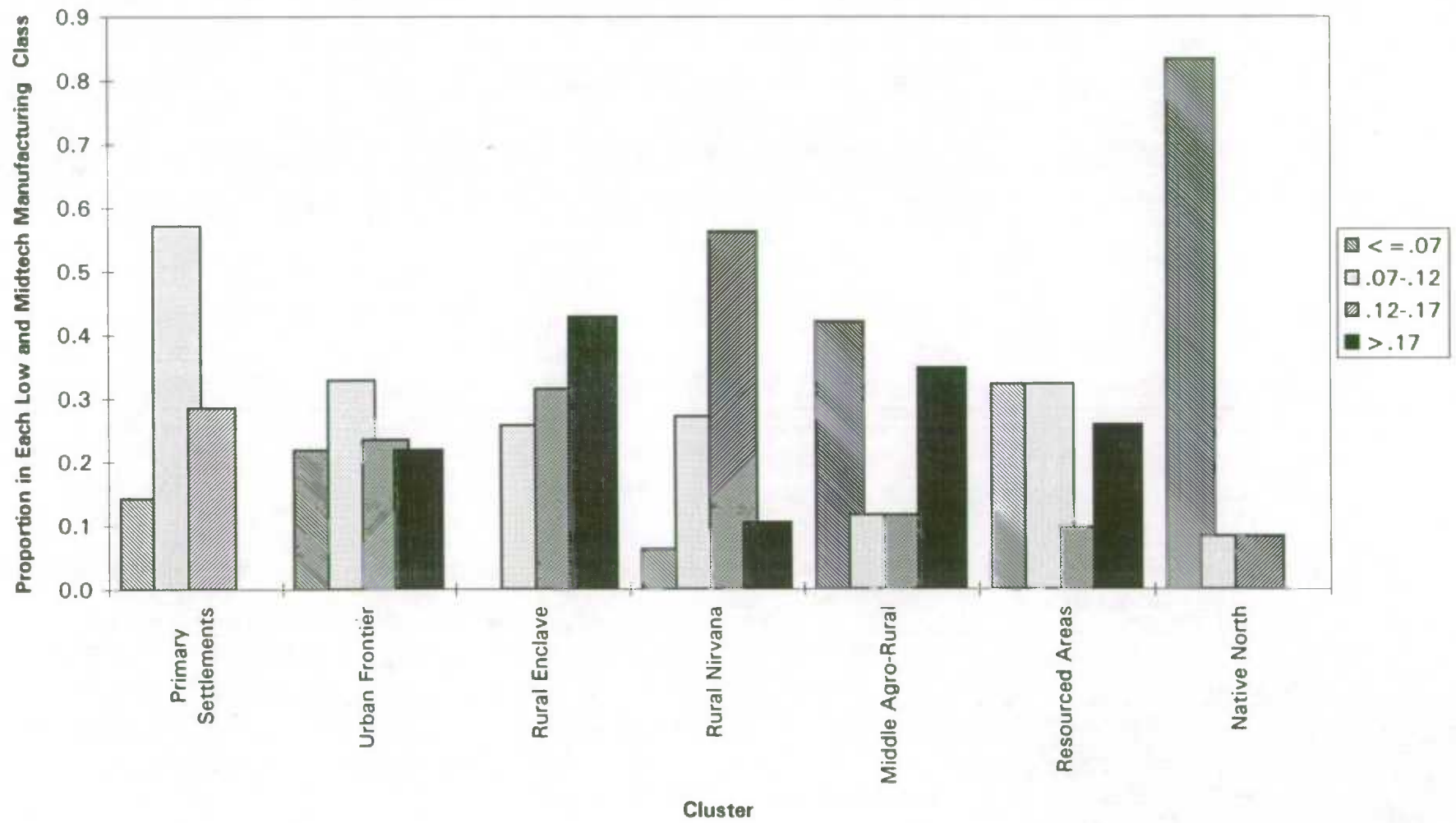
Unemployment Rate Ages 25-54



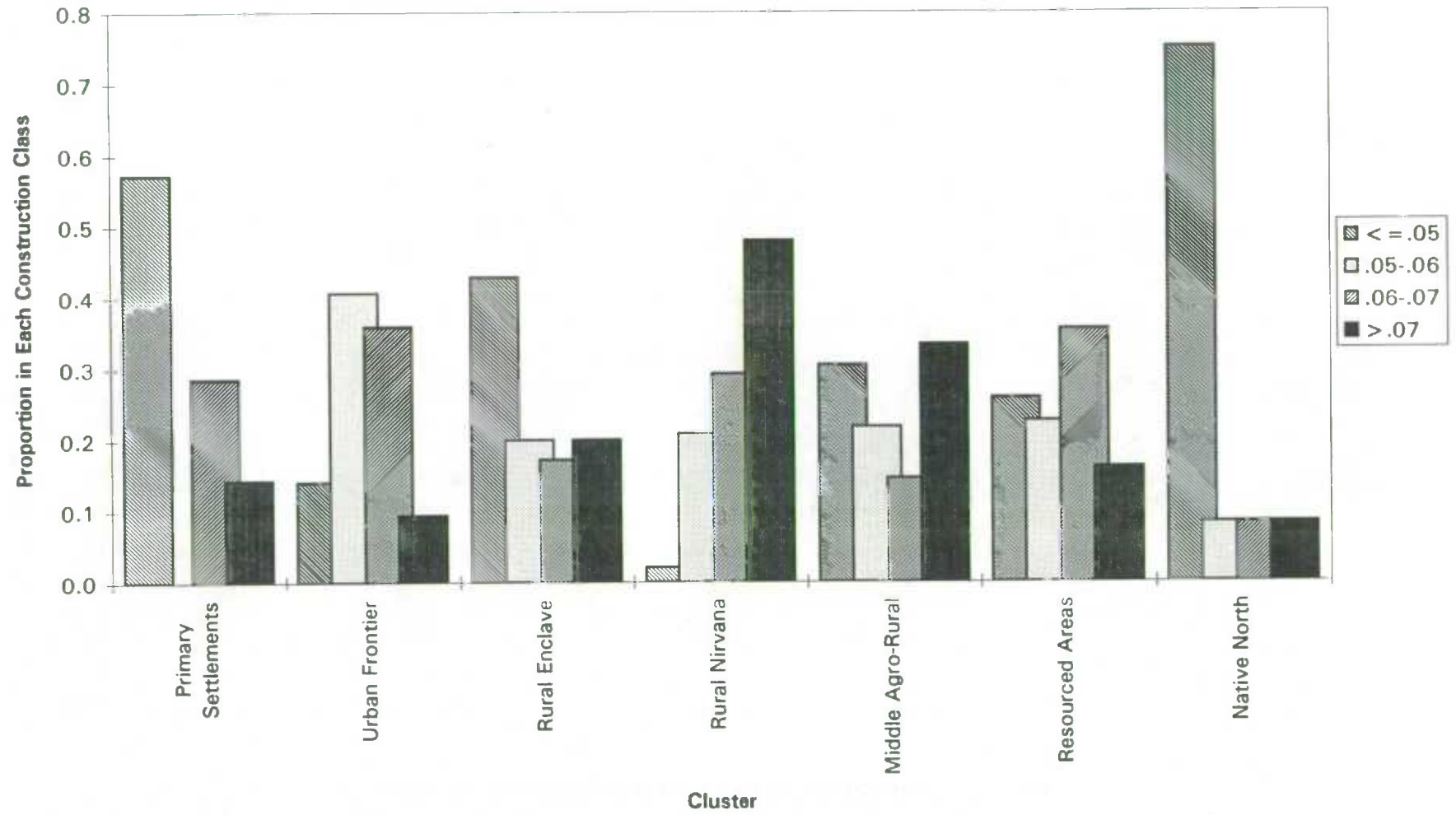
Proportion Employed in Hitech Manufacturing



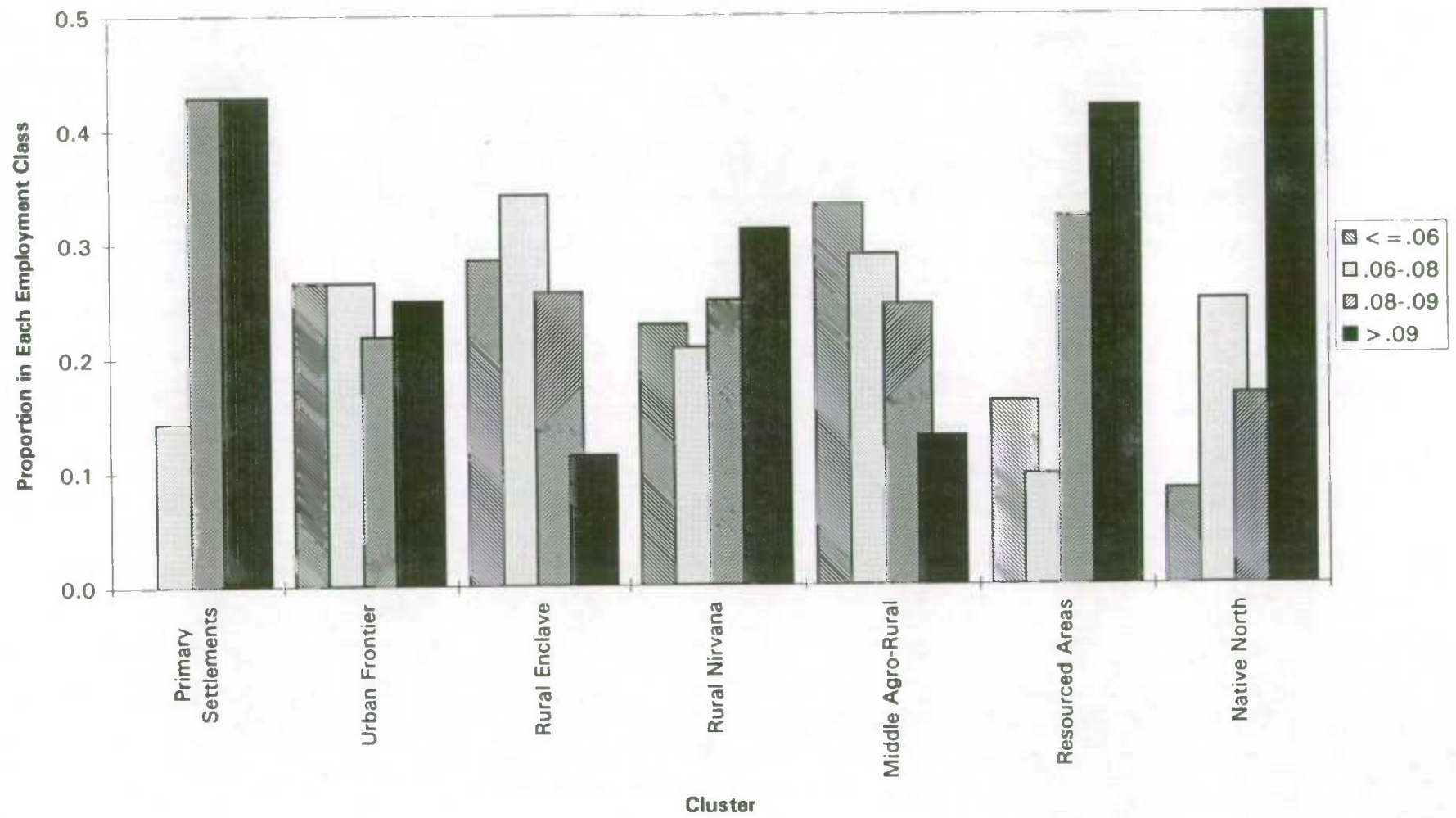
Proportion Employed in Low and Midtech Manufacturing



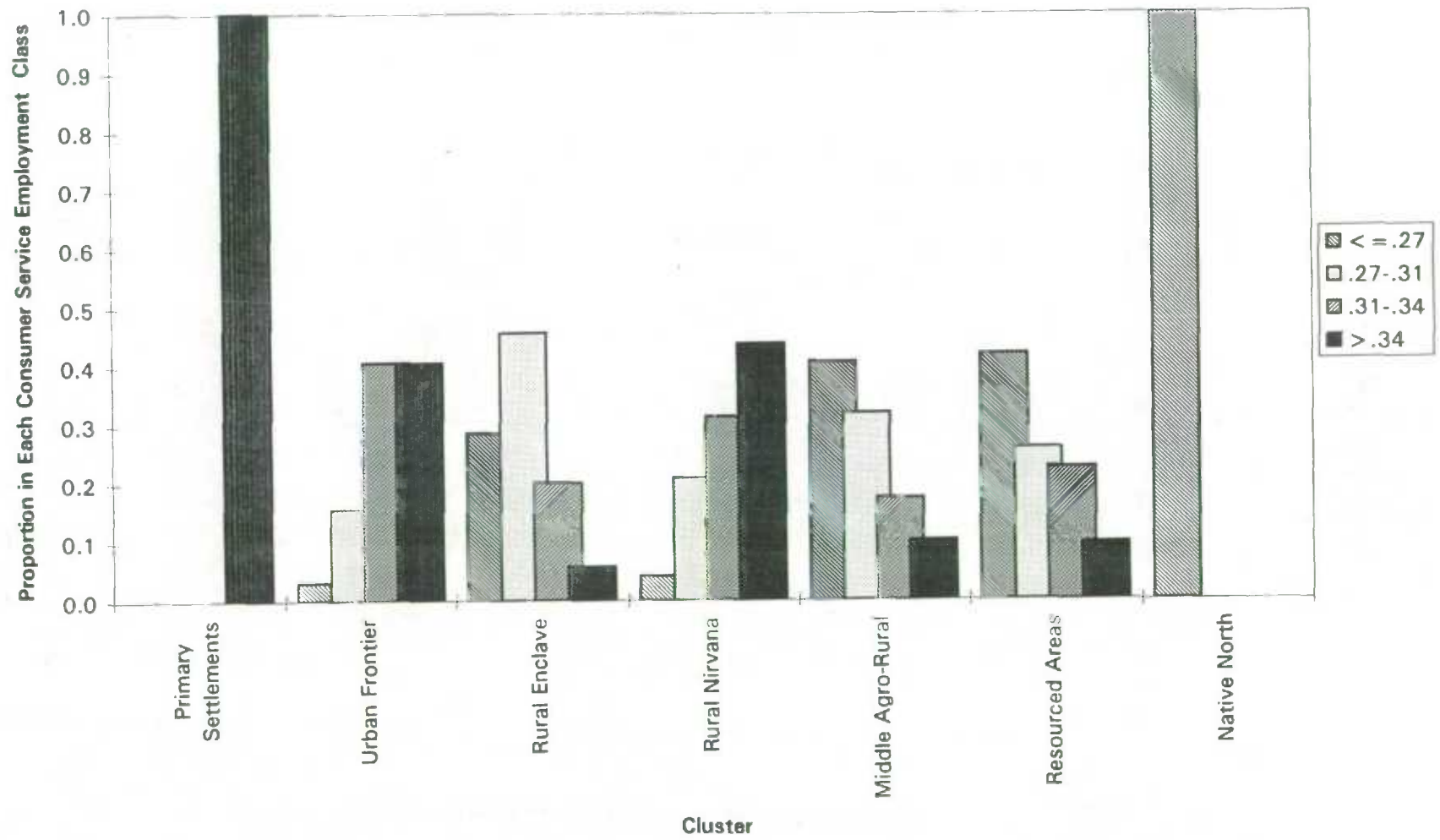
Proportion Employed in Construction



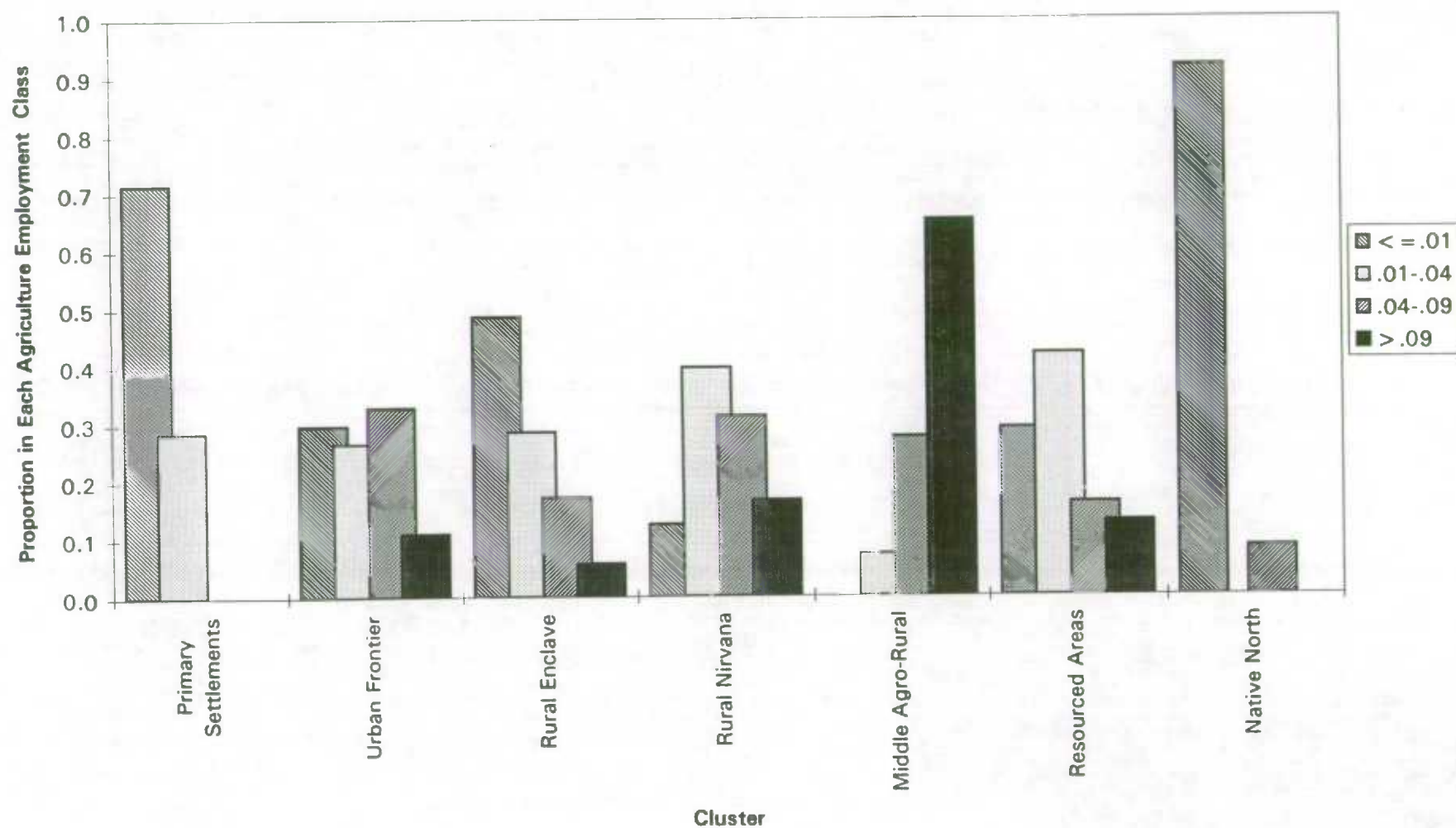
Proportion Employed in Utilities, Transportation & Communication



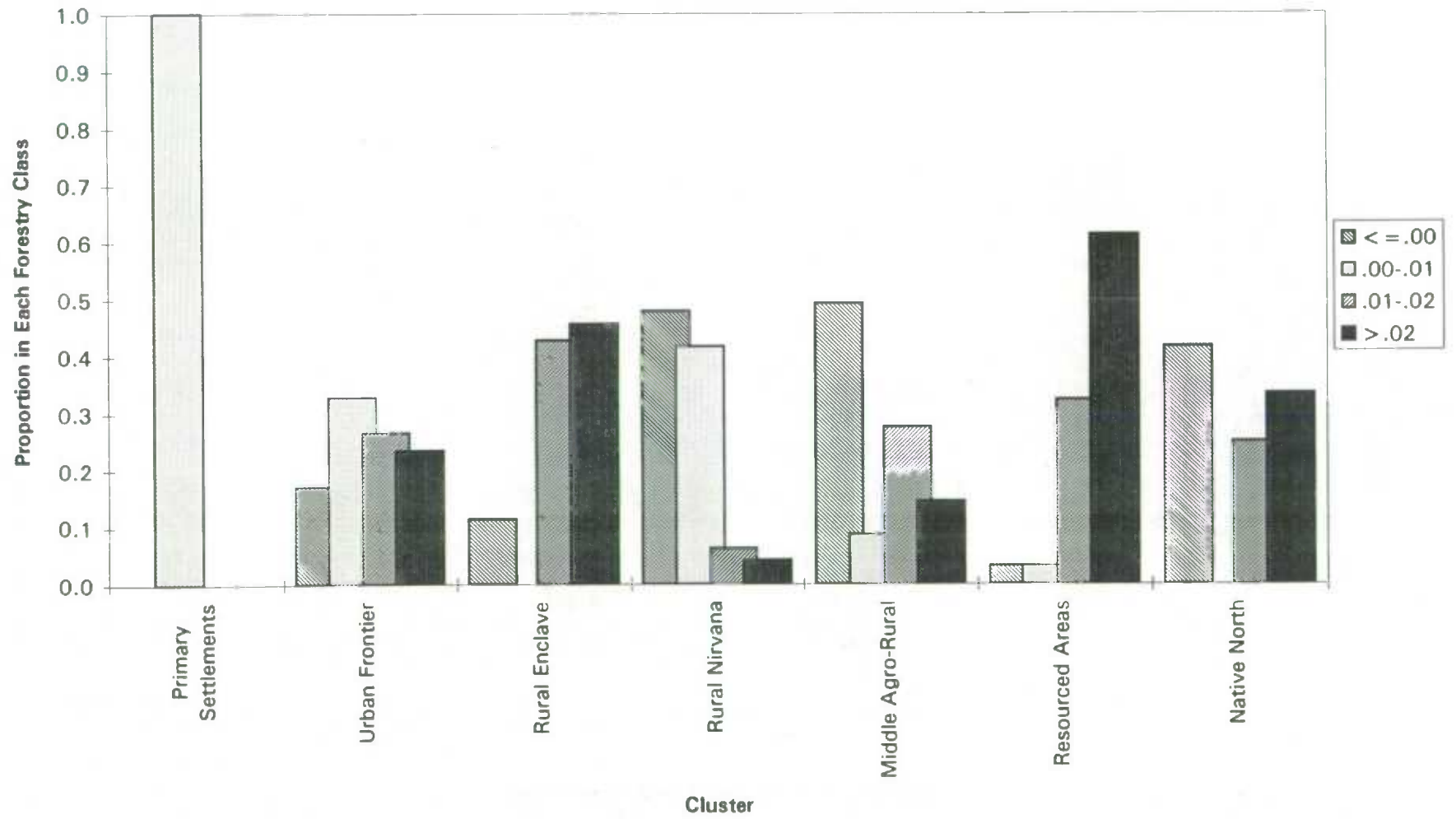
Proportion Employed in Consumer Services



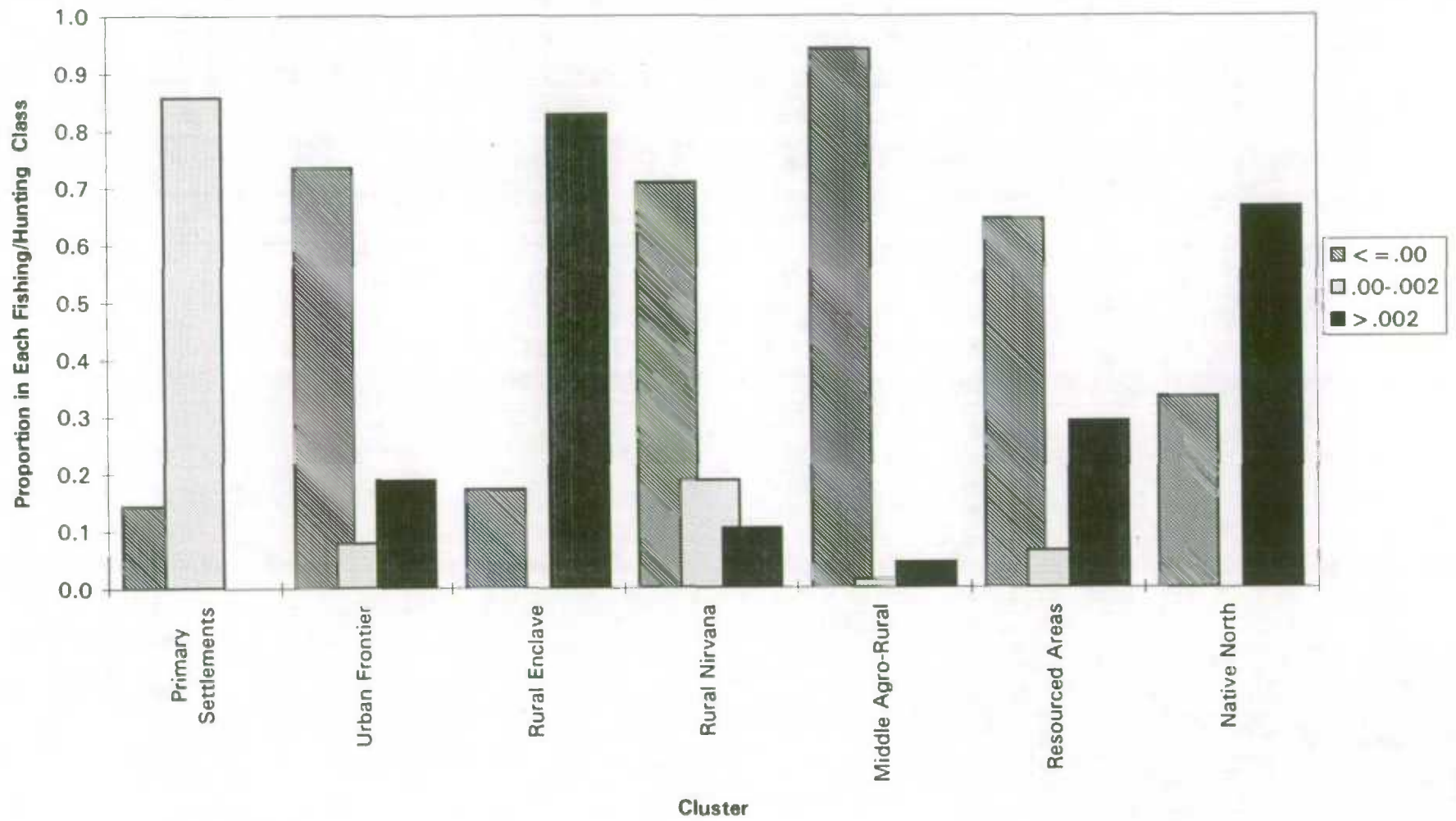
Proportion Employed in Agriculture



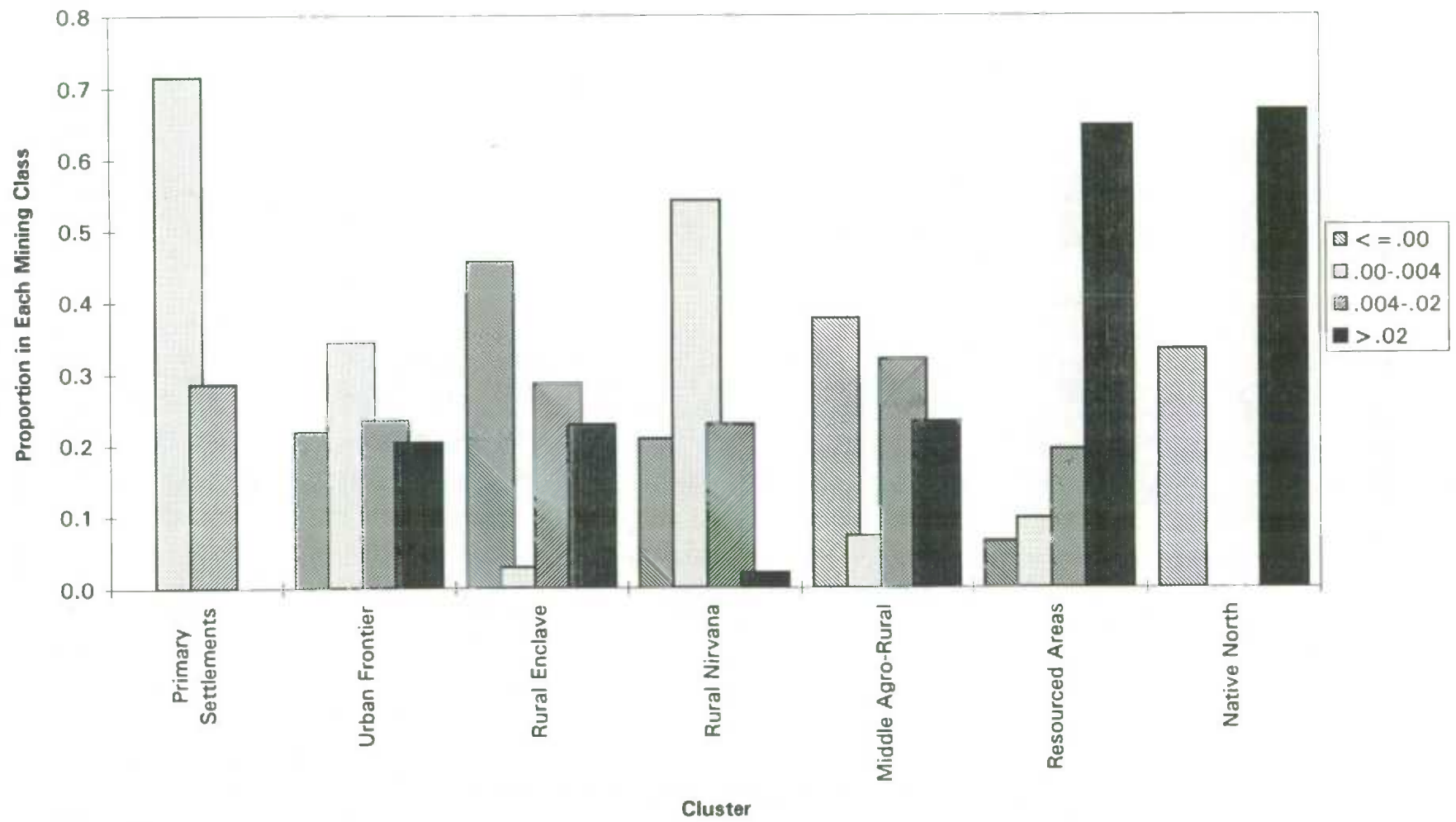
Proportion Employed in Forestry



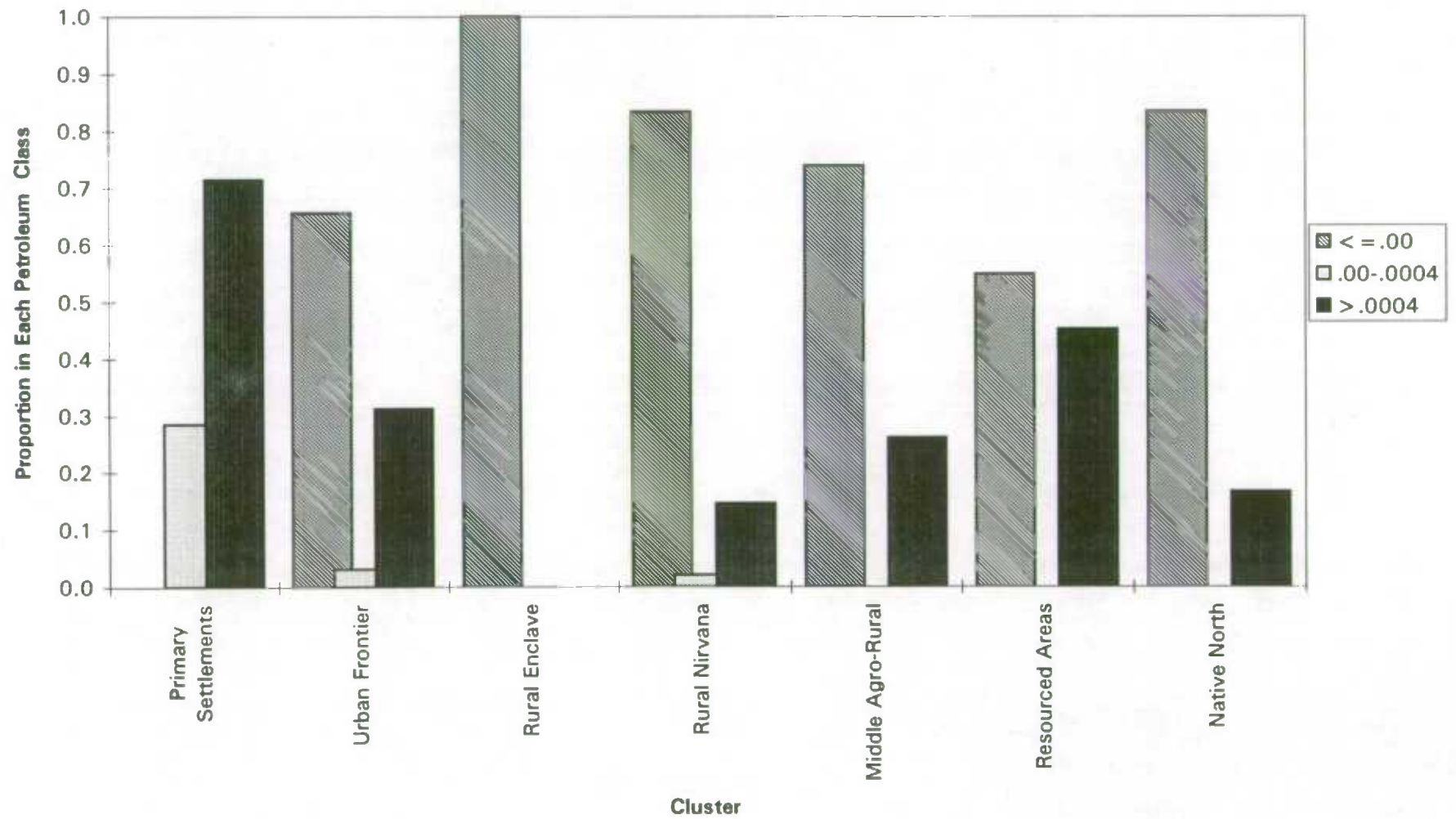
Proportion Employed in Fishing/Hunting



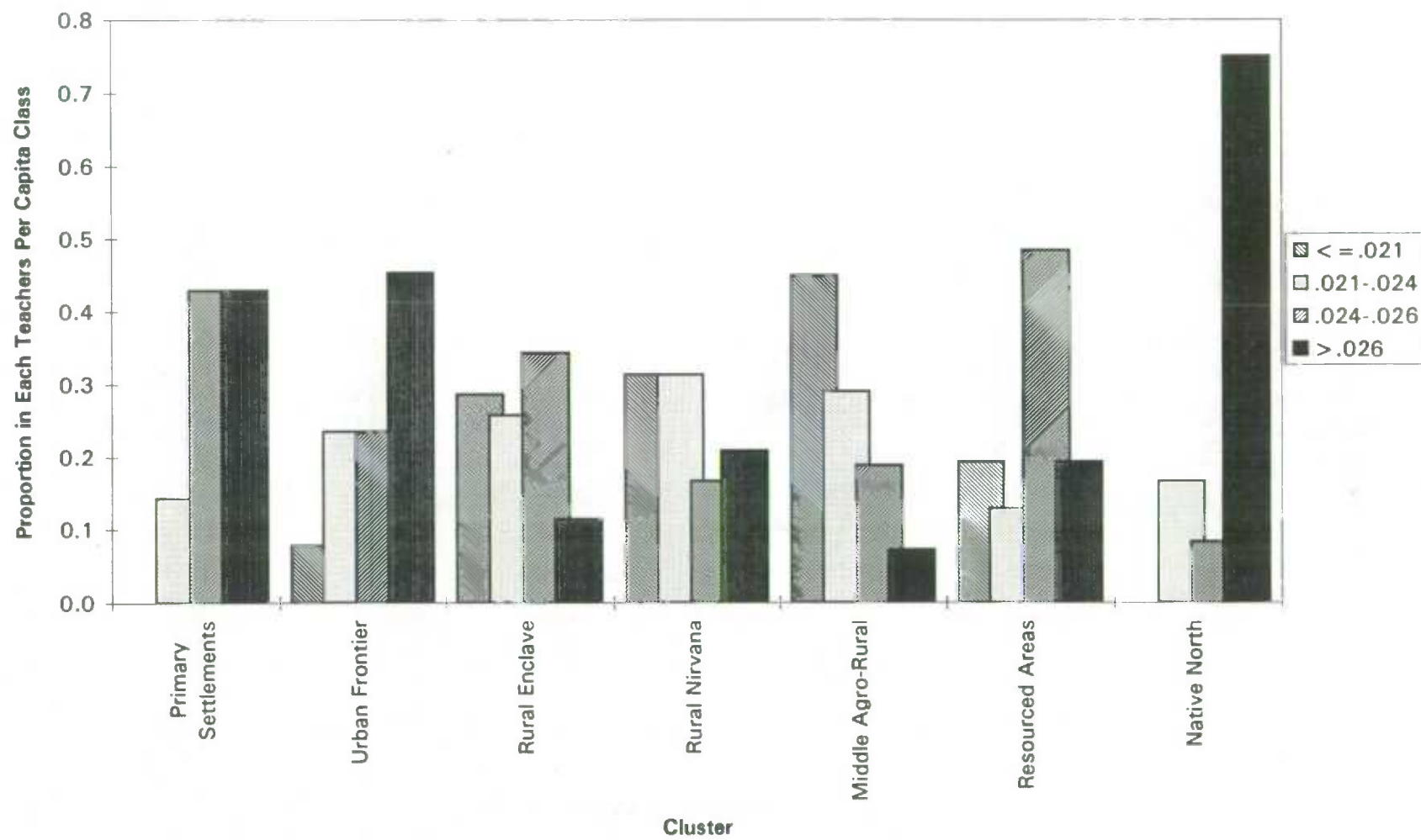
Proportion Employed in Mining



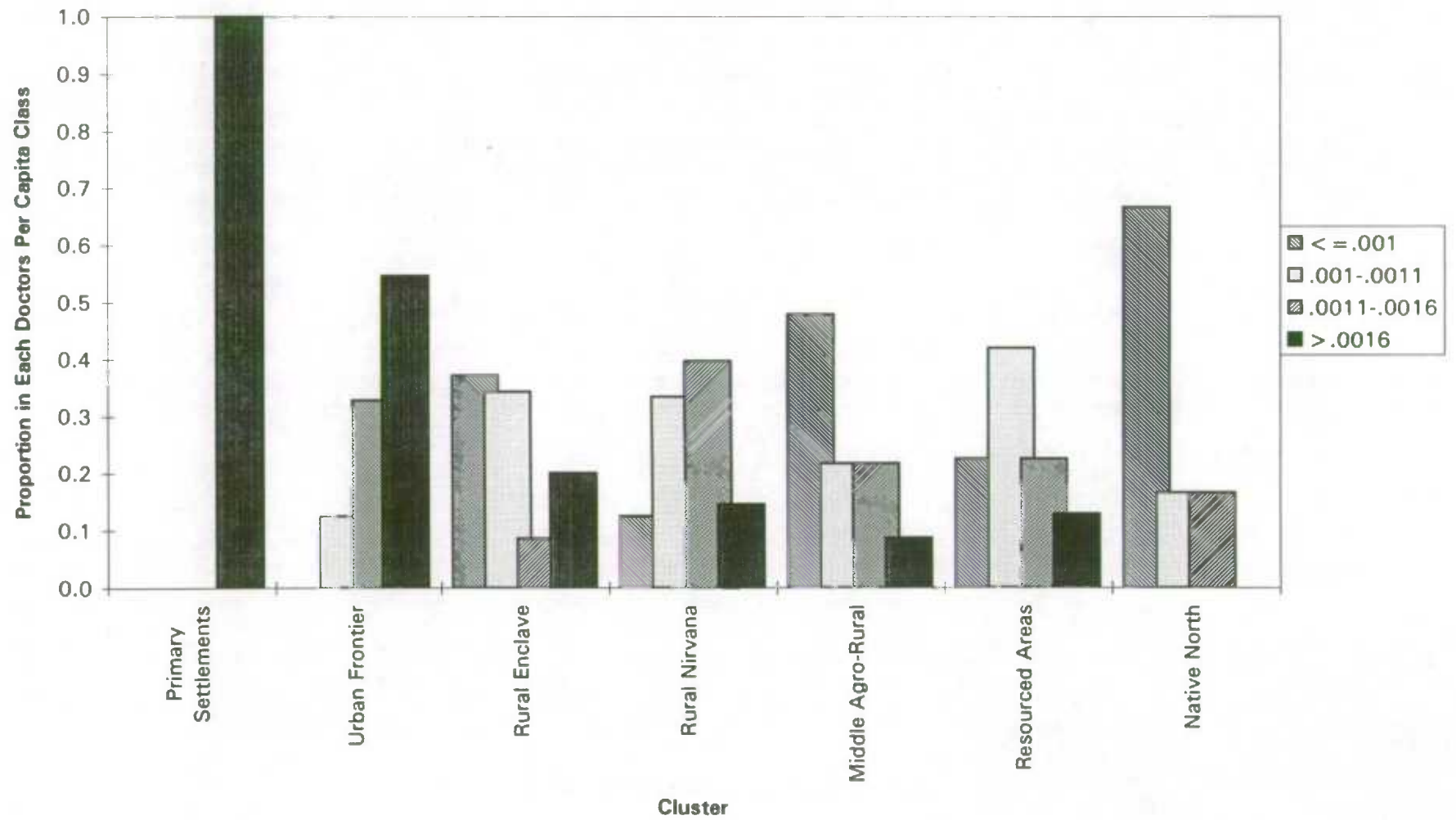
Proportion Employed in Petroleum



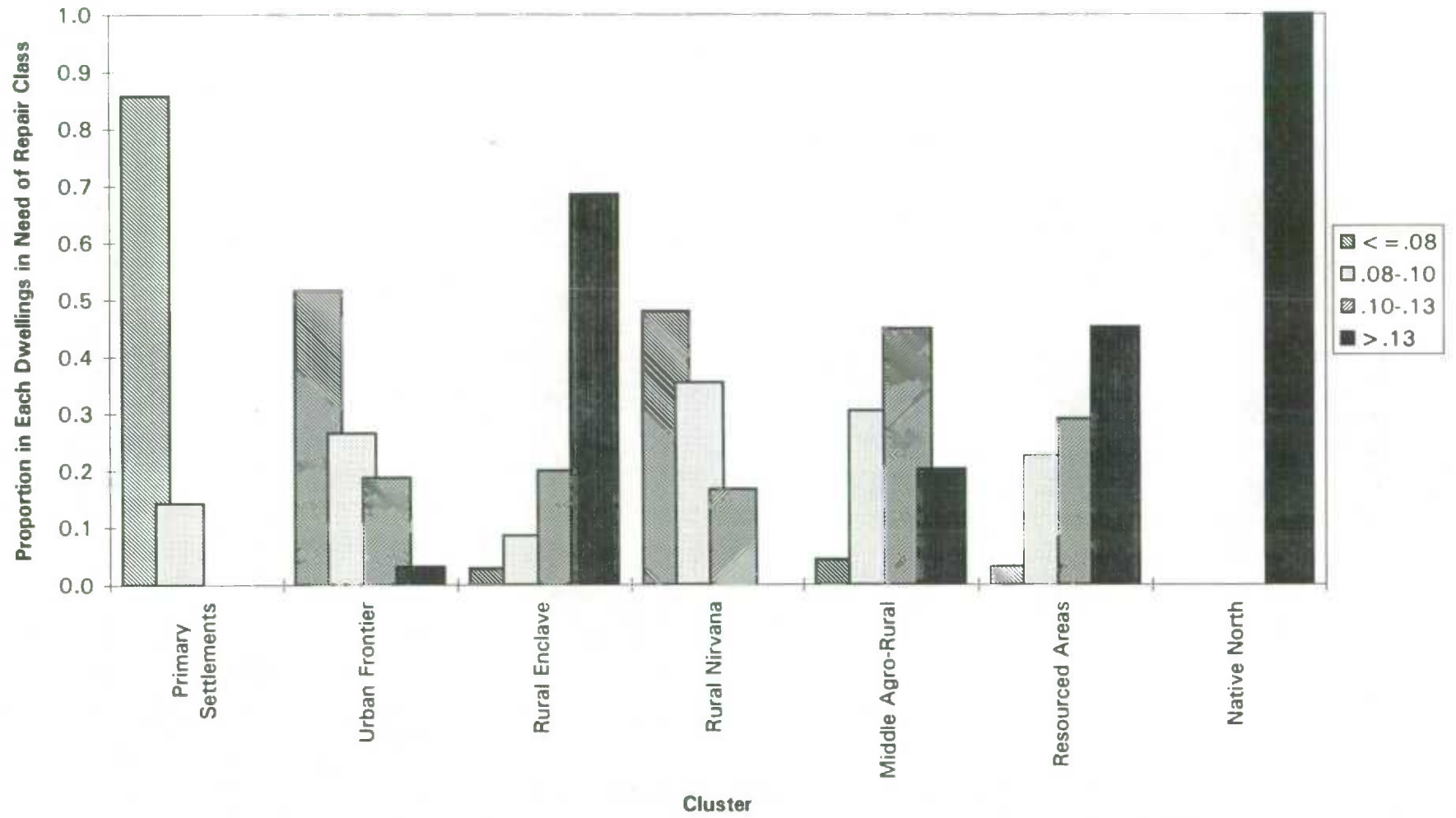
Teachers Per Capita



Doctors Per Capita



Proportion of Dwellings Needing Major Repairs





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