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Census Monograph No. 2

The Age Distribution of the Canadian People

(A study based on the Census of 1931 and supplementary data)

by
MURDOCH C. MacLEAN

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PREFACE

This monograph is one of a series analysing and interpreting the data obtained by the Decennial Census of 1931. In this monograph, however, data from previous censuses are used almost as extensively as the data of 1931.

The study deals first, in Chapter I, with the evolution of the Canadian age distribution from 1881 to 1931. By a method of fitting dealt with in the Appendix, it is found that the age distribution progresses in such a way that higher and higher degrees become important when the different years are fitted with complex exponential curves.

A classification is then made, in Chapter II, of the 220 counties and census divisions of Canada in 1931. For the purpose a threefold age index is used. This index defines the age structure by means of the percentages under 25 years of age and 65 years of age and over and a quantity called "standard age." In Chapter III, functional aspects of age distribution, the most important of which are taken to be percentage born in province of residence, age of settlement and resident death rates, are discussed and their relation to the previous classification by age structure is shown.

In Chapter IV, the study considers the age structure of cities of 5,000 population and over. Eight of these are selected and subjected to a special analysis for the decades 1911-21 and 1921-31, in order to determine the effect on age structure in urban centres of movement as opposed to that of death and ageing.

The monograph was written by M. C. MacLean, M.A., Chief of the Social Analysis Branch of the Dominion Bureau of Statistics. The charts were drawn by Mr. J. W. Delisle and the manuscript was prepared for press by Miss B. J. Stewart.

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FEBRUARY 13, 1939.

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KEY TO INDEX MAP

Province	County	Number on Map	Province	County	Number on Map	Province	County	Number on Map
Prince Edward Island	Kings	1	Quebec-Con.	Chateauguay	14	Ontario	Addington	1
	Prince	2		Chicoutimi	15		Algoma	2
	Queens	3		Compton	16		Brant	3
				Deux-Montagnes	17		Bruce	4
				Dorchester	18		Carleton	5
Nova Scotia	Annapolis	1		Drummond	19		Cochrane	6
	Antigonish	2		Frontenac	20		Dufferin	7
	Cape Breton	3		Gaspé	21		Dundas	8
	Colchester	4		Hochelaga	22		Durham	9
	Cumberland	5		Hull	23		Elgin	10
	Digby	6		Huntingdon	24		Essex	11
	Guysborough	7		Iberville	25		Frontenac	12
	Halifax	8		Joliette	26		Glengarry	13
	Hants	9		Kamouraska	27		Grenville	14
	Inverness	10		Labelle	28		Grey	15
	Kings	11		Lac-St-Jean	29		Haldimand	16
	Lunenburg	12		Laprairie	30		Haliburton	17
	Pictou	13		L'Assomption	31		Halton	18
	Queens	14		Laval	32		Hastings	19
	Richmond	15		Lévis	33		Huron	20
	Shelburne	16		L'Islet	34		Kenora	21
	Victoria	17		Lotbinière	35		Kent	22
	Yarmouth	18		Maskinongé	36		Lambton	23
				Matane	37		Lanark	24
				Mégantic	38		Leeds	25
New Brunswick	Albert	1		Missisquoi	39		Lennox	26
	Carleton	2		Montcalm	40		Lincoln	27
	Charlotte	3		Montmagny	41		Manitoulin	28
	Gloucester	4		Montmorency	42		Middlesex	29
	Kent	5		Montreal Island	43		Muskoka	30
	Kings	6		Jesus Island	44		Nipissing	31
	Madawaska	7		Napierville	45		Norfolk	32
				Nicolet	46			
	Northumberland	8		Papineau	47		Northumberland	33
	Queens	9		Pontiac	48		Ontario	34
	Restigouche	10		Portneuf	49		Oxford	35
	St. John	11		Quebec	50		Parry Sound	36
	Sunbury	12		Richelieu	51		Peel	37
	Victoria	13		Richmond	52		Perth	38
	Westmorland	14		Rimouski	53		Peterborough	39
	York	15		Rouville	54		Prescott	40
				Saguenay	55		Prince Edward	41
				Shefford	56		Rainy River	42
Quebec	Abitibi	1		Sherbrooke	57		Renfrew	43
	Argenteuil	2		Soulanges	58		Russell	44
	Arthabaska	3		Stanstead	59		Simcoe	45
	Bagot	4		St-Hyacinthe	60		Stormont	46
	Beauce	5		St-Jean	61		Sudbury	47
	Beauharnois	6		St-Maurice	62		Thunder Bay	48
	Bellechasse	7		Témiscouata	63		Timiskaming	49
	Berthier	8		Temiskaming	64		Victoria	50
	Bonaventure	9		Terrebonne	65		Waterloo	51
	Brome	10		Vaudreuil	66		Welland	52
	Chambly	11		Verchères	67		Wellington	53
	Champlain	12		Wolfe	68		Wentworth	54
	Charlevoix	13		Yamaska	69		York	55
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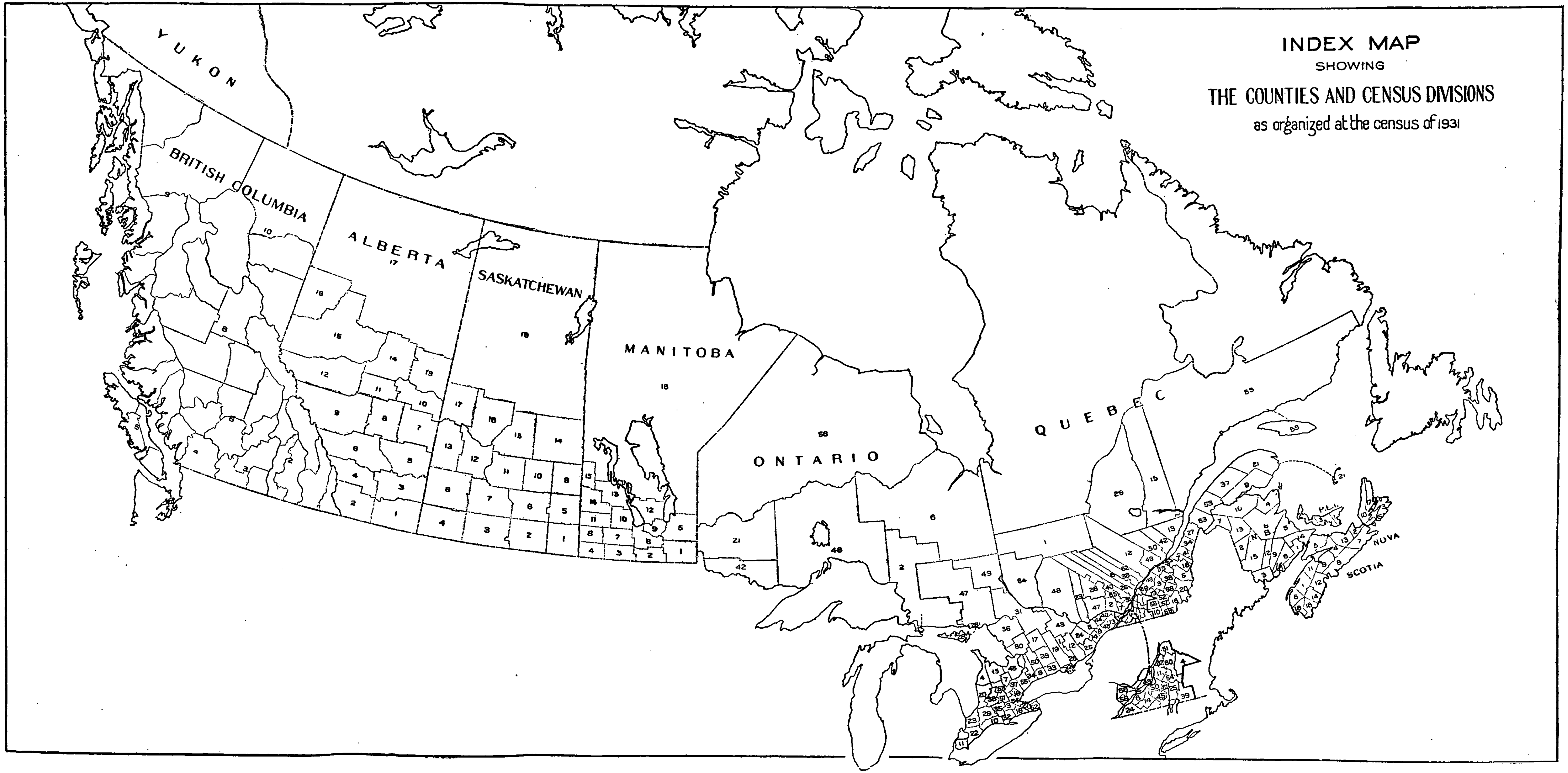
NOTE.—The census division numbers of the Prairie Provinces and British Columbia are given on the map.


INDEX MAP
SHOWING
THE COUNTIES AND CENSUS DIVISIONS
as organized at the census of 1931
YUKON
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
P.E.I.
N.B.
NOVA
SCOTIA

SUMMARY

THE EVOLUTION OF CANADA'S AGE DISTRIBUTION

From the material in Chapter I and especially the Appendix, the conclusion arrived at is that during the first part of the period of observation, *i.e.*, up to the beginning of the present century, Canada's age distribution developed fairly steadily in a manner which may be described mathematically. The population moved on from 1881 to 1901 according to an ageing process capable of graphical description, the "picture" in the earlier years showing large proportions at the younger ages and small proportions at the older ages, the peak at the earlier ages gradually flattening as the years went on and the proportions at later and later ages increasing. This steady process was rudely interrupted at the beginning of the present century, synchronizing with, and undoubtedly due to the large immigration wave which superimposed upon the original population a new population largely at the early adult ages and centering in the middle twenties. The result has been a composite age structure consisting of a large "middle-age" population moving up in the process but at the same time causing what might be called a rejuvenation by means of another superimposed population at the early ages, *viz.*, the children of these immigrants.

The social significance of this middle-age population seems to be considerable. In the first place, it has been generated by population mobility. It shows properties different from those of the ordinary population and it is difficult to decide whether these properties are due to the fact that it is a mobile population or due to the age composition. However, the facts of Chapter III would seem to justify the conclusion that both causes are operative. There, evidence is given that it has a death rate lower than might be expected from the age composition, although the age itself of this population is subject to low death rates. Indirectly, we see the same phenomenon in the monograph *Canadian Life Tables, 1931*.

Another feature of this superimposed middle-age population is that it contains a preponderance of males and of persons at working ages. The influence of age here is buttressed by the fact that the population moved largely for the sake of working so that it is apt to contain almost as large a proportion of workers as the age distribution warrants. Further, the fact that it is a moving population carries with it the implication that these workers contain a large element of wage-earners as distinguished from owners and independent workers who need a more or less stationery or stable form of life. This helps to explain why the proportion of wage-earners to other workers increased very rapidly up to the time of the great depression.

Another feature of the superimposed population is that it tends to lead to a sudden increase in the old population instead of that gradual increase to be expected from the ageing process of an ordinary population. This is apt to lead to social complications during a definite period in the future until the effect of the immigration wave has passed on, *viz.*, an abnormal proportion of persons over the age of seventy. If the mobile population is *per se* less liable to death than the static, the proportions thus expected at the older ages will be larger than expected from calculations made on ordinary death rates.

Still another feature of the middle-age population with a preponderance of single males at the earlier part of the wave is the probable effect upon expenditure and assumption of obligations at the time. The fact that a large wage-earning population without dependents was suddenly converted into a population with dependents but with no greater earning powers can reasonably be expected to be reflected in certain economic situations that have risen during the more recent years of the century.

CLASSIFICATION OF AREAS BY AGE TYPES

Chapter II classifies types of age structures of the population and shows that there are emigration as well as immigration and static types. The emigration type is particularly characterized by scarcity of persons in the early adult ages, this scarcity moving on in the same way as the superabundance in the case of the immigration type. This means that these emigration types are short of the usual working ages so that the work is done by the old and the young. In the other respects mentioned in the case of the immigration types, the emigration type is apt to behave in the opposite direction.

CLASSIFICATION OF AREAS BY FUNCTIONAL ASPECTS OF AGE DISTRIBUTION

Chapter III classifies areas by three main functional aspects of age distribution, *viz.*, percentage born in province of residence, age of settlement and death rates of residents. This classification corroborates that of Chapter II. When the functional aspects are correlated separately with the threefold index of the previous chapter, migration—immigration and emigration—is again shown to be the main cause of our age distribution, overshadowing the fundamental influence of births and deaths.

CLASSIFICATION OF URBAN LOCALITIES BY PECULIARITIES IN AGE STRUCTURE

Chapter IV shows how another type of migration affects age distribution, *viz.*, the movement into cities. A very interesting and perhaps important feature of this movement is the constant rejuvenation of the population of these cities. What is most important in this chapter, however, is that it shows, in so far as can be shown indirectly, the ages or near ages of movement into cities, whereas in Chapter III is shown the ages of movement of immigrants into the country as a whole. The city movement is undoubtedly younger and more feminine. The implications of this differentiation are, no doubt, important.

PART I

INTRODUCTION

Age, after sex, is probably the most fundamental attribute of a population. It permeates almost all the other attributes. The rates of birth, death, marriage, earnings; the differential rates of these attributes among races, birthplaces and geographical areas, etc.; the movement of population; a good many of the financial and social problems of population, such as dependency, illiteracy, crime and institutional care; the inter-comparison of the component parts of the population in other respects than those mentioned; all are either impracticable or incapable of interpretation without making due allowance for age.

At the same time, age distribution is one of the most imperfectly understood attributes. Probably one reason for this is its familiarity; we are prone to think that there is nothing in it that *needs* analysis or clear understanding. Yet few have a definite idea as to what constitutes old age or middle age, an "old" country as distinguished from a "new" country. Few, in fact, have definite knowledge about any particular age or age group that was not true also of another age.

While age has been subjected to different forms of analysis for specific purposes, little has as yet been written on the subject in its general aspect, *i.e.*, on "age distribution" as a concrete whole and in ascertaining and depicting its definite shape as such. It follows that just as little has been done towards tracing its development through different stages as a concrete whole. Historical accounts of age are found but only of its history in spots or vaguely. We hear of a country or people "ageing" but what precisely does this mean? Does a population "age" in the same sense as an individual? From analogy to another question "Does the increase in life expectations mean longevity?" we have reasons to think that this is not necessarily so. It may merely mean that fewer persons die young, not that many persons live to old age.

An attempt to analyse age as a concrete whole is beset with many difficulties, chiefly through want of standards or precedent. Both the methods and the point of attack have to be discovered. However, even in this attempt it is possible to proceed safely so long as the methods are built on recognized principles but each step needs to be clearly defended.

The first step taken here is an attempt to define a general shape or concept for age distribution. Another step is the finding of a point of departure for analysis of the occurrence and of different varieties of its shape. This point may be called a basis of classification of age distribution. The subject is thus treated somewhat in the same manner as a botanical classification of plants as to family, genera, the species, etc., and the varieties and secondary material on evolution, ecology and pathology. The Appendix attempts, more or less technically, to develop the method of classification, illustrate and defend it. Chapter I sets out the principles underlying the development. The succeeding chapters of the study will consist of different forms of classification and examination of the attributes of population with which the different classes are associated and treatment of certain "pathological" phenomena, such as age mis-statements and other statistical errors to which data on age distribution are liable.

General Considerations on Age Distribution.—In connection with the Census of 1931 was compiled a wealth of material on ages in Canada unequalled in any previous census of Canada and probably not surpassed elsewhere. In addition, we have an unbroken series of uniform data on ages as far back as 1881 while, with the aid of smoothing and interpolation, data for 1861 and 1871 can be rendered uniform with this series within a small margin of error. The age distribution throughout the series is presented in quinquennial age groups. Since we know that age is fundamental to most of the attributes of population enumerated in the census, it is highly important that an attempt be made to analyse and present, in a form intelligible to the average thinker, the substance of this wealth of material.

If an age distribution were a single number or were measurable in such a way that the quantitative aspect of it could be expressed succinctly, it would be a simple matter to list age distributions geographically and under different attributes so that the mind could immediately grasp important differences. It is the object of this study to present it in such a form but the attainment of this object is exceedingly difficult. Even a quinquennial age distribution has twenty-one different groups and when twenty-one figures of one kind are presented along with twenty-one figures of another kind, it is difficult or impossible for the mind to take in the comparison even when the numbers are shown as percentages and thus referred to a common base.

It would seem that the best means of attaining the objective of this study is to present age distribution pictorially. The mind can readily distinguish between a photograph of, say, two different species, although in doing so it does not enumerate the points of difference. Further, it can grasp the distinction between different kinds within the same species; through familiarity its does not have to stop to analyse when the object is seen. If it were possible thus to familiarize the mind with a "picture" of age distribution, different kinds of such distribution could be made distinguishable at a glance.

This is laying great emphasis upon the *shape* of age distribution. Even if age distribution has not a *universal* shape (as will be more fully developed later) distinguishing it from something that it not an age distribution, it nevertheless has a *general* shape distinguishing one kind of age distribution from another. The nearest approach to a *universal* shape is brought about by the fact that in any real population every one of the five-year age groups from 0–4 to (at least) over 80 is represented and that, owing primarily to deaths, but also to other causes, the largest groups are in the earlier ages; the groups progressively and more or less gradually decreasing until they disappear around the age of 100. This shape, however, does not distinguish age distribution from millions of natural objects—say, one side of a mountain. We can, however, generalize on a shape which distinguishes one age distribution from another in the same way as we can generalize on what gives a greyhound the greyhound shape in contradistinction to what gives it an unusual shape caused by an accident. In other words, there are *steady processes* giving age distribution a general shape as distinguished from accidents which cause distortions. Two outstanding processes among these are birth and death. It is believed here that these have been expressed in the order of their importance. The changes that take place in these two processes are gradual; consequently, the *general* shape of an age distribution is comparatively smooth.

To present this in diagramic form we can imagine that each five-year interval is a closed compartment in the shape of a rectangular column filled with population. The simplest diagram is that of a life table and below is shown the population of the life table of Canada males, 1931* (Chart 1), and the population of the life table of the United States, 1870† (Chart 2), each column representing the number per ten thousand of the total.

* 1931 Census Monograph No. 13. † *Ninth Census of the United States*, Vol. II, p. xii.

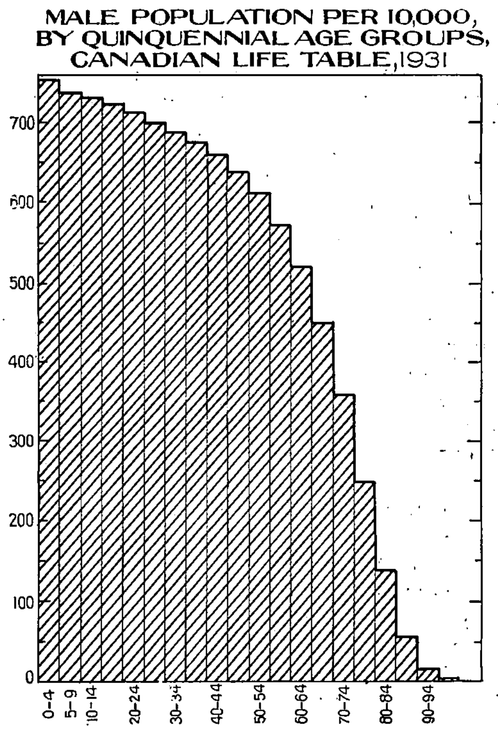


Chart 1

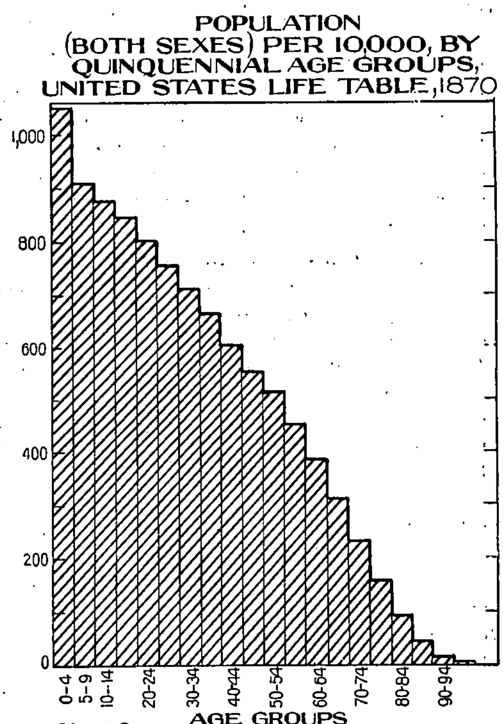


Chart 2

In Chart 1 the element of *natural increase* is eliminated and only the influence of death is shown. This is the reason for mentioning it as the simplest diagram. The peak in the first column is due merely to the fact that infant mortality is greater than that of the succeeding ages up to old age. It is not a *necessary* part of the diagram, since it also is being gradually eliminated.

Although the picture presented by a life table is thus comparatively simple, it is not so simple that it cannot have many varieties. Death is the only agent but death itself is undergoing a process of elimination.

The difference between these two charts can be expressed simply as caused by the process of elimination of death. In the earlier period represented by Chart 2, death was prominent at all ages, particularly at the younger. When it came to the later years, death was less prominent because there were fewer to die at those ages. In the later period (Chart 1) death was being postponed—very little at the earlier or middle ages and, since death is inevitable at some time, increasingly prominent at the later ages. The earlier chart is steep; the later, comparatively flat to a late age when this population may be said to vanish almost at once. We can imagine the ultimate shape of a life table if the process of death elimination continues. The columns up to very old age should be nearly equal, thus making the diagram an almost horizontal line with a sudden drop at the end. It may be longer than at present, *i.e.*, a person may live to ages beyond 100, but this is very doubtful. The more probable event is a gradual flattening up to ages around 80, then a sudden descent down to around the age of 100. The difference between the contour of the two charts may be expressed roughly as a line in the case of the life table of the United States, 1870, and an ellipse in that of Canada, 1931.

Now, as soon as we introduce actual population age distributions as distinguished from life table distributions we have added to the processes affecting the general shape that of natural increase. We have just seen that even differences in death rates can change the shape, a greater decrease from age to age due to death making the diagram steeper. It might be supposed that natural increase would have merely this effect. If a population of one hundred years ago had the same natural increase as Canada around 1931, say, thirteen per thousand, each successive five-year group (back from 100 to 0–4) would be smaller than the preceding and somewhat proportionate to the rate of natural increase. There is, however, a considerable complication caused by this natural increase.

Chart 3 shows the resulting age distribution after one hundred years if the total population of the life table of 1931 were by some means to be given a natural increase at Canada's rate in 1931 (thirteen per thousand) and the same specific death rates (q_x) as in the life table.

It will have been noticed that the shape shown in Chart 3 was caused by two factors only, *viz.*, a steady natural increase and constant specific death rates for each age group. If either of these or both had been greater, then the curve would have been steeper; if less, flatter.

Now an actual distribution, *i.e.*, any age distribution that comes under our observation, is different from any of those shown in either of the three foregoing charts, although some are found to be closely approaching one or other of them, as will be seen later. In an actual age distribution the natural increase has *not* been steady, nor have the specific death

MALE POPULATION PER 10,000, BY QUINQUENNIAL AGE GROUPS, CANADIAN LIFE TABLE, 1931, PROJECTED 100 YEARS

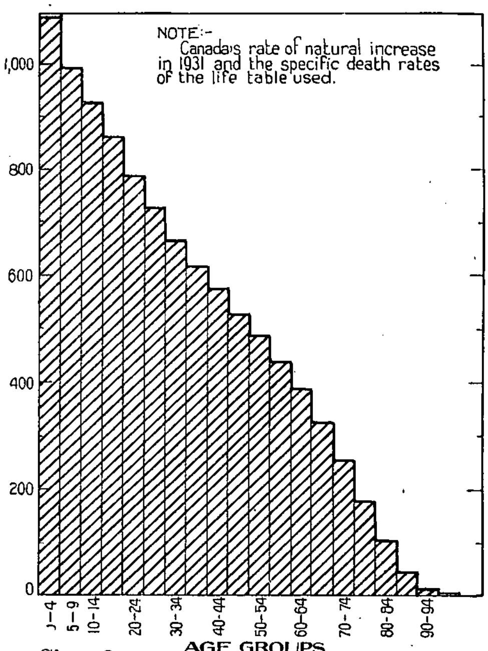


Chart 3

rates been constant. We can readily see that if its present age distribution has been built up under conditions where the natural increase and the specific death rates were changing continually, the result would cause a very complex curve; this, without introducing the effects of immigration and emigration.

General Shape of Age Distribution.—By consulting the Appendix and especially the charts therein, it will become obvious that age distribution has a general shape—that there is such a thing as a "picture" of age distribution. This shape does not sharply distinguish age from something else, such as the side of a mountain or iceberg, but variations from the common or general type enable us to distinguish between one age distribution and another and trace the general change in shape as the population becomes more and more aged. This general shape is an inverted S-curve that varies from one extreme, when the age distribution is simply geometric (all concave) through all stages of growing convexity until it becomes entirely convex or elliptical in shape. If we take the first quarter of the moon as representing the early stage, the last quarter will represent the last stage, but the intermediate stages have no resemblance to the moon's phases. A convexity begins at the top part of the first quarter (leaving the lower part concave). This convexity creeps down from stage to stage until at last the whole shape is convex, except that we know of no actual cases where there is no concavity at the later ages. This is because a small remnant live beyond "the allotted span" and at the present may be considered as a sort of tail to the general shape; whether this tail will or will not persist depends upon whether the gradual lowering of the specific death rates will extend to the older ages or not. If our death rate were to be cut down to half the present rate, would this mean that we would have more centenarians? Probably not; at least, it does not necessarily follow.

Now, the "first quarter" shape is the stage when the number at each successive group is decreasing in geometric progression and the arithmetic difference between each successive age group is smaller than the preceding; the "last quarter" stage is when the difference between each successive age group is larger than the preceding, *i.e.*, death or whatever wears down the columns is increasing arithmetically from group to group. This means that death is being postponed to later and later ages and there is no increase in the population. The age distribution of the year 1931 is a fairly good example of an intermediate stage, *i.e.*, half concave, half convex. We might call the three chief stages (1) the geometric, (2) the linear and (3) the elliptical. Quebec, 1881, furnishes a fairly good example of the first; Canada, 1931, of the second and the Canadian life table, 1931, of the third. Throughout its known history the age distribution of Canada as a whole have been at stages between the first and second of those above mentioned but several of the counties of Canada and countries like France have passed beyond the second. We might mention such places in Canada, *e.g.*, Elgin County, Ont. and the town of Brockville; also, the provinces of Prince Edward Island and Nova Scotia.

Basis of Age Classification of Areas.—The problem with which we are faced is the classifying of the different areas and sections of the population of Canada in such a way that their age development (the general shape) is indicated. Clearly, it is not possible to do so by a succession of graphs for, even if this were done, the minute difference between each one would not strike the eye; besides, it would not furnish a quantitative measure of the stages of development. By a method developed in the Appendix (the charts of this appendix should be studied at this point) a basis of classification is proposed which seems to provide a quantitative expression for the development in the general shape of the age distribution. In the Appendix it is shown that there are certain critical points in the age distribution *i.e.*, the age groups 25–29 and 60–64. Between these ages we may consider that we have the middle and main part of our age distribution, a term which must not be confused with "middle age." The proportions before and after the 25–29 and 60–64 groups show how far the age is skewed towards either the geometric or elliptical extreme, while for the middle term there is a pivotal point which we may designate as "standard age." This pivotal point is ascertained by finding the root mean square of the age distribution from ages 25 to 64. (The reason for this is explained in the Appendix.) This standard age is used instead of mean age, median age, etc., because from trial it seems that mean age tells nothing about the shape of age distribution. The very nature of the shape of age distribution would seem to indicate that "mean" age is not a mean at all in the generally accepted meaning of the term. The mean is the centre of gravity and the word "mean" presupposes such a thing as a centre. The only thing corresponding to a conception of a centre in an age distribution is the age of zero. Every change emanates from this point.

The question may now be raised as to why it is so important that a classification be made as aforementioned. The answer is that if age is fundamental to most attributes of the population, such a classification will in a measure be a classification of such attributes. As a description of the present time, the mid-stage population should be the most vigorous population from the point of view of such attributes as low death rate, high earning capacity, etc.; the first-stage population and especially the one with mixed first- and last-stage conditions predominating should be ones where dependency is a heavy problem; the last-stage population is obviously an old one where high death rates, etc., are expected. From the point of view of history, the first-stage population is one that is not only young but has also had and still has a very large natural increase and very probably a combination of a high birth rate and a high death rate. The last-stage population is one with a past low natural increase and an increasingly low death rate. Again, the general shape is the result of steady and permanent processes; the local variations in shape depend upon transient ones. Thus, at a particular moment a population might be favourably situated with regard to earning capacity through an age distribution caused by immigration; but that very favourable situation might contain within itself the reason why in a few years the situation would be anything but favourable. A classic example was that of Saskatchewan in 1906. Its population of male adults gave it an age distribution most favourable to earning capacity but that very situation worked out a complete change in the age distribution in ten or fifteen years. These adult males married all at once and the result was an enormous proportion of dependents all at once. The adults passed beyond the favourable ages before the dependents reached them. This would not have happened to a population where the age distribution was less abnormal. As already indicated, the general shape gives the history of the age distribution which involves the history of what was steady in population increase as well as natural increase and death rates. To study the age distribution of a locality is to study the population history of that locality. The general shape, indicating the stage it has reached, throws some light upon the future. Again, it is only by knowing the general shape that we can appreciate varieties, excrescences, etc. (If we did not know the normal appearance of man we would not notice the lack of one hand in a particular individual.) Some striking examples of this may be mentioned. The Canadian population of 1911 had practically the same general shape as that of 1901 but the 1911 had an enormous hump (due to immigration) around the ages of 25 to 30. We would have expected that this hump would have dissolved into the general shape before 1931 but it did not. The hump kept travelling along, being present, though some years older, in 1921 and present, though still older, in 1931. It remains separate from the population, so that until this hump disappears in another forty years there are two populations in Canada, the one superimposed upon the other. We would not notice this—at least, we would not feel sure of it—if we did not know the general shape. Again, there was a large birth rate around 1921—probably from 1919 to 1924—and a low birth rate after 1924 with, very probably, a low birth rate from 1914 to 1918. The 1921 hump is noticeable in the Census of 1931, travelling as above mentioned. Similarly, there was a low rate of increase between 1881 and, say, 1896. The population born in that period would in 1931 be at ages 35 to 50. Later, the defect in this group was more than implemented by immigrants so that in Canada's present age distribution the effects do not appear but there is food for thought in the matter. When the immigrants came in, it was at a time when these missing ones would have been at the ages of the immigrants at the time of their arrival. The immigrants were really filling a hollow but they more than filled it—they turned it into a hump which has since progressed until it will one day reach the age groups over 70 years. If we did not know the general shape we could not record these phenomena with any confidence.

A geographical classification by general shape of age distribution can be made very useful. If we can classify counties into first, second and third degree types with some sub-classification, we contribute to the history of these counties and furnish useful information to the student and perhaps even to the physician, the economist and the statesman. Old age pensions are apt to be a matter of great concern to the third degree type; high birth rates, high death rates, institutional care, etc., in first degree types, while the second degree type would offer poor prospects for medical attendance. It is proposed, therefore, to classify the counties and census divisions of Canada into types of age distribution; the results of this classification will be seen in Chapter II.

In later chapters the classification will be correlated with other attributes of the population in an attempt to ascertain whether the expected results will turn out to be the actual. If we accept the soundness of the classification the conclusion must follow that when the actual and expected do not coincide, other agencies more potent than age are at work.

CHAPTER I

THE EVOLUTION OF CANADA'S AGE DISTRIBUTION

In the Introduction was given a description of the evolution of the general shape of our age distribution, based upon the development of the subject traced in the present chapter and particularly in the Appendix. It seems necessary to enter more into details and to trace this evolution step by step. We are fortunate in having in each census a step in the development more clearly marked out than was to be expected from actual data fitted to theory.

Already (in the Introduction) it was indicated that the general shape of age distribution passes from a stage close to the geometric, in which the number at each successive age is approximately the same fraction of the preceding age, and in which, also, the curve of the age distribution is concave, to the stage when the curve is convex and when the general shape is elliptical, resembling the last quarter of the moon. Now, the earliest census for which we can show a quinquennial age distribution for Canada is 1881; although we can give earlier years by interpolation, it is better not to use these in showing the development, as the method of interpolation presupposes what we are trying to show. However, we can find cases among the counties of Canada in 1931 where the stage of development is earlier than that of Canada as a whole in 1881. The province of Quebec in 1881 can be shown for this purpose. Although a better example could be obtained by using females instead of males, we are using males throughout this chapter for uniformity with the Introduction.

Quebec, Males, 1881.—The distribution of Quebec males, 1881, is shown in Chart III in the Appendix in comparison with the distribution of Canada as a whole at each census from 1881 to 1931. There are three points particularly noticeable in this chart of Quebec, 1881. First, the distribution is fairly smooth from the first group to the age above which all distributions are abnormal, *i.e.*, the age of 80. This reflects the history of the province. It has had a fairly steady rate of increase until recently and not much immigration. This smoothness enables us, even in a diagram, to recognize the general shape of the distribution.

The second point is that, if we begin at the latest age groups and look backwards, the distance between the heights of the columns steadily increases. This is the characteristic of a geometric progression curve. When measured as in the Appendix, it is found to come closer to a geometric than to any other simple curve.

The third point is that, in spite of its steepness and general geometric shape, it has departed from this shape sufficiently far to convince us that we have by no means discovered the ideal case of geometric distribution. And yet it is nearer to this ideal distribution than one of its counties and one of its cities, which, according to premature conclusions by *a priori* reasoning, we were led to believe would approach more nearly this geometric shape. These two places were Chicoutimi County, 1931 and Shawinigan Falls, 1921. The basis of the conclusion in the case of Chicoutimi was that it had had a large and steady population increase since 1881 (50 years) and that at the present moment (1931) it has a very large rate of natural increase. The basis of the conclusion in the case of Shawinigan Falls was that this place had a short history and an exceedingly rapid rate of growth. Both places have very small immigrant populations. Probably the fact that these two places came far short of expectations—much shorter than Quebec, 1881—gives a hint as to why we failed in this to find ideal cases of geometric age distribution. Their shapes are seen in Chart II of the Appendix.

At first thought, a steady rate of population increase through its native population seems to be the chief condition fulfilling the requirements of the geometric shape, the secondary condition being that there be no immigration or emigration. Chicoutimi and Shawinigan Falls show that there are other considerations involved in these. There is a very strong probability that both places have suffered from emigration and that the high rate of population increase has been maintained by persons coming in from other parts of the province. Let us see how this would work out. It can be shown that, on the whole, emigrants move out at early ages, this especially if it is a cityward movement or one out of Canada. If the persons coming in were at the same age as those moving out and they were equal in number, this emigration and immigration would make no difference to the age distribution. However, there is reason to believe, and it can partly be demonstrated, that the incomers and outgoers are not at the same age. Those moving into rural parts from the rest of the province are not apt to be of the same age as those moving out to cities or to the United States. The incomers are a sample of the population of the whole province with a possible bias towards the mature ages; the outgoers are young people. Consequently, if we take Chicoutimi in 1931 it is more apt to be nearer Quebec in 1931 than Quebec in 1881. The county is ageing almost as fast as the province, only more irregularly. However, on account of its great rate of natural increase, it has a very steep shape. It has a first-quarter shape through the early ages but becomes convex at the later middle ages.

There is another point that applies particularly to Shawinigan Falls apart from the fact of its rapid growth with both a short history and a large influx from the rest of the province presupposed. By 1921, it had not yet had time to become a population in our age-study sense of the term. In picturing the shape of the age distribution we have taken twenty-one columns--the quinquennial groups from 0–4 to 100–104. This is our population. We do not admit the possibility of any of these columns being non-existent. However, this is only true of a place long enough settled to have persons over the age of 100—if it depends upon its own population. It is only then that it may be said to have a population and it is only after this point has been reached that the shape develops definitely. While all the twenty-one columns are in process of coming into existence, the development is not the same. We are measuring all populations on the common basis—the number at each age group per ten thousand of the total population. The fact that there are none at the later middle ages at once destroys the concavity. Death has not had time to wear the shape down to smoothness. The shortness of duration admits of many more irregularities. Such an important irregularity would be caused by the moving in of parents with their children—this would make a depression at the early adult ages. Some of the links of the chain are missing and these links do not occur at random (causing only local irregularities) but are in definite places. Hence, we find a disproportion of very young persons with a disproportion of what, for that population, are old persons, *viz.*, forty and over. When the columns all come into existence, forty is a young adult age; before, it is old. Since we are classifying by shape, this distinction is important. A second very important condition, determining not only the geometric shape but the development of the shape, has thus been introduced, *viz.*, *age of settlement.*

The steadiness in the rate of population increase and the age of settlement, then, seem to be strong influences in determining the general shape, the latter being aided by death in lending it smoothness. The size of the increase causes steepness, but does not really affect the general shape. There could be several perfect geometric shapes of widely different steepnesses. The steadiness of increase is what matters. These two principles will help interpret the development of Canada's age distribution as traced in the following.

Our conception of development of age distribution should now be redefined, after which it will be possible to describe further the stage of development of Quebec, 1881 and the successive stages of Canada's development.

We might say that development of age distribution is a process of "ageing," but this really is not a good term if it is understood in the same sense as an individual ageing. A more adequate definition seems to be that the development is a process of growing convexity. The process does not begin, *i.e.*, the population does not exist as a population for the process to work on, until the country is a hundred years old with its native population or until the full span of life (twenty-one quinquennial groups) is represented with a borrowed population. If you place a ladder, say, thirty-six feet long against a wall and then slide it away until its foot is twenty-one feet from the wall, where it is made fast, the ladder in the process is still straight. Suppose now the ladder is flexible and the downward pressure is continued. It can no longer remain straight but becomes curved. The shape of the curve depends upon where and how the pressure is exerted. If properly applied, the ladder becomes convex from the wall, first, near the top. This convexity creeps down with continued pressure. The particular shape may be marked at definite stages, such as first degree, second degree and so on until we reach the *nth* degree. The difference between the ladder and age distribution is that the latter is not straight to begin with but concave, *i.e.*, when the population increases in simple geometric progression. So long as the rate of increase remains constant, and once the hundredth year is passed, the length of settlement does not seem to matter. But the rate of increase does not remain constant; it progressively slows down and the process of slowing down is a function of the age of settlement. Consequently, this age of settlement is one of the most important forces pulling on the ladder, *i.e.*, the ageing of settlement approximates the same meaning as the ageing of the population but it would seem that a hundred years, or some equivalent, must be subtracted from it. Immigration and emigration, in course of time, come in to act as equivalents but not for some considerable time. This will be seen when tracing the development of Canada's distribution, especially subsequent to 1901.

It must not be assumed that the foregoing considerations are *a priori;* rather they are based upon the conclusion from the Appendix and the following examination of cases. However, it should be added that the above process, described up to the *nth* degree, seems to be one of growing simplicity, *i.e.*, a gradual removal of the causes that differentiate the number of persons at each age group. As increase of population is removed, the degree advances; however, even after increase disappears, the process goes on. This is seen in a comparison of the life table of Canada, 1931 and of United States, 1870 (see Charts 1 and 2, Introduction). Once increase is eliminated, death seems to be the chief or only fundamental differentiating agent but death itself is probably in process of removal, *i.e.*, of postponement until later ages. The fundamental condition, however, in our conception is that this postponement of death does not mean longevity beyond the natural span but removal of the accidental causes of death within this natural span. If this conception is true, the ultimate *nth* degree is an ellipse or even a rectangle.

Returning now to Quebec, 1881, it is clear that the province at this date fulfilled the two main conditions of concavity or first degree, *viz.*, it had had a steady and high rate of increase in native population and it had been settled sufficiently long to begin development but not long enough for advanced development. However, its shape was not exactly the simple geometric shape and the chief reason for this seems to have been emigration. Quebec was the first province in Canada to show heavy emigration. Two of its counties—Laprairie and Deux-Montagnes—have not grown since 1851; a considerable number of its counties have not grown since 1861 and others not since 1881. The emigrants were mainly to the United States. Now, it has been mentioned that emigrants as a rule move out at an early age—the late teens and early twenties—*i.e.*, it is known that they do so at the present day. It is possible that in these earlier days there was a greater tendency for whole families to move, but generally the majority of emigrants are young single people. Let us see what effect this would have upon age development. Since the natural increase kept up vigorously, the emigration would at first cause a depression at ages around twenty. The result of emigration, then, *while in process*, is an artificial tendency to convexity which is not so pronounced as the convexity caused by natural development, but nevertheless exists. Subsequent immigration would tend to neutralize this as will be described later. The slight convexity near the top of the figure indicates that natural increase, high as it was then, had begun to slow down. No doubt, if it had been possible to obtain comparable data on the age distribution in 1851, the shape would have been very nearly the first degree or simple geometric progression.

Canada, Males, 1881.—The first of the series of age distributions for Canada is that of 1881. By measurement (as shown in the Appendix) the shape of this year is further advanced than that of Quebec and this is not because it is less steep. A true developmental process distinguishes the two. It was not emigration that caused the difference because Quebec had then suffered at least as much from emigration as the rest of Canada; nor was it length of settlement. Since it is clear that it could not have been either the rate of natural increase, length of settlement or emigration, what was it? The difference itself is that there was greater convexity on the whole—it was nearer the second degree. It is, perhaps, impossible to give a definite answer to the question but the fact itself is interesting. A reasonable explanation is that the other provinces had slowed up more in natural increase from the initial stage, *e.g.*, in the early years, say, before 1851 and indeed up to 1861, Ontario's rate of natural increase seems to have been almost as great as Quebec's. The large family was the rule also in the Maritime provinces while the other provinces hardly counted in the shape of the distribution. If at the same time child mortality was greater in Quebec, all this would have a tendency to bring the upper columns of the shape nearer together as compared with the subsequent. The slowing up of natural increase alone would do this.

Canada, Males, 1891.—The next field of observation is Canada, 1891. Here we have a more advanced stage of development than 1881 but this was to be expected because of the lapse of time. Heavy emigration had been going on in the ten years but this, if it had operated for only ten years, would cause lack of smoothness rather than development; however, it had been going on longer than that and, consequently, operated in the same manner as already described in the case of Quebec.

Canada, Males, 1901.—Canada, 1901 is probably the most interesting of all the stages of development. It is a good simple second-degree shape (see Chart III of the Appendix). Anything that is a simple regular form in nature is highly interesting because it must have been operated upon either by a constant force or by a combination of forces acting together in such a way as to produce the same results as a constant force.

In the first place, the lapse of ten years produced its natural results. But then, why the smooth results? A reasonable explanation seems to be as follows: very heavy emigration had gone on from, say, 1881 to about 1896. This was long enough to advance the development somewhat; but, manifestly, with this emigration was going on a process of slowing up of natural increase. If the census had been taken in 1896 the shape would probably have been very irregular, *i.e.*, with unnatural humps and depressions, since around 1896 the huge wave of immigration had set in, gathering force up to 1914. By 1901 this wave had been operating for only five years and had not reached nearly its maximum force. The immigrants at the time of immigration were just slightly older than the emigrants at the time of emigration—just enough older to be exactly the same age as the emigrants and thus fill the places they left vacant in the age distribution. By 1901 just enough of them had moved in to fill the gaps left by the emigrants—no more. If the census had been taken a few years later the gaps would have been more than filled in and there would have been humps. This was so in 1911. The particular date at which the census of 1901 was taken, therefore, was important in its bearing upon the smoothness of the age distribution of that date.

Canada, Males, 1911.—It is remarkable that in spite of the huge immigration the development proceeded naturally in the next ten years and in 1911 was at a further stage. It is true that its shape was more irregular but this does not seem to have affected the fundamental shape as measured (see Appendix). The slowing up of natural increase evidently proceeded as did also the age of settlement. The immigrant hump acted merely as a superimposed population upon the existing population—it was not the sliding out of the end of the ladder, but the placing of an object on it. This object had not yet become a part of the ladder.

Canada, Males, 1921.—The next step is 1921 and here the effects of immigration, also emigration (including war casualties), become manifest. It is clear that immigration and emigration are analogous to births and deaths, with this difference that in connection with age distribution births affect the shape of the age at the upper end and death, although operating all over, affects particularly the upper and lower ends, while immigration and emigration affect the middle. At the beginning immigration and emigration merely cause humps and depressions; if they continue consistently these humps and depressions spread with the assistance of death and become a part of the population, but in the long run their results are neutralized. Consequently, what seems to be of importance in determining the fundamental (as distinguished from the rough) shape of age distribution is not the magnitude of any force but the *changes* in this magnitude—the *acceleration.* What happened in the case of immigration was that it went on with tremendous force for some time and then stopped. The hump made by immigration, somewhat worn down by death, spread. What spread it still more was the fact that although immigrants came in largely in one or two age groups—20–24 and 25–29—and a yearly succession of these arrivals for, say, 20 years spread the hump by 1921 to the ages from 30 to 50 or 60, thus covering the whole middle portion and a part of the latter portion of the age shape and giving a definite trend to the shape. Meanwhile, between 1914 and 1921 emigration depressed the population in the twenties. Then another phenomenon appeared, especially in the latter part of the decade, but also throughout the decade 1911-21. The immigrants, who were mainly single adult males, almost simultaneously either married or brought in their wives. This led to what may be considered an abnormally high birth rate or, rather, a large child population out of proportion to the former trend. The shape of the population was thus abnormally developed at the extremes, leaving the early middle part depressed. The result was that although on the whole the fundamental age distribution developed somewhat in what is regarded in the foregoing description as a natural manner, yet it developed but slightly. According to the method of measurement described in the Appendix it developed less than a third as fast as during the four previous decades or the succeeding one. As a matter of fact the age distribution shows two populations or shapes, not one—one population up to the age of 20 and another after. The question then came up as to whether this shape would round out in course of time and reassume its natural process of development.

Canada, Males, 1931.—During the decade 1921-31 the age distribution gathered up the slack with the result that 1931 showed a stage of development almost, though not quite, a direct continuation of 1901. The shape of 1931 is almost a simple third degree shape, analogous to the second degree in 1901. It is still quite irregular, but there is no mistaking the development. Now what happened between 1921 and 1931 was this: at first there was a very high birth rate for about ten years from 1916 to about 1925 or 1926, raising the numbers at ages 5–15. Next, there was heavy emigration from 1921 to about 1924 which was almost a continuation of the emigration during the War. This would have the effect of depressing still further the number in the twenties but during the latter half of the decade there was another big wave of immigration implementing the numbers previously lost by emigration. Since this immigration was largely still in the country at the Census of 1931, their results told to the utmost as in 1901. They rounded out the depression and made the age distribution more continuous from the age of 5 on. Meanwhile the natural development due to lapse of time was going on. We have thus the double shape changed once more into closer approximation to a single shape. Naturally we expect a still greater rounding out of the shape between 1931 and 1941, unless emigration and immigration again set in.

We have thus endeavoured to set out the elements that have entered into the development of our age distribution, including the effects of emigration and immigration. It may be stated here (although it seems unnecessary to illustrate the statement with figures as an abundance of tables is furnished in the Appendix to verify it) that not only are big movements in the past traceable in the general shape of the age distribution as above described but smaller or secondary movements are also traceable in the irregularities or contortions in the general shape. The question in the face of an irregularity, wherever it occurs in the succession of age groups, is: "At what date were these either 0–4 or 20–24 years of age?" (*i.e.*, the age immediately following birth or emigration or immigration). Usually we find that the date corresponds to a secondary movement in the history of the population. Tertiary and smaller movements, unless very recent, are not apparent as they are smoothed out by death or covered up by the larger movements. This makes it very difficult to uncover such phenomena as age mis-statements. What may be said of such phenomena is that they reveal themselves by certain hall-marks, such as preferences to certain digits and excesses or defects at strategic points. However, while these hall-marks disclose such phenomena, it is here contended that we cannot measure them until we have first determined the fundamental and secondary shapes. These can be then used as norms or points of reference.

One phenomenon in connection with the development in 1931 has not yet been mentioned. For the first time in the history of the Canadian age distribution, the first quinquennial group was smaller than the second. In certain studies published on the subject, particularly in reference to the United States population (where the same phenomenon occurred), this is regarded as significant and as pointing to the approach of a decreasing population. Now in our description of development the possibility of the decreasing population has not been admitted. It will require much stronger evidence than has hitherto been supplied to bring conviction that this is a possibility. Decrease for a time, yes, but a permanent trend of decrease is doubtful in the face of existing evidence. A great deal of material has been gathered for the purpose of studying this point with reference to the Canadian population. Since, of course, no study of decrease in the case of the Canadian population as a whole could be made, it was considered a proper mode of attack to take the population in parts in 1931 and study the shapes of increasing and decreasing populations. In Statement G and Chart IV in the Appendix, is shown a division of the population of Canada as of 1931 into eight parts. These eight divisions are the aggregation of the populations of counties stationary or decreasing since 1851, 1861, 1881, 1891, 1901 1911, 1921 and those still increasing in 1931 (no county was found to begin decreasing in 1871). A further study was made of individual cities showing the first quinquennial group smaller than the second, the second smaller than the third, and so on (see Table 3, Part II, page 76). Of the latter there are very many varieties, *e.g.*, in the British Columbia population we find the maximum age groups appearing in the thirties or forties. Now, since we actually have more than a dozen age distributions in which various age groups turn out to be the largest one of the series, it seems rather premature to draw any particular conclusion from the fact that, for the first time, the aggregate of these varieties turns out to have the first group smaller than the second. One would be inclined to call it an accident until further proof is forthcoming. It just happened to occur at this particular spot. If, when the country was broken up into parts, the majority of the parts showed this tendency to have the first group smaller than the second, then the evidence would be more satisfactory. As it is, it does not occur in the majority of cases. Rather, what seems to happen is that A is smaller than B because B is abnormally large. We have already given an historical account of phenomena which could bring this about in Canada. The birth rate in the first half of the decade 1921-31 was abnormally high in relation to trend. This, of course, would make the number at ages 5–9 abnormally large. The fact that the number at 0–4 was smaller than this may mean that the birth rate has come back to trend or, as usually happens in phenomena of this kind, has temporarily fallen below trend as a reaction to the previous excess. It may, of course, mean that the birth rate has permanently settled down to a decrease but it seems a premature conclusion, especially as the years in question not only were partly years of economic depression but partly years of heavy immigration when motion alone would tend to check birth rates. Motion has already been shown to be a very important determinant of the age distribution. The study of the eight groups (the decreasing populations) is interesting in view of the fact that it disclosed little or nothing of the effects of decrease upon the shape of age distribution in so far as the general shape was concerned. Rather, it was reflected in giving to one and all of the decreasing populations the double shape of the 1921 distribution. This, of course, was due to the fact that the decrease was largely the result of emigration but without doubt the natural increase went down as well. To show this, the 1931 rates of natural increase in these eight groups of counties are also shown in Statement G of the Appendix. If there is a fairly steady progression of decreasing natural increase among these eight groups even in the case of one year, it should indicate something.

Conclusion.—In concluding this chapter it seems necessary to summarize two facts:—

1. That age distribution has undergone a fairly steady and rapid pace of development showing a stage at every census between 1881 and 1931 but an exceptional case or, rather, a poorly defined stage, in 1921.

2. That the chief determinants in the development were the length of settlement and rate of increase but particularly the changes in the rates of increase, changes which were further defined as *motion*. In this motion emigration and immigration played very important parts.

To illustrate the second fact still further the population of 1931 was divided into two parts or populations by age groups. (This was possible for the first time in 1931.) The one population consisted of Canadian born with their children; the second, immigrants with their children whether born abroad or in Canada. The Census of 1931 shows by quinquennial age groups the immigrant population and also the Canadian born with immigrant parents. The only approximations that were necessary were the Canadian born, one of whose parents was immigrant, the other native. In this case half were credited to the Canadians and half to the immigrants. The error in estimation here was so slight that it is hardly worth mentioning.

Statement J in the Appendix shows, in comparison, the two populations. The difference can readily be detected. The immigrant (and children) are throughout what might be termed a middle-age population; the Canadian born are a full population. Clearly, immigration has had a powerful effect in hastening the development of the age distribution of the Canadian population as a whole.

The effects of emigration are more subtle. These have to be studied in the native population (with children). According to the method of measuring development shown in the Appendix, this population in 1931 had only reached a stage of development between that of Canada in 1891 and in 1901. This seems astounding and the first question that suggests itself is whether, in spite of the elimination of immigrants and their children from this population, immigration had the effect of rejuvenating the native population. This seems untenable in the face of a much more reasonable explanation. The rejuvenation is credited to emigration, not immigration. It will be necessary to show clearly how this would work.

First, we have to remember that we are examining a native population so that complications arising from immigration no longer come in.

As above mentioned, there was a huge wave of emigration from Canada between 1881 and, say, 1896. This emigration occurred at the late teens and early twenties. The number was close to a million, more or less, judging from the increase in that period in Canadian born living in the United States. The first results of this would be to leave a depression in the native population at the ages of movement and, as the movement extended over about twenty years and became progressively smaller, this depression would spread and become more smooth. Now, by 1931 the ages which these emigrants vacated would be ages about 50 to 80, while the older population living in Canada at the beginning of the movement would be dead in 1931. The result was an abnormally low number at ages 50 and over with a reasonably high number at younger and younger ages, reinforced by the higher birth rates around 1921 and in spite of subsequent emigration. The returning Canadians in the latter half of the decade would probably be largely Canadians who had left Canada early in the decade so that this earlier emigration was not so apparent in 1931. This, as can readily be seen, would have the effect of rejuvenating the native-born population. It also shows the part emigration can play although it played other parts as shown earlier in the chapter. Death, of course, in the meantime acted merely as a smoothing agent but naturally it would have the effect of making the survivors of the remnant left in 1881-96 still smaller than those at earlier ages in 1931.

CHAPTER II

CLASSIFICATION OF AREAS BY AGE TYPES

In the Introduction, Chapter I and the Appendix an effort was made to arrive at a basis of classification by age types. Such a classification is necessary because such concepts as mean ages, median ages, etc., fail to bring out functional differences in age distribution, since the same mean age can be arrived at by different types of age distribution. Besides, it is submitted, such a concept as mean age is illogical if we consider a "mean" as a centre from which the dispersion radiates. If we procure types different in function we have at least arrived somewhere.

Threefold Index.—It was pointed out that there are three phases in the age distribution (especially of such countries as Canada, populated so largely by immigration) which determine type, *i.e.*, the early, middle and old ages. Reasons are given in the Appendix for setting boundaries to these phases at (1) under 25 years of age, (2) 25–64 years of age and (3) 65 years of age and over. Since the proportion of the population in the second phase is given by the proportions in the first and third (*e.g.*, if the first and third are large, the second must be small), it seemed desirable to characterize the second in some other way than by size. If the middle portion of the population, *i.e.*, the adult population, is young or old, this not only indicates the trend of the whole towards youth or old age but, as will be seen more conclusively in the next chapter, indicates whether the immigrant or mobile population, of which the middle portion largely consists, is recently immigrant and very mobile or has been in the country for some time and thereby lost some of its mobility. In forming a threefold index for the classification of areas by age type the percentage of the population under 25 was taken as the first member, the percentage 65 and over as the third member, while for the middle member a peculiar quantity designated as "standard age" was taken. This "standard age" was measured by squaring the different quinquennial groups from 25 to 64, averaging these squares and extracting the square root.

It will help us to realize the significance of this threefold index if we show the progress of its members through the different censuses of Canada, beginning with Quebec, males, 1881 as a young age type, Canada, 1881 as a somewhat older, and so on up to 1931, as follows:—

I.—AGE STRUCTURE OF QUEBEC, MALES, 1881 AND CANADA, MALES, 1881-1931

Item	P.C. under 25 Years	Standard Age	P.C. 65 Years and over
		years	
Quebec, males, 1881	61·0	21·2	4·5
Canada, males—			
1881	59·7	21·4	4·3
1891	56·8	21·3	4·7
1901	53·9	21·5	5·1
1911	51·0	20·7	4·5
1921	50·4	21·6	4·7
1931	49·3	22·3	5·5

From this statement it is easy to see what has actually happened. The proportions at the younger ages have steadily declined but this decline in 1911 was not because the population aged, for the proportion at the older ages also dropped, but because the middle age* increased owing to an increase in immigration from 41 p.c. in 1901 to 44·5 p.c. in 1911. Notice also how the recent immigration or mobility is borne out by the fact that the standard age dropped from 21·5 years in 1901 (having increased up to then) to 20·7 years in 1911. The threefold index, then, is quite sensitive to three processes, *viz.*, natural increase, mobility and general ageing of the population. As such it should enable us to indicate age distribution correlating with functions of ages in the population much better than such an index as the mean age of the population, which might increase by several channels, *e.g.*, a decline in birth rate, an increase in persons at old ages, a static population, etc.

* That is, the percentages under 25 years plus those 65 years and over subtracted from 100.

We have now reached a difficulty in classification, *viz.*, the arrangement of this threefold index, when applied to areas, in such a manner that it may indicate some kind of progression. This would be simple enough in the case of a single index like mean age, for it would be sufficient to arrange these means in order of size. This is impossible in the case of a threefold index.

It would also be easy to classify the age types according to a functional progression. This will be seen in the next chapter; but the objection to this is that an age type progressing according to one function does not progress similarly according to another function. We need a classification that will be descriptive of different age types independently of function.

Since, for the moment, we are not concerned with quantitative progression, it will be sufficient to refer such quantitative progression as will be used to the average, without regard to how far from the average each class extends. The two hundred and twenty counties and census divisions of Canada* were averaged for the three phases of age. The three averages may be designated by the notation 51·4—22·5—6·3. The counties were then arranged in relation to these averages with a view to placing the younger age types at one extreme, the older at the other extreme and those with large proportions at the middle ages in the centre. If we use the notation "h" for above average and "l" for below average, we have the following four classes each with two subdivisions.

II.—AGE-TYPE CLASSES AS RELATED TO AVERAGE OF THREEFOLD INDEX FOR 220 COUNTIES AND CENSUS DIVISIONS OF CANADA,[1] WITH NUMBER OF COUNTIES OR CENSUS DIVISIONS FALLING INTO EACH CLASS, CANADA, MALES, 1931

Class	Age Type	No. of Counties Falling into Class	Class	Age Type	No. of Counties Falling into Class
IA	hll	56	IIIA	lll	37
IB	hhl	11	IIIB	lhl	12
IIA	hlh	6	IVA	llh	2
IIB	hhh	33	IVB	lhh	63

[1] Omitting Yukon and Northwest Territories.

In the case of hll (IA) the proportion under 25 is above average, the proportion 65 and over is below average and the middle group is younger than average. Clearly this is a young type. Again, in IIIA (lll), since the proportions under 25 and 65 and over are both below average, it is clear that the proportion at the middle ages is above average, *i.e.*, there is a large middle-age population and it is of a young type. Similarly, in IVB (lhh), the smaller proportion at the younger ages and the larger at the older ages combined with an older middle-age type show that the class is an old type. It will be noticed that the four classes occur in pairs, A and B, according as the middle age is older or younger, *viz.*, a pair of the younger type with larger proportions at the younger ages; a pair of the older type with higher proportions at the older ages, etc. The definitely middle type is III, while II is intermediate between the younger and middle. The younger, middle and older types are fairly evenly represented among the counties and census divisions of Canada. It would seem that four main classes are sufficient for a threefold index, as a finer classification would tend to disguise the type. Obviously, if we can arrange our age distribution satisfactorily into four main types we have gone a long way. It will be interesting to see how the age types of Canada in the past, when referred to the same average as the counties of 1931, fall into classes. The result is as follows:—

Quebec, males, 1881 .... IA

Canada, males—

1881 .... IA
1891 .... IA
1901 .... IA
1911 .... IIIA
1921 .... IIIA
1931[1] .... IIIA

* Omitting Yukon and Northwest Territories.

This shows that 77 counties of Canada had in 1931 progressed further than the average of all counties of Canada in 1931 (see Statement II), while 56 are at the stage of Canada before 1911 and 37 are at the stage of Canada during the present century, *i.e.*, with a definitely middle-age population. If we take the main classes, 67 are definitely pre-nineteenth century; 65 are definitely post-1931, while 49 are definitely a middle-age population corresponding to Canada, 1911 and 1921; the remaining 39 lean towards a young type. The comparison with Canada at different dates indicates that the classification is not sufficiently fine to differentiate between the different censuses; however, this will be effected sufficiently by the functional classification in the next chapter. Moreover, it is not this we desire in the present classification, but a definite differentiation between the middle-class types of the present century and the younger or older of other periods or, in other words, the immigrant and mobile types from the static. It will be seen further on that the present classification effects this differentiation satisfactorily. In the next chapter it is shown that the most mobile is Class IIIA and that this class shows the lowest death rates. On further examination it will be noticed that IIB has a large proportion of both young and old persons and, consequently, a small proportion of middle-age persons, while the latter are advanced from the early to the late middle ages. This class will be shown to have the highest death rates. Similarly, IIIA shows a small proportion of both young and old persons and, consequently, a large proportion of middle-age persons, the latter being in the early middle ages.

This, on the face of it—a young adult population—is a definite condition for low death rates. It might also be expected that Class III would have very definite functions in relation to employment, earnings, marriages, etc. Classes II and III could be placed at opposite extremes except for the fact that they would not show a logical progression of ageing. It is not ageing that differentiates these two classes but immigration and also emigration. An abnormally small middle-age population is usually brought about by some type of emigration in which type we may include that caused by the Great War. An abnormally large middle-age population is brought about by immigration. The movement either in or out is at the early middle ages usually termed the "early adult ages," but we prefer the use of the term "middle" to that of "adult" as the latter is both technical and indefinite. Consequently, in the above classification it is not illogical to find the population age type produced by emigration next to that produced by immigration.

Male Types.—We are now ready to show the divisions of Canada falling into each type. This is done for males in Table 1a, Part II, page 62.

The different types bring out some interesting features, geographical and other. Perhaps the most interesting type is the main one, Class III, *i.e.*, the immigrant or mobile type. It will be understood that by "immigrant" is meant not only persons moving in from outside Canada but also from one part of Canada to another. IIIA is the younger middle-age and IIIB the older middle-age type. It is clear that IIIA is found in the Prairie Provinces and British Columbia, in the new parts of the Eastern Provinces and in the counties of the Eastern Provinces which are largely urban or affected by recent activities bringing population to centres. Examples of this type are Halifax in Nova Scotia, Beauharnois and Montreal Island in Quebec and Essex, Welland, Wentworth and York in Ontario. The older middle-age type (IIIB) is very much the same except that its members are found mainly in Manitoba and British Columbia, while those of IIIA are found in Saskatchewan and Alberta. Type IIB is also interesting. A very hasty examination is sufficient to show that it is an emigrant type, *i.e.*, that its peculiar age distribution has been powerfully affected by emigration.

Type IA, found almost entirely in Quebec and such parts of the Prairie Provinces as have had a high birth rate, shows a process that took place after the immigration in the Prairie Provinces. Immediately after the period of heavy immigration these provinces had the characteristic middle-age type. Then, immigrants either married or brought in their wives. The heavy birth rate which ensued changed these counties suddenly from a middle-age to a young population. This sudden change might be expected to have great social consequences, *e.g.*, an economically irresponsible population of single young adult males was suddenly changed to a highly responsible population of young families. The habits of lavish expenditure formed during the irresponsible stage would no doubt make the conditions more severely felt when not only the responsibility suddenly increased but prosperity waned. It is a question whether this phase of the situation has attracted the attention it deserves.

Type IVB (lhh) is the ageing type with a small proportion at the younger ages and, consequently, a large proportion at the middle ages; this latter proportion is at an advanced age and also there is a large proportion at the older ages. This type should be characteristic of a country built up from immigration in the more or less remote past and of one with a low birth rate.

Pure Types.—Attention is drawn once more to the fact that there are only four main classes, occurring in pairs. Those coming closest to representing pure types are:—

IA (hll), the youthful type presupposing a high birth rate;
IIB (hhh), what we believe to be the emigrant type;
IIIA (lll), the recent immigrant and mobile type;
IVB (lhh), the elderly type.

It will be noticed from an examination of the counties representing the various classes that these types are not pure, *i.e.*, that, if they represent what we think they do, some counties are not altogether true to type. This is to be expected, not only because we hardly ever find statistical data conforming to any law to the extent that every member of a series fits exactly into place, but also because the rough and ready method of separating the types (*i.e.*, referring to each member of the series as being above or below the general average) is not quantitative. Some that are shown as above the average may be so close to the average that there is no significant difference between them and others which are equally close, but below average. It is analogous to sifting grain through a coarse sieve. The method, however, has the same advantages as this method of separating grains because we can always re-sift. This will presently be done to remove those too close to the average, but first a re-sifting will be carried out to bring out the definitely pure types as just listed. The method followed in doing this may be illustrated by taking type IA. The 56 counties representing this type were averaged and the "high-low-low's" ascertained. These may be designated by IA_1. These were in turn averaged and their "hll's" were found and designated by IA_{1a}. Thus these, passed through three siftings, should be quite pure. Similarly, the pure type of IIB may be designated as IIB_{4d}, of IIIA as $IIIA_{5e}$ and of IVB as IVB_{8h}. These should show such counties as are pure types and a study of their characteristics should enable us to find the functional characteristics which separate them.

III.—AGE STRUCTURE OF PURE TYPES OF AGE CLASSES ARRIVED AT BY THREE SIFTINGS OF THE INFORMATION CONTAINED IN TABLE Ia, PART II

County or Census Division	P.C. under 25 Years	Standard Age	P.C. 65 Years and over
		years	
Type IA_{1a}—			
Chicoutimi, Que.	63·4	20·2	2·9
Lac-St-Jean, Que.	64·7	20·7	3·2
Type IIB_{4d}—			
Kent, N.B.	58·8	23·3	7·5
Type $IIIA_{5e}$—			
Cochrane, Ont.[1]	44·9	18·5	1·8
Type IVB_{8h}—			
Grenville, Ont.	43·0	24·4	11·6
Huron, Ont.	42·7	24·6	12·1
Victoria, Ont.	44·0	24·1	11·0

[1] There are no really pure types of this class but Cochrane which is of type $IIIA_{5a}$ is the county most nearly approaching the distribution.

Statement IV shows the percentage age distribution of a pure-type county of each class and Chart 4 shows the general shape of each type.

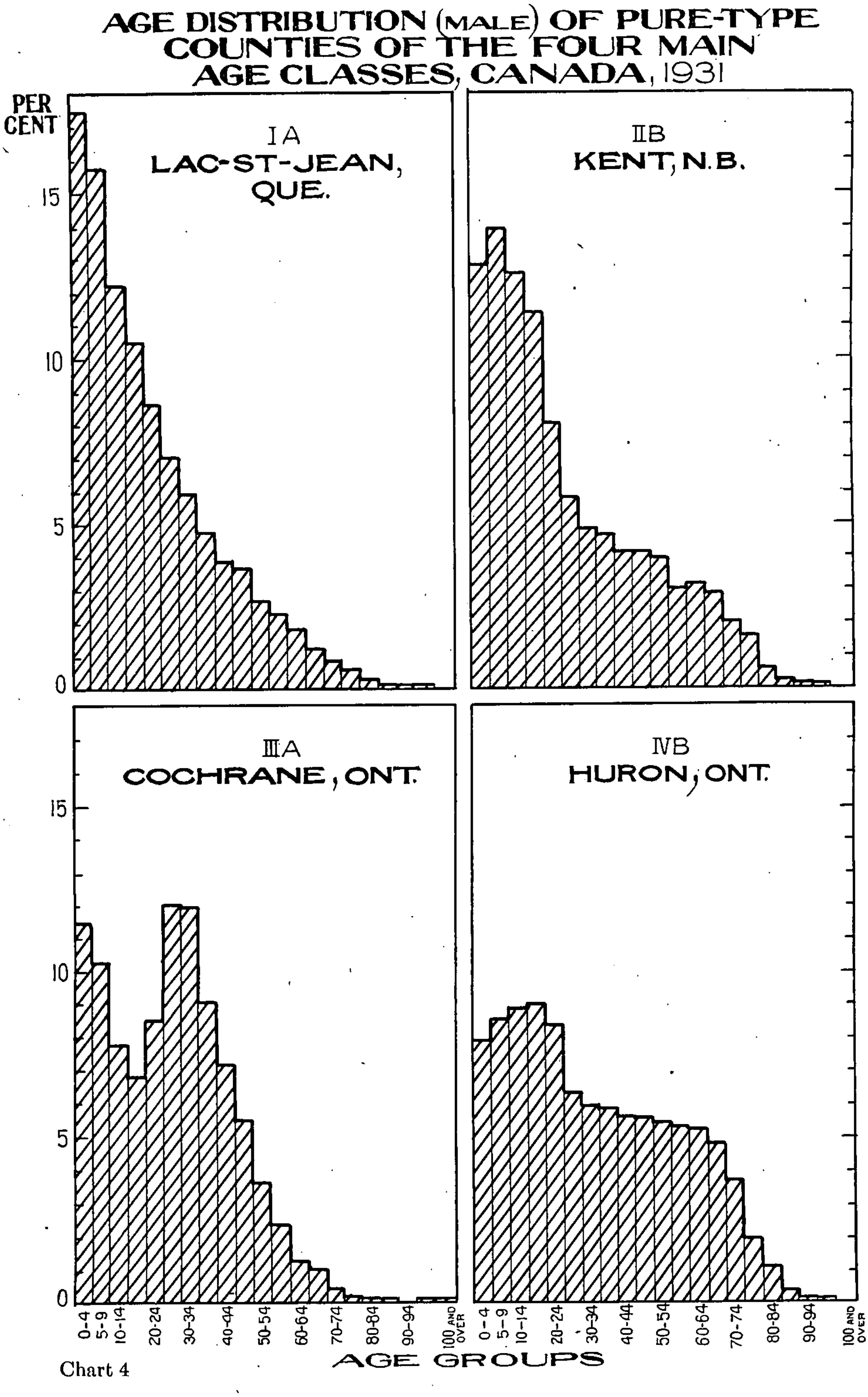

AGE DISTRIBUTION (MALE) OF PURE-TYPE COUNTIES OF THE FOUR MAIN AGE CLASSES, CANADA, 1931
PER CENT
IA
LAC-ST-JEAN, QUE.
IIB
KENT, N.B.
IIIA
COCHRANE, ONT.
IVB
HURON, ONT.
0
5
10
15
0-4
5-9
10-14
20-24
30-34
40-44
50-54
60-64
70-74
80-84
90-94
100 AND OVER
AGE GROUPS

Chart 4

IV.—PERCENTAGE DISTRIBUTION OF MALE POPULATION IN PURE-TYPE COUNTIES OF THE DIFFERENT AGE CLASSES, BY QUINQUENNIAL AGE GROUPS, CANADA, 1931

Age Group	IA Lac-St-Jean, Que.	IIB Kent, N.B.	IIIA Cochrane, Ont.	IVB Huron, Ont.
	p.c.	p.c.	p.c.	p.c.
All ages[1]	100·00	100·00	100·00	100·00
0– 4	17·49	12·83	11·48	7·92
5– 9	15·76	13·92	10·30	8·56
10–14	12·23	12·57	7·77	8·84
15–19	10·52	11·39	6·81	8·99
20–24	8·67	8·09	8·53	8·36
25–29	7·08	5·83	12·06	6·35
30–34	5·95	4·81	11·98	5·93
35–39	4·76	4·66	9·06	5·85
40–44	3·87	4·13	7·22	5·60
45–49	3·67	4·12	5·58	5·55
50–54	2·68	3·93	3·67	5·43
55–59	2·29	3·02	2·40	5·31
60–64	1·82	3·19	1·31	5·23
65–69	1·21	2·85	1·01	4·80
70–74	0·88	2·00	0·48	3·70
75–79	0·63	1·61	0·21	1·98
80–84	0·32	0·64	0·08	1·11
85–89	0·11	0·27	0·02	0·39
90–94	0·03	0·11	–	0·07
95–99	0·01	0·02	0·01	0·02
100 and over	[2]	–	0·01	–

[1] Persons of unstated age are omitted.
[2] Less than one one-hundredth of one per cent.

Another way of sifting is to remove such counties as come within an insignificant distance from the average for Canada in respect to one or other or all of the three phases—percentage under 25 years, standard age and percentage 65 years and over. This can be done by finding the standard error of the mean of each phase and considering any county within three of these standard errors as being within an insignificant distance from the mean. The means, standard deviations, three times the standard error of the means, and field of the true mean of the different phases are as follows:—

Item	P.C. under 25 Years	Standard Age	P.C. 65 Years and over
		years	
Mean	51·4	22·5	6·3
Standard deviation	6·21	1·14	2·44
Three times error of mean	1·25	0·23	0·49
Field of true mean	50·1—52·7	22·3—22·7	5·8—6·8

Going back now over the list* of counties under each type, the indices of each phase of age coming within an insignificant distance of the mean of that phase, *i.e.*, coming within the field of the true mean as shown in the last column above, will be starred. It will be noticed that only one county is exactly average in all three phases, *i.e.*, Halifax, N.S. The starring is useful in that it eliminates those which are not pure types and shows what the different types represent. It is of particular interest to bring out the pure types of IIB (hhh), since this is suspected of being the emigrant type. We shall now list such of IIB as seem to be undoubtedly pure.† There are, in all, 13 counties, as follows:—

V.—PURE-TYPE COUNTIES OF AGE CLASS IIB, SHOWING AGE STRUCTURE, INCREASE IN POPULATION, 1921-1931, BIRTH RATE AND NATURAL INCREASE, CANADA, MALES, 1931

Province	County	P.C. under 25 Years	Standard Age	P.C. 65 Years and over	Male Population			Birth[1] Rate, 1931	Natural Increase, 1931 (calendar year)
					1931	1921	Increase		
			years						
Nova Scotia....	Inverness................	54·2	24·7	9·2	11,235	12,421	−1,186	19·1	71
	Richmond..............	52·9	24·4	10·5	5,875	6,579	− 704	20·9	66
New Brunswick	Kent....................	58·8	23·3	7·5	12,279	12,317	− 38	30·3	256
Quebec.........	Bagot.....................	56·4	23·0	8·0	8,489	9,003	− 514	29·0	141
	Deux-Montagnes.........	53·8	22·9	8·0	7,328	7,333	− 5	25·8	100
	Montcalm................	55·6	22·9	6·9	7,051	7,075	− 24	29·4	125
	Nicolet..................	57·1	23·1	6·9	14,282	14,841	− 559	31·2	249
	Pontiac..................	53·8	23·6	7·3	11,512	10,679	833	23·7	162
	Rouville.................	54·8	23·0	7·9	7,012	6,852	160	25·3	106
	Soulanges................	54·9	23·3	7·6	4,641	5,115	− 474	24·8	53
	Stanstead................	53·8	23·1	7·0	12,619	11,714	905	25·1	227
	Yamaska.................	57·7	22·9	7·8	8,433	9,028	− 595	31·8	180
Ontario.........	Prescott.................	56·1	23·1	7·0	12,618	13,429	− 811	28·5	219
	Total................	....	....	....	123,374	126,386	−3,012	....	....

[1] Birth rate per 1,000 total population.

In the first place it is seen that the male population decreased between 1921 and 1931 in all but three of these counties and that there was an aggregate decrease of 3,012. The high proportion at the young ages indicates a fairly high birth rate. The natural increase shows that the population would have grown considerably if the natural increase had remained. It is evident, then, that these places have been reduced to stationary or decreasing populations by means of emigration. If we take Inverness, N.S. as representative of the type, we have the age distribution in 1931, by stated ages, as shown in Statement VI and Chart 5.

VI.—NUMERICAL AND PERCENTAGE DISTRIBUTION OF MALE POPULATION, BY QUINQUENNIAL AGE GROUPS, INVERNESS, NOVA SCOTIA, 1931

Age Group	Male Population, Inverness, Nova Scotia		Age Group	Male Population, Inverness, Nova Scotia	
	No.	P.C.		No.	P.C.
All ages[1].........................	11,233	100·00	50–54..........................	555	4·94
			55–59..........................	498	4·43
0– 4.........................	1,139	10·14	60–64..........................	428	3·81
5– 9.........................	1,289	11·48	65–69..........................	342	3·04
10–14.........................	1,334	11·88	70–74..........................	297	2·64
15–19.........................	1,326	11·80	75–79..........................	194	1·73
20–24.........................	995	8·86	80–84..........................	124	1·10
25–29.........................	624	5·56	85–89..........................	55	0·49
30–34.........................	473	4·21	90–94..........................	17	0·15
35–39.........................	518	4·61	95–99..........................	4	0·04
40–44.........................	465	4·14	100 and over.....................	1	0·01
45–49.........................	555	4·94			

[1] Persons of unstated age are omitted.

* See Table 1a, Part II, page 62.

† Above the upper limit of the field of the true mean in all three phases.

It would seem that the chart speaks for itself. In the case of Inverness (IIB) there is a manifest shortage of males at ages 25–44, with a strong tendency to shortage at 20–24. This is undoubtedly the result of emigration, not only of males in their early twenties but also emigration that has been in progress for some years. The population of Inverness (both sexes) increased between 1901 and 1911 and has been decreasing since that time. An increase of over 1,000 in 1901-11 was immediately followed by a decrease of nearly 3,000 in 1921-31. If both the increases and decreases (by emigration) were taking place between the ages of twenty and thirty, the result would be exactly as shown in the chart. We are, therefore, justified in regarding Type II as the emigration age type.

AGE DISTRIBUTION (MALE) OF INVERNESS, NOVA SCOTIA (TYPICAL OF CLASS II B), 1931

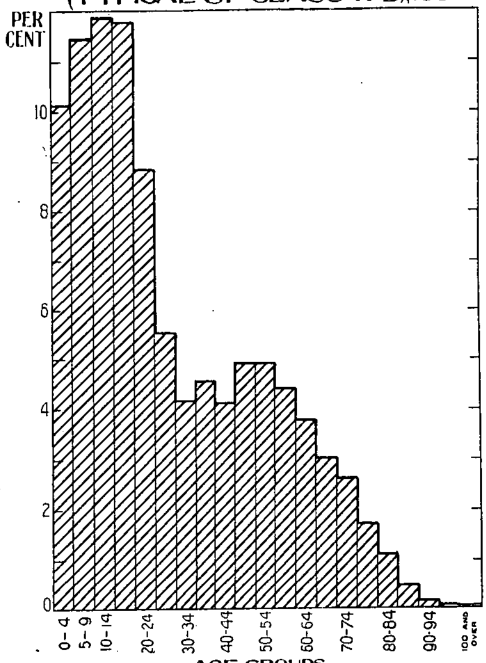


Chart 5

Now that we have practically established that the four main classes of age distribution into which the counties and census divisions have been divided represent (1) primitive or young types, (2) emigration, (3) immigration or mobile and (4) old types, it will be useful to show these types as arranged on a map of Canada. This is done in Map I, the main types only being distinguished.

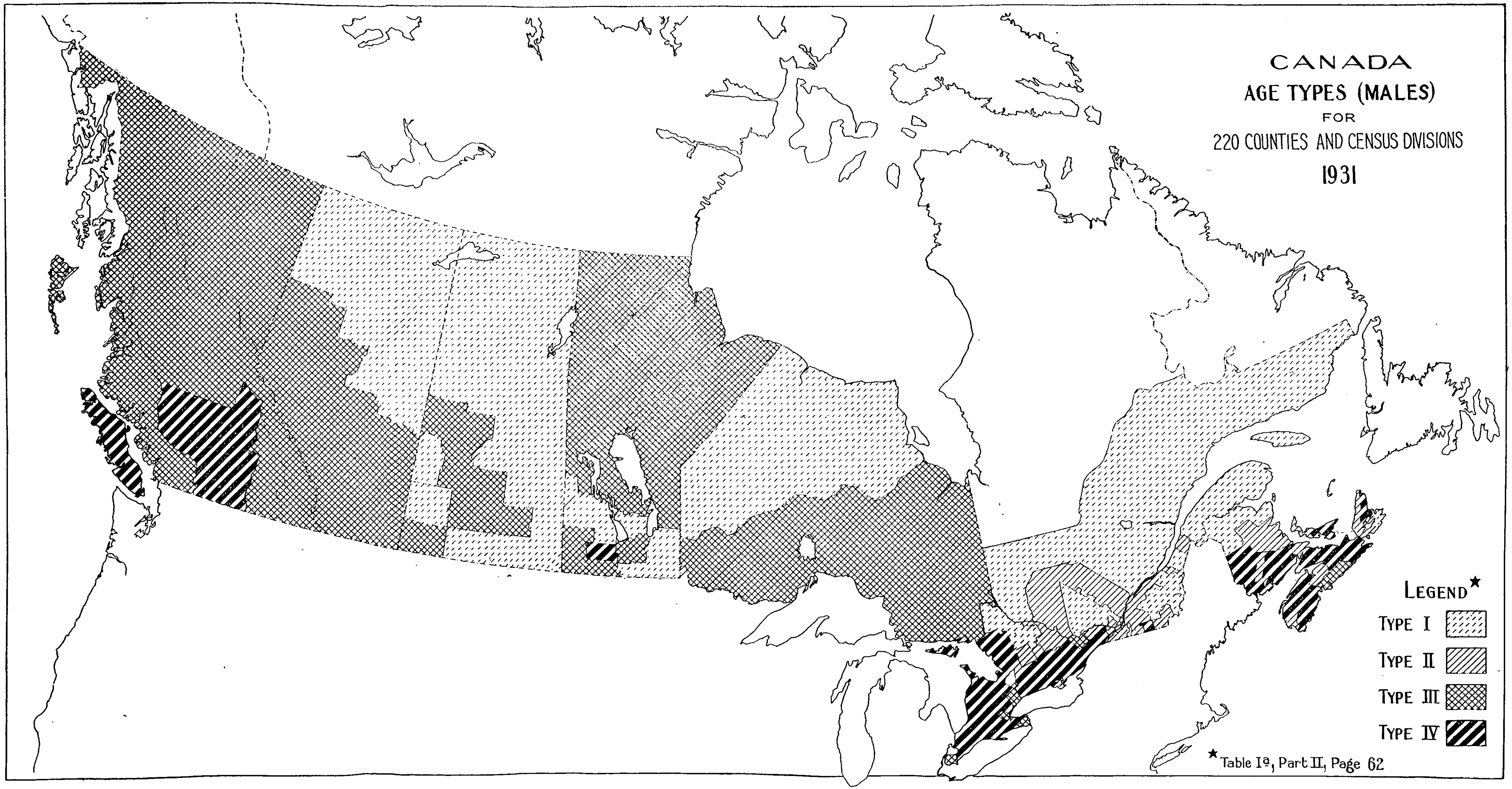
Average Types.—A discussion of age types would be incomplete without including average types. These are the types starred in Table 2a, *i.e.*, they do not depart sufficiently far from the average to be classified definitely under any type. Averages are just as intriguing as startling exceptions. What are the characteristics that make any individual conform to the average of all? To illustrate, we take the one county in Canada, Halifax, N.S., that conforms in all three phases to the average of Canada and show its quinquennial age distribution along with that of Canada in the following statement. Then the two are shown side by side graphically in Chart 6.

VII.—PERCENTAGE DISTRIBUTION OF MALE POPULATION, BY QUINQUENNIAL AGE GROUPS, CANADA AND HALIFAX, NOVA SCOTIA, 1931

Age Group	Canada	Halifax, Nova Scotia	Age Group	Canada	Halifax, Nova Scotia
	p.c.	p.c.		p.c.	p.c.
All ages[1]	100·00	100·00	50–54	4·98	4·78
0– 4	10·11	10·52	55–59	3·71	3·49
5– 9	10·66	10·75	60–64	2·92	3·17
10–14	10·11	10·45	65–69	2·25	2·53
15–19	9·78	9·51	70–74	1·65	1·63
20–24	8·63	8·96	75–79	0·93	1·00
25–29	7·63	7·23	80–84	0·44	0·54
30–34	6·85	6·94	85–89	0·16	0·22
35–39	6·68	7·11	90–94	0·04	0·05
40–44	6·47	6·03	95–99	0·01	0·01
45–49	5·99	5·09	100 and over	-	-

[1] Persons of unstated age are omitted.

Map I


CANADA
AGE TYPES (MALES)
FOR
220 COUNTIES AND CENSUS DIVISIONS
1931
Legend*
Type I
Type II
Type III
Type IV
* Table Iª, Part II, Page 62

There is no doubt that the age distribution of Halifax county is the same as that of the whole of Canada. This county is the only one in Nova Scotia in which the rural parts have never passed a point of maximum density. Further, it is largely urban, having one large city to which the population moving from rural parts of the county are apt to go. Consequently, it does not show the effects of emigration as other counties of Nova Scotia do. Its natural increase, immigration and emigration are, therefore, similar to those of Canada as a whole. There are 87 other counties in Canada which come close to the average in one or other of the three phases. These, as already mentioned, are starred in Table 2a. Most of these, however, differ from the average in one or other of the two remaining phases and cannot be regarded as average types. Only such as come fairly close to the average in all three phases will be shown here as follows:—

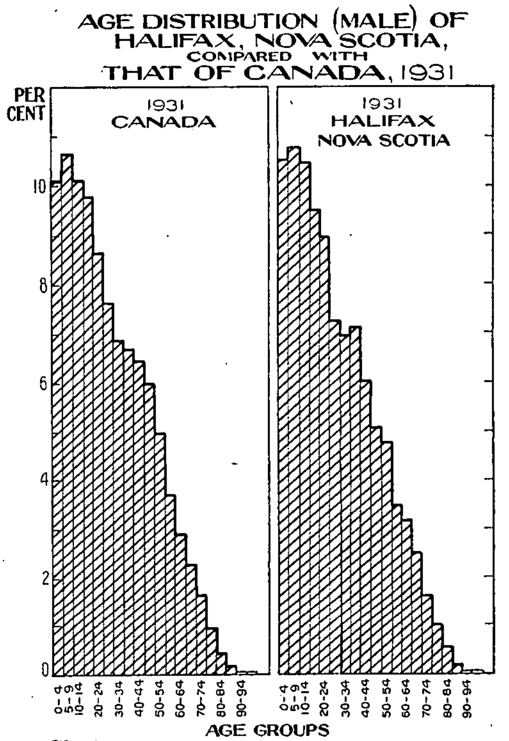


Chart 6

VIII.—AGE STRUCTURE OF COUNTIES OR CENSUS DIVISIONS APPROACHING CLOSELY THE AVERAGE IN EACH OF THE THREE PHASES, CANADA, 1931

County or Census Division	P.C. under 25 Years	Standard Age	P.C. 65 Years and over
		years	
Halifax, N.S.	50·2	22·3	6·0
Sunbury, N.B.	52·5	23·2	6·4
Sherbrooke, Que.	52·6	22·0	5·6
Vaudreuil, Que.	53·5	22·3	6·4
Parry Sound, Ont.	49·9	22·6	6·9
Division No. 3, Man.	50·9	22·4	5·7
Division No. 10, Man.	52·2	23·2	6·2
Division No. 11, Man.	51·0	22·7	5·5

It may or may not be significant that three out of the eight are in Manitoba.

Female Types.—We now come to the distribution of females by age classes in the counties and census divisions of Canada. It was considered desirable to refer the females to the male average rather than to their own. This is open to some objections, for the separation of females into age classes may well be possible only as a comparison of female with female, not female with male. Thus, if Class III is the immigration type for males referred to the male average, it need not be such for females as their age distribution is different. However, there are good reasons for referring all types to the same average. One is that the meaning of the nomenclature remains constant. Again, while female age structure is different from males and also, while it may be true that their ages of greatest mobility are different from those of males, the difference does not lower it a sufficient number of years to interfere seriously with the broad classification used. A female moves only a year or two sooner than the male. The difference in age structure between the immigrant male and female is just about the difference in age between husband and wife, *i.e.*, four or five years. These differences do not throw them out of class when the class is based upon the three phases, percentage under 25 years, standard age and percentage 65 years and over.

The distribution of females is shown by counties and census divisions in Table 1b, Part II, page 65.

The first thing to consider is whether any distortion of type has been caused by referring the females to the male average. It is important to settle this question as it is desirable, if possible, to bring the females and males into direct contrast. If we overlook the fact that some are mixed types, *i.e.*, types where one or other of the three phases is average, we have the following numbers representing each type.

IX.—NUMBER OF COUNTIES AND CENSUS DIVISIONS IN EACH CLASS OF AGE DISTRIBUTION, BY SEX, CANADA, 1931

Age Class	No. (including mixed types) of Counties or Census Divisions		Age Class	No. (including mixed types) of Counties or Census Divisions	
	Males	Females		Males	Females
IA	56	104	IIIA	37	9
IB	11	4	IIIB	12	5
IIA	6	10	IVA	2	4
IIB	33	25	IVB	63	59

It is true that too large a number of females occur in Class IA but it is clear from the fact that the opposite extreme, Class IVB, is almost as large for females as for males that the reason for this over-representation is a genuine difference between the age distribution of the two sexes, not a mere sliding back of the females because they were referred to the averages of the males. The fact that the intermediate classes are very small in the case of the female must mean, therefore, that this is a genuine sex difference.

The young and the old classes are well represented by both sexes but the males have secondary types while the females have not. This is seen by comparing the two sexes by quinquennial age groups. The female distribution is smoother than the male. The females run into fundamental types more than do the males, as discussed in the Appendix. It is the males that come into the country as single adults and simultaneously—the females come gradually. Again, female emigration has been more or less consistent over a long period of years. This would disguise somewhat the emigration age type. It is the occurrence of phenomena over short periods of time with breaks between these periods that causes the intermediate types. There is little doubt that the classification brings out real differences between the sexes. The female age distribution shows better than the male the rate at which the population is ageing. This knowledge should be of importance to calculations along the line indicated in the Appendix.

Aside from considerations of technique and theoretical interest, the facts are interesting. Young types are much more common among the females than the males. Old types are about equally common. Intermediate types are far more common among the males. The females are younger than the males chiefly because of the manner of settlement, immigration and emigration. The wife is younger than the husband and the population is largely constituted by the married, the very young and the old; further, the female unmarried is more apt to emigrate than the male. Referring to the classification in its broad form we see that Class II (the emigration type) is almost as large for females as for males. It is Class III (the immigration class) that is under-represented in the case of females.

X.—NUMBER OF COUNTIES OR CENSUS DIVISIONS, BY BROAD CLASSES OF AGE DISTRIBUTION AND SEX, CANADA, 1931

Age Class	No. of Counties or Census Divisions		Age Class	No. of Counties or Census Divisions	
	Males	Females		Males	Females
I	67	108	III	49	14
II	39	35	IV	65	63

As now arranged, the sex differences would appear to be quite genuine and easily explainable. Obviously, this shows that females have not been thrown into the wrong classes by being referred to the male average. The sliding down thus caused would have had the effect of increasing the intermediate classes, not decreasing them. Least of all was it possible that an interchange between Classes II and III would have been thus brought about. Further, the intermediate class that would have been increased was Class III and it is the only one almost wiped out. It would seem that we may be satisfied with the classification as it stands. If so, the sex difference is very important. There are four main age-types among the males—a young, emigrant, immigrant and old—while among the females there are only three—a young, emigrant and old. The females go in for fundamental types. Their age distribution is smoother than that of the males. They pass through even stages from youth to old age; the males do not. It would seem unnecessary to show this by diagrams as this ground has already been covered in the Appendix.

Changes in Age Types in the Prairie Provinces, 1931-1936.—The justification of referring females to the male average can be extended to referring populations at other dates and in other countries to the average of Canada males in 1931. It is particularly desirable to see what happened in the Prairie Provinces between 1931 and 1936. This was only a five-year period but it was a period of depression. From the fact that the population growth in the Prairie Provinces has been quite cyclical since 1901 and since these cycles correspond closely with economic prosperity and depression, it is reasonable to believe that a period of depression would result in an outward movement from smaller areas like the census divisions even if the movement extended no farther than from one division into another. The change in age structure, if any, during the period should be highly illuminating and we believe that we have a measure in these types that will show changes very effectively indeed. Statement XI will show the change in phases and types in the census divisions of these provinces between the two dates.

XI.—CENSUS DIVISIONS SHOWING AGE STRUCTURE AND CHANGES IN AGE CLASS, MALES, PRAIRIE PROVINCES, 1931-1936

Census Division	1931			1936			Age Type	
	P.C. under 25 Years	Standard Age	P.C. 65 Years and over	P.C. under 25 Years	Standard Age	P.C. 65 Years and over	1931	1936
		years			years			
Manitoba—								
Division No. 1	59·0	21·9	4·6	57·9	22·0	4·7	IA	IA
Division No. 2	58·9	21·4	4·5	57·3	21·5	4·8	IA	IA
Division No. 3	50·9	22·4	5·7	48·1	23·0	6·6	IIIA	IVB
Division No. 4	48·4	22·6	6·1	45·0	23·5	7·7	IIIB	IVB
Division No. 5	53·8	21·9	4·0	51·7	22·8	4·8	IA	IB
Division No. 6	45·0	22·2	4·1	43·3	23·3	5·2	IIIA	IIIB
Division No. 7	45·9	23·0	6·9	43·0	24·0	8·5	IVB	IVB
Division No. 8	48·6	22·8	6·1	45·1	23·3	7·9	IIIB	IVB
Division No. 9	49·9	22·7	4·6	46·9	23·7	5·6	IIIB	IIIB
Division No. 10	52·2	23·2	6·2	49·1	23·3	7·4	IB	IVB
Division No. 11	51·0	23·2	5·5	48·4	23·1	6·4	IIIB	IVB
Division No. 12	57·0	23·3	5·8	53·8	23·4	6·5	IB	IIB
Division No. 13	55·9	22·9	5·5	53·6	22·8	6·2	IB	IB
Division No. 14	55·5	22·2	5·3	53·5	22·6	3·9	IA	IB
Division No. 15	54·0	22·6	4·8	52·3	22·9	5·5	IB	IB
Division No. 16	48·1	20·2	3·2	49·6	21·0	3·5	IIIA	IIIA
Saskatchewan—								
Division No. 1	51·5	22·4	4·6	49·0	23·5	6·3	IA	IVB
Division No. 2	51·5	22·5	3·7	48·6	23·7	4·8	IB	IIIB
Division No. 3	53·6	22·0	3·0	52·6	23·9	3·6	IA	IB
Division No. 4	49·1	21·9	3·4	48·3	23·9	4·2	IIIA	IIIB
Division No. 5	53·5	21·9	5·1	50·9	22·6	6·0	IA	IIIB
Division No. 6	50·3	21·4	3·3	48·2	22·6	4·4	IIIA	IIIB
Division No. 7	50·8	22·3	3·1	48·7	23·8	4·3	IIIA	IIIB
Division No. 8	52·0	21·6	2·6	51·6	23·5	3·6	IA	IB
Division No. 9	57·7	21·7	4·2	55·1	22·1	4·9	IA	IA
Division No. 10	56·2	22·2	3·9	54·2	22·7	4·4	IA	IB
Division No. 11	49·2	21·8	3·1	46·9	23·5	4·3	IIIA	IIIB
Division No. 12	50·5	22·3	3·5	48·8	23·6	4·6	IIIA	IIIB
Division No. 13	52·2	21·8	2·8	51·7	23·6	3·6	IA	IB
Division No. 14	51·6	21·4	3·4	50·8	22·2	4·0	IA	IIIA
Division No. 15	55·7	21·0	3·8	54·3	21·7	4·2	IA	IA
Division No. 16	51·1	21·5	3·4	50·5	22·4	4·2	IIIA	IIIA
Division No. 17	50·5	21·9	3·6	50·0	22·5	4·1	IIIA	IIIB
Division No. 18	56·7	19·8	3·4	52·8	19·9	3·2	IA	IA

XI.—CENSUS DIVISIONS SHOWING AGE STRUCTURE AND CHANGES IN AGE CLASS, MALES, PRAIRIE PROVINCES, 1931-1936—Con.

Census Division	1931			1936			Age Type	
	P.C. under 25 Years	Standard Age	P.C. 65 Years and over	P.C. under 25 Years	Standard Age	P.C. 65 Years and over	1931	1936
		years			years			
Alberta—								
Division No. 1	49·1	22·1	4·0	47·9	22·7	4·8	IIIA	IIIB
Division No. 2	48·3	21·5	3·2	47·4	22·5	4·2	IIIA	IIIB
Division No. 3	48·4	21·5	3·4	47·4	22·4	3·8	IIIA	IIIA
Division No. 4	45·3	21·8	3·7	42·5	22·5	5·0	IIIA	IIIB
Division No. 5	48·0	22·5	3·6	45·7	24·4	4·5	IIIB	IIIB
Division No. 6	43·9	22·0	3·4	42·3	23·3	4·7	IIIA	IIIB
Division No. 7	50·3	22·5	3·9	48·7	23·7	4·7	IIIB	IIIB
Division No. 8	48·8	22·4	5·0	46·5	22·5	5·5	IIIA	IIIB
Division No. 9	45·8	22·0	4·0	45·4	22·8	4·5	IIIA	IIIB
Division No. 10	55·2	21·2	3·8	52·9	21·7	4·4	IA	IA
Division No. 11	47·8	21·9	3·9	45·8	22·7	4·8	IIIA	IIIB
Division No. 12	43·6	21·1	2·9	43·6	22·8	3·7	IIIA	IIIB
Division No. 13	56·1	21·6	3·6	55·9	22·5	3·8	IA	IB
Division No. 14	52·3	21·5	3·5	52·1	22·5	4·2	IA	IB
Division No. 15	49·9	20·6	2·8	49·7	21·9	3·9	IIIA	IIIA
Division No. 16	46·6	21·1	3·3	45·8	22·3	4·3	IIIA	IIIA
Division No. 17	52·7	21·0	3·9	52·9	21·1	3·9	IA	IA

In the first place it will be noticed that 33 out of the 51 divisions changed type in the five years. The question is in what direction they changed type. This may be seen in the following statement.

XII.—SCATTER DIAGRAM SHOWING FREQUENCY DISTRIBUTION OF THE CENSUS DIVISIONS OF THE PRAIRIE PROVINCES ACCORDING TO AGE TYPE, 1931 AND 1936, WITH THE NUMBER CHANGED IN THE FIVE-YEAR PERIOD

Age Type, 1931	Age Type, 1936								No. Changed	No. Unchanged	Total
	IA	IB	IIA	IIB	IIIA	IIIB	IVA	IVB			
IA	7	8			1	1		1	11	7	18
IB		2		1		1		1	3	2	5
IIA											
IIB											
IIIA					5	15		1	16	5	21
IIIB						3		3	3	3	6
IVA											
IVB								1		1	1
Total	7	10		1	6	20		7	33	18	51

This summary presents many interesting points. We see that many of the changes were to a higher category of the same type. However, the most noted changes were that, while 18 were in the youngest class in 1931, there were only 7 in it in 1936; while there was only 1 in the oldest class in 1931, there were 7 in it in 1936. The immigration class (III) contained practically the same number in both years but there was a definite shift from the younger to the older sub-class. There were no representatives in the emigration class (II) in 1931 and 1 in 1936, *viz.*, Division No. 12, Man. This one came in the young sub-class. On the whole, the direction of the changes shows that the method of classification is very good. The population became definitely older in 1936 but, if we regard each sub-class as a type, the two extreme types had 19 in 1931 and had only 14 in 1936, *i.e.*, the intermediate types gained. It would seem that in ageing they pass through the intermediate types.

That the ageing itself was definite enough may be seen as follows:—

Age Class	No. of Divisions 1931	1936
I	23	17
II	–	1
III	27	26
IV	1	7

It will be seen from the counties starred in Table 2a that the changes took place particularly among those near the average in one phase or other in 1931. While this tends to minimize the importance of the changes, it shows clearly the behaviour of the process of ageing. We have, in 1936, one more county which has almost the same age distribution as Canada males in 1931, *viz.*, Division No. 5, Sask. It will contribute to scientific interest in the subject if we can show that when the ages of this division are taken by quinquennial groups and charted, the general shape is the same as Canada in 1931.

XIII.—PERCENTAGE DISTRIBUTION OF MALE POPULATION, BY QUINQUENNIAL AGE GROUPS, CANADA, 1931 AND DIVISION No. 5, SASKATCHEWAN, 1936

Age Group	Canada, 1931	Division No. 5, Saskatchewan, 1936	Age Group	Canada, 1931	Division No. 5, Saskatchewan, 1936
	p.c.	p.c.		p.c.	p.c.
All ages[1]	100·00	100·00	50–54	4·98	4·82
0– 4	10·11	9·42	55–59	3·71	3·79
5– 9	10·66	10·35	60–64	2·92	3·07
10–14	10·11	11·08	65–69	2·25	2·22
15–19	9·78	10·84	70–74	1·65	1·76
20–24	8·63	9·24	75–79	0·93	1·22
25–29	7·63	7·69	80–84	0·44	0·50
30–34	6·85	6·31	85–89	0·16	0·22
35–39	6·68	5·96	90–94	0·04	0·07
40–44	6·47	5·89	95–99	0·01	–
45–49	5·99	5·57	100 and over	–	–

[1] Persons of unstated age are omitted.

AGE DISTRIBUTION (MALE) OF DIVISION NO. 5, SASKATCHEWAN, 1936, COMPARED WITH THAT OF CANADA, 1931

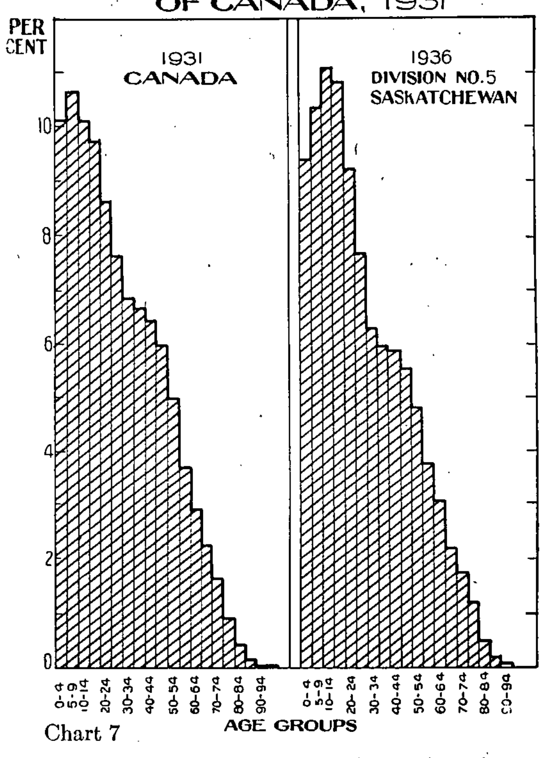


Chart 7

It would seem that the expectation that Division No. 5, Sask. would, in 1936, conform in general shape to the average of Canada in 1931 is fully justified. This confirmation that the three phases taken to describe age types actually picture the general age distribution is particularly strong because it is taken from a different and later census. We may take it as established, then, that the indices and types devised are doing what they were intended to do.

Summary.—This chapter has classified the areas of Canada into age types and the map of Canada marking these types shows the age structure of Canada as related to geographical areas. The young, emigrant, immigrant and old age types and where they are situated are closely connected with the history and manner of settlement of these areas. It must once more be mentioned that by "immigrant" and "emigrant" we do not mean merely those coming into Canada or leaving Canada—we mean "migrants," who may come from or leave for some other province of Canada or even for some other division of the same province. It is noticeable that the "immigrant" types are found in the new parts and in counties with large cities. The young types are found mainly in Quebec and in such of the new parts as have had large birth rates following a period of heavy immigration. It is seen that considerable changes took place in these new parts even in the short period of five years (1931-36) and that they are rapidly approaching (in age structure) the Canadian average. The old types are found mainly in the Maritimes, Ontario and Quebec, *i.e.*, the older settled parts. The emigrant types are found, or seem to be found, in areas that have had stationary or decreasing populations. The behaviour of these age types in relation to certain functions of the population will be shown in the next chapter.

CHAPTER III

CLASSIFICATION OF AREAS BY FUNCTIONAL ASPECTS OF AGE DISTRIBUTION

In Chapter II was given a classification of age types with their geographical distribution. The functions of these types were not stressed, although roughly indicated. In this chapter an attempt will be made to classify age distribution according to the functional aspects of age. While the types discussed in the last chapter will come into this classification they are not regarded as important as the threefold index on which these types were based. This threefold index was successful only to the extent of picking out four main types or eight sub-classes. It will now be shown that it is capable of affecting a much finer classification when related to functions. In fact, the age distribution as described by these three indices serves to some extent the same purpose as standardizing in the case of death rates, etc., where all the ages have to be considered.

The three functions on which emphasis will be laid are (1) the indigeneity of the population, (2) the age of settlement and (3) the death rates of residents, meaning, of course, the crude death rates.

Functional Aspects in Relation to Age Class Determined by Threefold Index.—If, first, we take the types as described in the previous chapter, ignoring for the present the indices on which they are based, we have the three scatter diagrams shown in Statements XIV, XV and XVI as follows:—

XIV.—SCATTER DIAGRAM SHOWING FREQUENCY DISTRIBUTION OF 220[1] COUNTIES AND CENSUS DIVISIONS OF CANADA ACCORDING TO PERCENTAGE BORN IN PROVINCE OF RESIDENCE IN RELATION TO AGE CLASS, CANADA, MALES, 1931

P.C. Born in Province of Residence	No. of Counties in Age Class				
	I	II	III	IV	Total
90 and over	32	31		20	83
81-89	6	8	1	28	43
72-80	6		2	12	20
63-71	3		3	1	7
54-62	6		7		13
45-53	7		8	1	16
36-44	7		13	1	21
27-35			13	2	15
Under 27			2		2
Total	67	39	49	65	220
Approximate mean p.c. born in province of residence	77·3	92·9	44·9	83·2	74·6

[1] Omitting Yukon and Northwest Territories.

XV.—SCATTER DIAGRAM SHOWING FREQUENCY DISTRIBUTION OF 209[1] COUNTIES AND CENSUS DIVISIONS OF CANADA ACCORDING TO AGE OF SETTLEMENT IN RELATION TO AGE CLASS, CANADA, MALES, 1931

Age of Settlement	No. of Counties in Age Class				
	I	II	III	IV	Total
10–14			2		2
15–19	10		17		27
20–24	11		8		19
25–29	6		7	1	14
30–34	5		2	2	9
35–39	8	1	4	1	14
40–44	15	6	1	8	30
45–49	9	15	1	27	52
50–54	2	15		23	40
55–59		2			2
Total	66	39	42	62	209
Approximate mean age of settlement	33·1	48·4	23·3	47·2	38·2

[1] Omitting Yukon and Northwest Territories, the ten divisions of British Columbia and District of Patricia, Ont.

XVI.—SCATTER DIAGRAM SHOWING FREQUENCY DISTRIBUTION OF 209[1] COUNTIES AND CENSUS DIVISIONS OF CANADA ACCORDING TO DEATH RATE IN RELATION TO AGE CLASS, CANADA, MALES, 1931

Death Rate	No. of Counties in Age Class				
	I	II	III	IV	Total
5	2		4		6
6	6	1	7		14
7	4		7	1	12
8	7	1	10	3	21
9	4	6	4	2	16
10	12	2	6	9	29
11	12	7	1	13	33
12	12	10	3	17	42
13	3	4		12	19
14	2	4		4	10
15		2		1	3
16	2	2			4
Total	66	39	42	62	209
Approximate mean death rate	10·0	11·7	8·0	11·5	10·3

[1] Omitting Yukon and Northwest Territories, the ten divisions of British Columbia and District of Patricia, Ont.

The percentage born in the province of residence in 1931 and distributed between counties and census divisions was taken as the measure of indigenous or static as compared with migrant or mobile populations. Naturally this is not a perfect measure, especially since persons born in the province in which the county was situated and moving into that county would be migrants as well as those moving in from other provinces or outside of Canada; similarly for those moving out. However, it is the best measure we have. It is obvious from Statement XIV that the four main types reflect very definite differences. Class II (the emigrant type) represents the highest percentage indigenous, followed by Class I (the young) and then by IV (the old). This is a natural order. On the average, Class III shows considerably less than half (44·9 p.c.) of the population indigenous, while there are only 13 counties out of 49 in this class that had more than half born in the province of residence. This class, then, is definitely an immigrant class. The thirteen exceptions are not real exceptions but rather represent either mixed types or counties with large cities whose migrant population would move largely from persons born in the province. This can be seen from Table 2a, Part II, page 69.

The age of settlement was obtained by weighting the number of years from 1931 at each census back to 1871, or if not to 1871 as far back as possible, by the populations at these censuses and thus striking an average. It might be expected that the oldest average age of settlement would be shown by Class IV (the old type) but here again Class II (the emigrant type) comes first. The reasons for this are that Class II contains the old populations as well as Class IV, except that Class II contains large elements both old and young and a small element of middle-age population. The fact that it is the emigrant age types that are found in the oldest settlements is very important indeed. The average age of settlement is increased to the extent that a population is stationary or decreasing; it is decreased by the fact that a population is increasing. This is obvious. However, this does not alter the fact that it is the oldest settlements that show emigrant age types. The order of correlation of age type with age of settlement is Class II, IV, I and III—a very natural order.

The death rates refer to deaths of residents in so far as this was possible. Here again Class II is well above the others, the order being Class II, I, IV and III. The emigrant type shows the highest death rates and the immigrant types the lowest, while the young type shows higher death rates than the old. Of course, it is in the young types that infantile mortality is heaviest. However, it is the differentiation between Classes II and III that seems the most important. The immigrant type contains the mobile type which the area has gained; the emigrant type has lost this mobile type. It is hardly necessary to show a statement giving death rates at different ages; it is well known that the middle ages have, on the whole, the lowest death rates. This can easily be verified by consulting life tables and, in the case of Canada, several interesting points relevant to death rates in the middle ages are given in the press matter accompanying *Canadian Life Tables, 1931.** Coming back to the subject of this chapter, it seems very important that the shape of the age structure as indicated by the age class should show up such features as death potentialities.

Correlation of Functional Aspects with Threefold Index.—It will now be shown that a much finer gradation than that of the four main age classes or types can be made in relation to these three functions. The threefold index—percentage under 25 years, standard age and percentage 65 years and over—will be shown to be a classification in itself.

Table 2a, Part II, page 69, shows the counties and census divisions of Canada with their age indices, age type, percentage born in province of residence, average age of settlement and death rates both in absolute figures and in relation to age structure. Table 2b shows the same detail for females. The order of the divisions in Table 2a is the order in which the percentage born in the province occurs in relation to, or in so far as it is dependent upon, age structure, Hants, N.S., being at the top and Division No. 9, B.C., at the bottom. This needs some explanation and will be gone into presently. The indigenous versus the mobile population seemed the most important order as this seems to be the most important characteristic of age structure.

The manner in which age structure was related to the different functions is explained as follows:—

The threefold index already described was correlated (for example) with the percentage born in the province, by considering each element in the index as an independent variable and the percentage born in the province as a dependent variable, the equation being $X_1 = a + bX_2 + cX_3 + dX_4$ where X_1 = percentage born in the province, X_2 = percentage under 25 years, X_3 = standard age and X_4 = percentage 65 years and over. The statement below shows the various moments and correlations obtained not only in this case but also where the age indices were correlated with age of settlement and death rates.

* 1931 Census Monograph No. 13.

XVII.—CORRELATION OF INDICES OF AGE PHASES WITH (1) PERCENTAGE BORN IN PROVINCE OF RESIDENCE, (2) AGE OF SETTLEMENT AND (3) DEATH RATES, CANADA, MALES, 1931

Factor Denoted by X_1	Equation	Arithmetic Mean	Standard Deviation	Coefficient of Correlation	Standard Error of Fit
P.C. born in province of residence	$X_1 = 48 \cdot 2 + 2 \cdot 55X_2 - 7 \cdot 30X_3 + 9 \cdot 64X_4$	75·6	22·64	·90	9·96
Age of settlement (years)	$X_1 = 13 \cdot 8 + 0 \cdot 89X_2 - 2 \cdot 64X_3 + 5 \cdot 80X_4$	38·0	12·36	·88	5·97
Deaths per 1,000 population	$X_1 = 18 \cdot 0 + 0 \cdot 19X_2 - 1 \cdot 08X_3 + 1 \cdot 10X_4$	10·8	2·50	·68	1·84

Percentage Born in Province of Residence.—The equation found by fitting the age indices to percentage born in the province was $X_1 = 48 \cdot 2 + 2 \cdot 55X_2 - 7 \cdot 30X_3 + 9 \cdot 64X_4$; the coefficient of multiple correlation was $R = \cdot 90$, a very significant correlation considering that 220 divisions were correlated.

Examining this equation it is seen that both the young and old ages vary directly and the standard age inversely as the percentage born in the province. This is in accordance with what we have already shown in the first part of the chapter, but contains additional information. The larger the old and young population, the smaller the middle or the immigrant population. But, also, it is important in its bearing upon indigenous and non-indigenous population whether this middle population be young or old. It is rather remarkable that the older the middle population (as indicated by "standard age") the smaller the percentage born in the province, other things being equal. Of course, other things are *not* equal. If the standard age varied as widely as the two percentages, then we should have in all cases the smallest indigenous population associated with an old middle-age type, but the standard age does not so vary. Its standard deviation (in the 220 counties or census divisions) is only 1·14 while that of the percentage under 25 is 6·21 and of the percentage 65 and over is 2·44. If we consider three standard deviations on each side of the mean as practically the outside limits of probable variation, it is just as likely that the percentage under 25 will be 18·63 above or below its mean and the percentage 65 and over will be 7·32 above or below its mean as that the standard age will be 3·42 above or below its mean. Supplying the weights shown in the equation, we have:—

		P.C. Born in Province
P.C. under 25	2·55 × 18·63 =	47·51
Standard age	−7·30 × 3·42 =	−24·97
P.C. 65 and over	9·64 × 7·32 =	70·56
		93·10

If we suppose all three are in any actual case at their limit above the mean, the negative weight of the standard age would have the effect of lowering the percentage born in the province only to the extent of one-fifth of the amount the other two would raise it above the mean. The means of the age indices are 51·4—22·5—6·3 while that of the percentage born in the province is 75·6. This shows how absurd it would be to expect that all three indices would be their full limit above the mean at the same time, as in that case 168·7 p.c. would be province born. However, if there were two counties where the percentages under 25 and 65 and over were the same but the standard age of the one greater than that of the other, *i.e.*, the middle group older than in the other, the latter would be expected to have a smaller percentage province born. Since the correlation is so high as to render this expectation very probable, the point is very intriguing. Why should an older middle-age group presuppose a smaller indigenous population? A plausible explanation can be given for this. The middle ages are very intimately connected with migration. Since the extreme variation of the standard age is only about 3½ years and the mean standard age is 22·5, *i.e.*, (added to 22·5) 45 years of age, the great part of this middle portion would be between 42 and 49 years of age. Furthermore, if 24 be set as the age of maximum migration, then those 42–49 in 1931 would be migrants from 1906 to 1913 and it is well known that this was the period of heaviest migration. Consequently, the higher standard age shows a larger element of migrants, the size of the middle age being the same. It would not be so if the standard age was capable of varying to the extent of going past the fifties or sixties.

Considering this, it is remarkable that the emigrant type (Class II) should show the largest proportion indigenous, since a defect at the ages of migration would raise the standard age. An explanation of this will be rendered easier by taking the classic case of Inverness, N.S., which has already been discussed and charted (see Chart 5, page 34). Here the indices are 54·2—24·7—9·2 with a percentage born in the province of 96·5 as compared with the average for all counties of 51·4—22·5—6·3 and the percentage born in the province, 75·6. The differences between the two sets of indices are 2·8—2·2—2·9 and between the percentages born in the province, 20·9. The difference of the percentages born in the province as calculated by the weights in the equation is 19·1 so that the fit is very close and Inverness is true to type. The standard age is high because of the shortage of young people in the middle ages. There are in all only 26·6 p.c. in the middle ages as compared with 42·3 p.c. in the average of all counties.

It is clear that the reason Inverness is so highly indigenous is because there is such a small middle age and this in spite of its advanced standard age. The average middle-age proportion of all Class II types is 37·4 p.c. as compared with 42·3 p.c. for all counties. In spite of the high standard age of this class the indigenous population is large because the middle age actually is smaller than in the other types.

The higher standard ages of this class, then, serve to prevent the full connection of the emigration type with indigenous population from becoming manifest. This should have been remedied by subdividing the class into IIA and IIB but there were only 6 of the IIA's*; in other words, all of the class had high standard ages. However, all this makes it clear that the younger the middle age the more indigenous element is found in it, providing the numbers at the middle ages remain the same. It all seems to hark back to the fact that the period of heavy emigration was at the beginning of the century and that the migrants would by 1931 be part of the average standard age.

Age of Settlement.—The manner of calculating the age of settlement has already been explained. The equation correlating this with the age indices has the same form as the previous one, *viz.*, $X_1 = a + bX_2 + cX_3 + dX_4$, where X_1 = age of settlement and the other variables the age indices as before. The fitted equation was $X_1 = 13{\cdot}8 + 0{\cdot}89X_2 - 2{\cdot}64\,X_3 + 5{\cdot}80\,X_4$. The correlation coefficient was $R = {\cdot}88$, again so high that we need have no hesitation in commenting upon the relationship.

It is again noticeable that the two indices measuring the proportions of the population have positive weights while the standard age has a negative weight. Again, it is obvious that the middle-age population is associated with migrations. The negative weight of the standard age is more difficult to explain than before. Taking the limit of possible variation as before, we would find the three indices causing variations for the means as follows:—

		Age of Settlement
P.C. under 25	0·89 × 18·63 =	16·58
Standard age	−2·64 × 3·42 =	−9·03
P.C. 65 and over	5·80 × 7·32 =	42·46
		50·01

The percentage 65 and over naturally is even more effective in relation to the other two in this equation than in the case of the previous one. The explanation of the negative weight of the standard age must be the same as before, *viz.*, the heavy period of emigration occurring at the beginning of the century.

Death Rates.—The equation correlating death rates with the age indices was in the same form and fitted as follows: X_1 (death rate) $= 18{\cdot}0 + 0{\cdot}19X_2 - 1{\cdot}08X_3 + 1{\cdot}10X_4$. The correlation was $R = {\cdot}68$.

We have, thus, the same phenomena as before. The effective weights are:—

		Deaths per 1,000 Population
P.C. under 25	0·19 × 18·63 =	3·54
Standard age	−1·08 × 3·42 =	−3·69
P.C. 65 and over	1·10 × 7·32 =	8·05
		7·90

* See Statement II, Chapter II.

The standard age is much more effective than in the case of the other two correlations. The higher the standard age and the larger the middle group the smaller the death rates. This seems to confirm the explanation of the behaviour of the standard age as being connected with the actual period at which the heavy emigration took place. No other explanation is reasonable. We may suggest another explanation, only to dismiss it, *viz.*, that an older middle age goes with a lower death rate because in the case of higher death rates the age has been worn down by death, *i.e.*, the middle group is older *because* the death rate is lower, not the converse. If this were so, surely the same would be true of the older group—those 65 years and over.

Inter-relation of Correlations.—It is remarkable that in the case of all three correlations with age index—percentage born in the province, age of settlement and death rate—a simple correlation with standard age has a positive sign. It is only the partial correlation that has the negative sign. This means that, for example, if we correlate standard age with death rate and ignore the other age indices, the higher the standard age the higher the death rate, but when the other two indices are kept constant, the higher the standard age the lower the death rate. The reason for this is that in actual cases a high standard age is associated with old age and as such with high death rate, but in the rare case that a high standard age is not so associated, the death rate, *ipso facto*, is low when the standard age is high. In counties with equally large middle-age populations, the older this middle-age population is, the lower the death rate. Such counties are found in the parts of Canada settled at the beginning of the century.

The connection of the standard age with death, then, is the result of an accident of association. The higher standard ages are associated with older migrant populations, other things being equal. We can come very near to proving this. For the purpose a multiple correlation was taken between (1) death rate, (2) age index, (3) percentage born in the province of residence. To obtain a single age index for this a new one had to be devised, *viz.*, the percentage born in the province as calculated from the three age indices. This is really an age index, not a percentage-born-in-the-province index. When the death rate was correlated with the two, the correlation was $R = \cdot 78$ but the age index had very little weight while the percentage born in the province had practically all the weight. That is, the only reason why the death rate correlated with the age index was because of the association of both with the percentage born in the province. This means that the migrant populations are correlating with low death rates *per se*, not because of their age distribution. In other words, the migrant populations are the condition of the age distribution and also the condition of low death rates; therefore, a certain age distribution is associated with low death rates. This is the only logical explanation that can be given of the fact that a high standard age indicates a low death rate and it seems to be confirmed by findings which are entered into in detail in *Canadian Life Tables, 1931.**

This, of course, does not alter the importance of the correlation between the age index and death rates. It merely gives it meaning. It was obvious at the outset that age distribution was the effect of certain causes. The peculiar age distribution of Canada is caused by migration—immigration and emigration. The part that is normal or fundamental in the age structure is caused by births and deaths. At present, however, the migrant cause is uppermost. A migrant population means a moving or mobile population. They are migrants because they have moved. We have two classes of age types in counties; the one caused by moving out, *i.e.*, the result of the *loss* of a moving population (Class II); the other, by moving in, *i.e.*, the result of the *gain* of a moving population (Class III). These two classes show opposite extremes of death rates. The normally ageing population (independent of migration) behaves as might be expected towards death rates. A large population at very young or very old ages means high death rates; a large population at intermediate ages means low death rates. These extremes, however, would be under 5 and over 50. A large population from 8 to 15 would be more important for a low death rate than one from 25 to 33. There would be no question that a large proportion of these extremes would correlate with larger death rates but this would be telling us only what we know without testing. The age indices actually used are those which test a migrant versus a static population. A condition which gains or loses for Canada population at the most mobile period of life has an important bearing upon its death rate. Since up to this time any part of Canada which shows a stationary or decreasing population shows this because of emigration, it is significant if these parts show higher death rates than the others. Already it has been shown that Class II (the emigrant class) counties show stationary or decreasing populations and that this class also

* 1931 Census Monograph No. 13.

shows the highest death rates. They are in the oldest settled districts because the age of settlement was measured by the size of the population at each past census and a decreasing population would thereby show an older population; they contain the highest percentage province-born because people were moving out, not in. In a given area the two, immigration and emigration, do not usually go together. They have the highest death rate because they have lost their mobile population. All this lends tremendous significance to the correlation between the age indices and these functions. The age structure is here regarded as not necessarily the cause of certain functions but the barometer of symptom, and it would seem to be a very sensitive barometer. We could multiply the functions with which it correlates but this is left for others or later studies. It could safely be predicted, however, that the threefold index as it stands is sensitive mainly to such symptoms as have to do with static and mobile populations, the sensitiveness to such things as death rates being merely a secondary product dependent on static or mobile conditions.

Unusual Types Brought Out by Correlations.—It is always of interest in studying correlations to know what members of the series do not conform to type and why. In this case we shall take the correlation between the age indices and the percentage born in the province. This is regarded as the most significant correlation not only because it shows the highest coefficient but also because we believe it is the fundamental correlation, the other two correlating with age largely because of their association with this attribute. As a measure of non-conformity we take it that areas which are more than three times the standard error of fit* are out of the field of this correlation. There is only one area in this category. We can also take such areas as are almost out of the field (two to three times the standard error of fit).

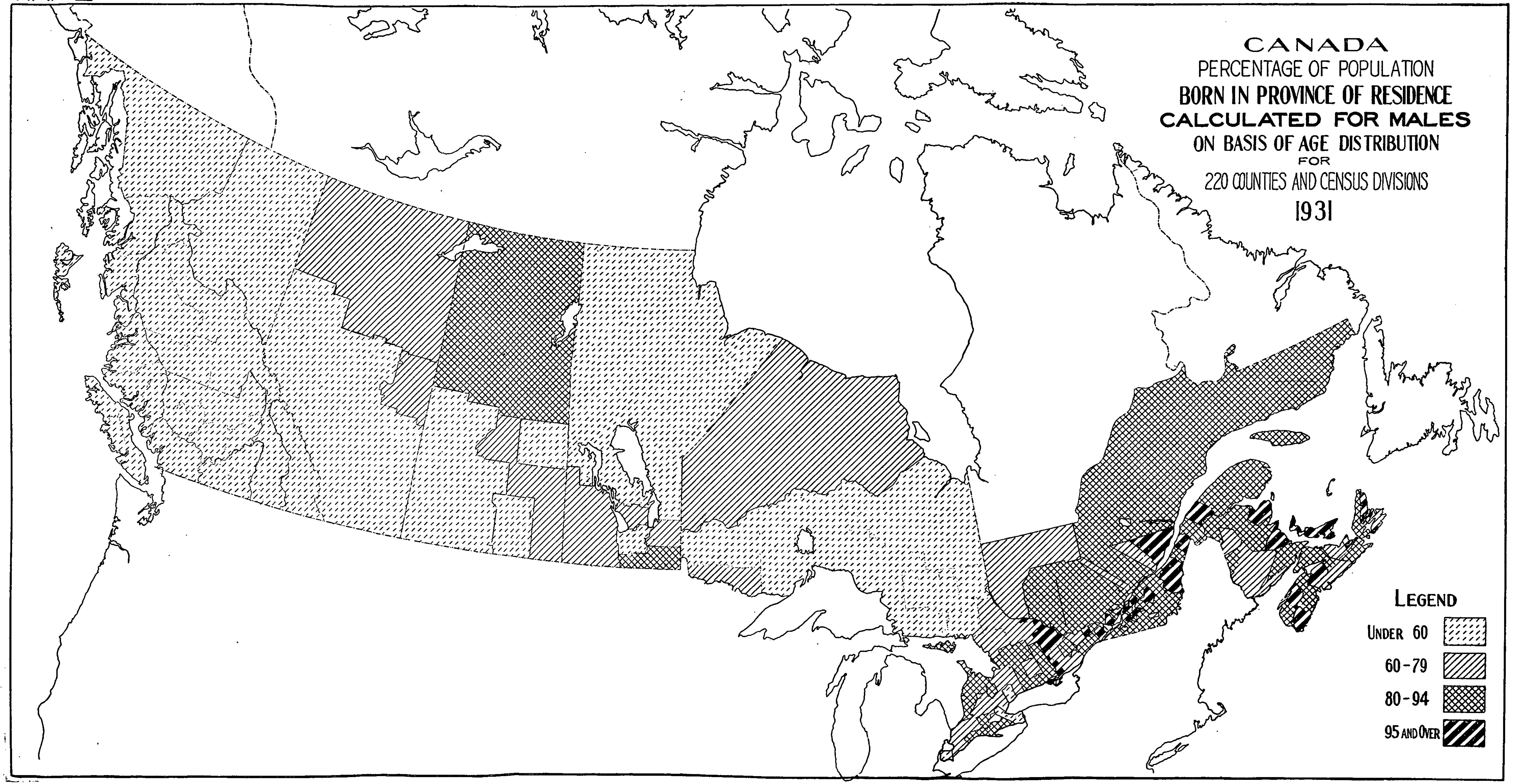
XVIII.—COUNTIES WITH VARIATION BETWEEN ACTUAL AND EXPECTED PERCENTAGE BORN IN PROVINCE OF RESIDENCE (A) THREE TIMES STANDARD ERROR OF FIT, (B) TWICE STANDARD ERROR OF FIT, SHOWING THREEFOLD AGE INDEX AND AGE TYPE, 1931

County or Census Division	P.C. Born in Province of Residence	Threefold Age Index	Type	P.C. Born in Province of Residence (calculated on basis of correlation with age index)
(a) Three times standard error of fit or 30 p.c. (out of field)—				
Hants, N.S.	94·2	52·2 — 19·5 — 8·9	IIA	124·7
(b) Twice standard error of fit (20-30 p.c.)—				
Addington, Ont.	93·5	46·6 — 23·7 — 12·6	IVB	115·3
Montreal Island, Que.	74·9	48·2 — 21·0 — 3·7	IIIA	53·4
Division No. 14, Man.	58·1	55·5 — 22·2 — 5·3	IA	78·6
Division No. 15, Man.	46·6	54·0 — 22·6 — 4·8	IB	67·0
Division No. 5, Sask.	53·7	53·5 — 21·9 — 5·1	IA	73·8
Division No. 9, Sask.	54·7	57·7 — 21·7 — 4·2	IA	77·3
Division No. 15, Sask.	51·7	55·7 — 21·0 — 3·8	IA	73·4
Division No. 10, Alta.	48·0	55·2 — 21·2 — 3·8	IA	70·6
Division No. 9, B.C.	35·5	33·0 — 22·8 — 4·5	IIIB	9·3

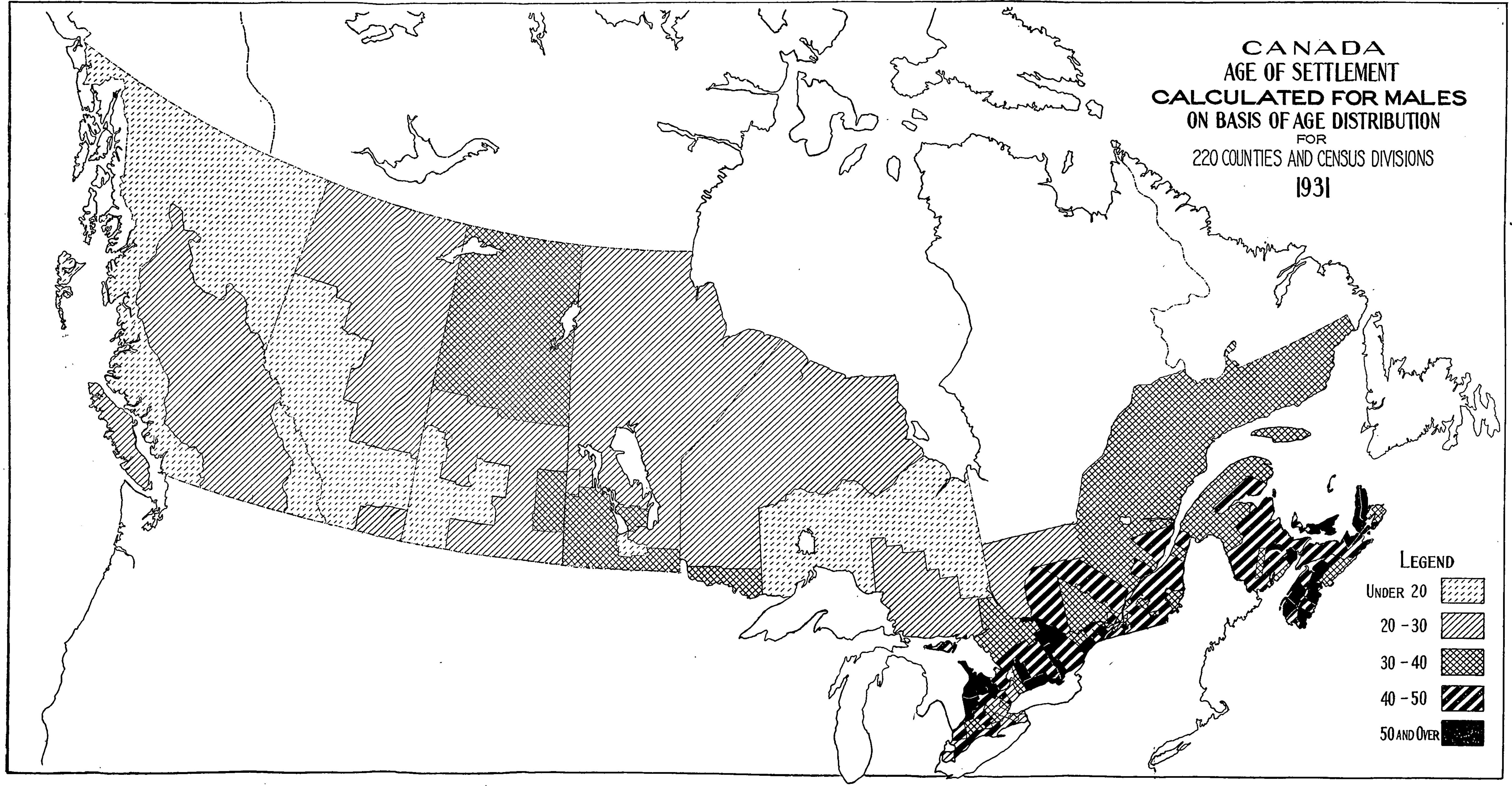
In the case of three of these, Hants, N.S., Addington, Ont. and Division No. 9, B.C., the explanation is obvious; they are merely cases of non-linearity, *i.e.*, so extreme that no prediction is possible for them. Such occur in practically all calculations and there is nothing more that can be said about them. Hants has a most peculiar age distribution, the standard age being remarkably low. Its age distribution is so remarkable that it seems worth while charting (see Chart 8). In the case of the three Saskatchewan divisions the situation is different. They have a large youthful population despite the fact that they are immigrant areas. Such areas have already been commented on, *viz.*, those where the immigrant population, coming in as single adult males, married and a huge birth rate followed; also, where they came accompanied by children. As evidence of this it may be mentioned that in Division No. 9, Sask., only 9·5 p.c. of the male population had both parents Canadian-born; in Division No. 5 only 18·8 p.c. and in Division No. 15 only 21·9 p.c. as compared with 23·3 p.c. in the province as a whole. Again, in the province as a whole, 20·5 p.c. of the males under 25 were born outside the province. This age group being so high in the three divisions mentioned is what causes the high prediction for

* Standard error of fit $= \sigma \sqrt{1 - R^2}$.

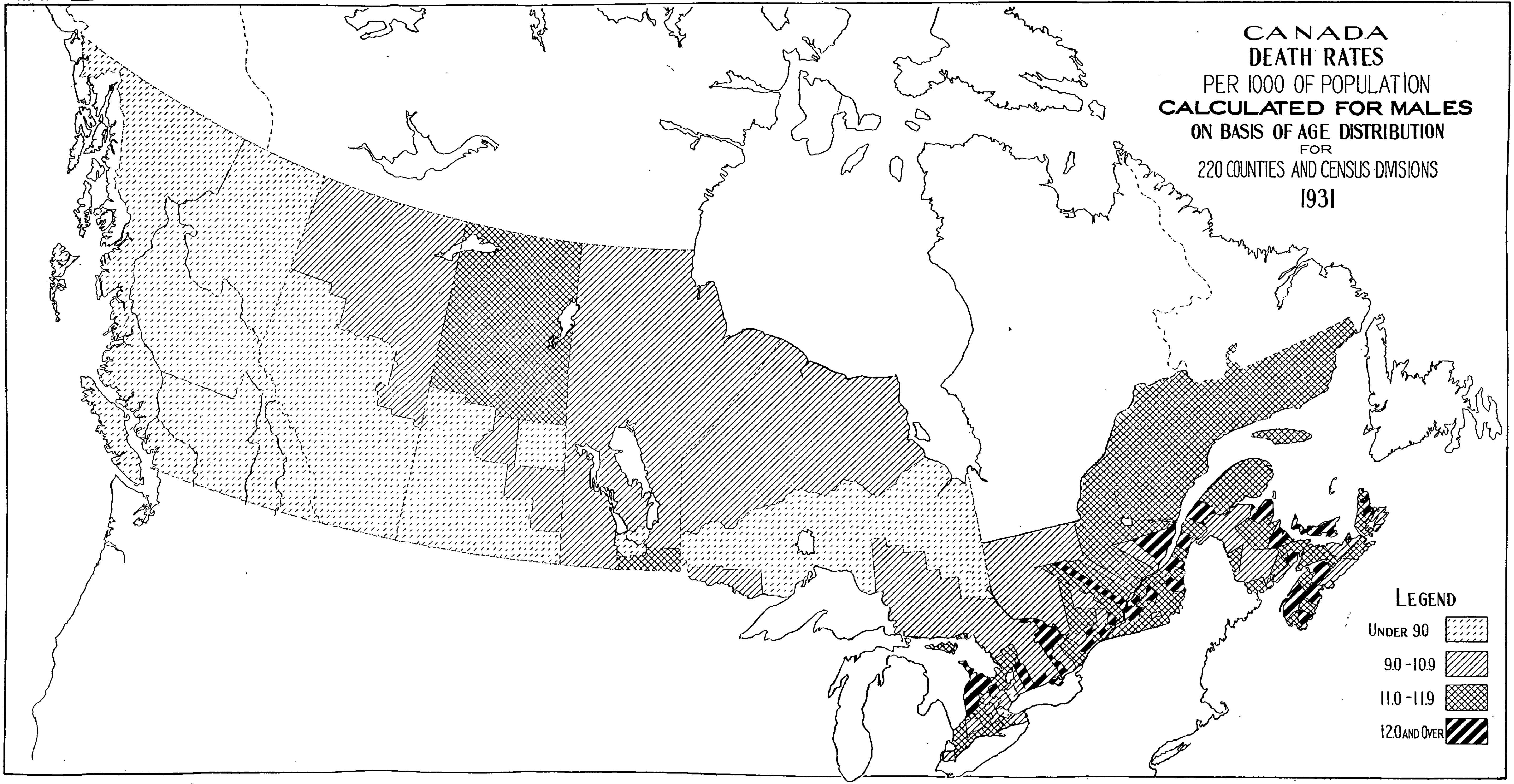
Map II


CANADA
PERCENTAGE OF POPULATION
BORN IN PROVINCE OF RESIDENCE
CALCULATED FOR MALES
ON BASIS OF AGE DISTRIBUTION
FOR
220 COUNTIES AND CENSUS DIVISIONS
1931
LEGEND
UNDER 60
60-79
80-94
95 AND OVER

Map III


CANADA
AGE OF SETTLEMENT
CALCULATED FOR MALES
ON BASIS OF AGE DISTRIBUTION
FOR
220 COUNTIES AND CENSUS DIVISIONS
1931
Legend
Under 20
20 - 30
30 - 40
40 - 50
50 and Over

Map IV


CANADA
DEATH RATES
PER 1000 OF POPULATION
CALCULATED FOR MALES
ON BASIS OF AGE DISTRIBUTION
FOR
220 COUNTIES AND CENSUS DIVISIONS
1931
LEGEND
UNDER 9.0
9.0 - 10.9
11.0 - 11.9
12.0 AND OVER

percentage born in the province. The correlation is based upon the natural tendency for the younger group to be born in the province. As seen in the last chapter the divisions with a large population under 25 and small populations at the middle and older ages are placed in Class IA. Most of the divisions of the Prairie Provinces belong to Class III, *i.e.*, with a large proportion at the middle ages. Now, every census division of Saskatchewan belonging to Class IA was overestimated for percentage born in the province calculated on the basis of the correlation. There is no doubt that this was due to the fact that those at the younger ages in these census divisions contained a considerable proportion of migrants while in Canada as a whole they did not; furthermore, this is evidence that the immigrants of these divisions had arrived recently. This is a further explanation of the manner in which the standard age correlates negatively with percentage born in the province.

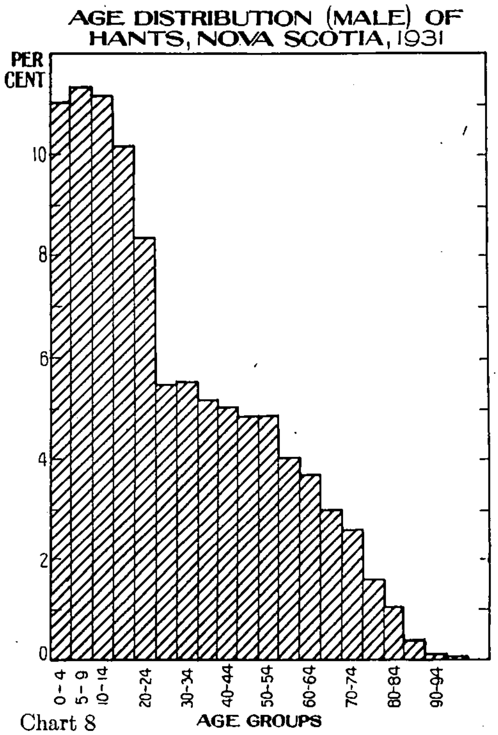


Chart 8

Conclusion.—Now that the significance of these correlations has been indicated, a classification of the areas of Canada (counties and census divisions) in 1931 is shown in Maps II, III and IV. As already mentioned, the percentage born in the province, the average age of settlement and the resident death rates, as calculated on the basis of the correlation between these and the threefold index of age, are really age indices, *e.g.*, a percentage born in the province as calculated from the equation $X_1 = 48 \cdot 2 + 2 \cdot 55X_2 - 7 \cdot 30X_3 + 9 \cdot 64X_4$, where X_1 = percentage born in the province, X_2 = percentage under 25, X_3 = standard age and X_4 = percentage 65 and over, is obviously an age classification, not a percentage-born-in-the-province classification. The province born so derived follow the order of the age structure because they are calculated on the basis of this structure. The calculated figures are of the same dimensions as the actual percentage born in the province and come very close to them merely because the correlation is so high, but none the less they are age calculations. If a person works three days at about five dollars a day he gets about fifteen dollars. This fifteen dollars is really a time figure although it has the form and dimensions of a money figure. It correlates perfectly with the days worked but not with the amount of money actually received since one condition is "about" five dollars a day. Similarly, our classification correlates perfectly with the age structure but only ·90 with the percentage born in the province. Consequently, it progresses with the age structure—is, in fact, an age structure—but the percentage born in the province not only gives this structure a meaning but also enables us to arrange the areas quantitatively according to a *single* index. We could not do so according to a threefold index.

CHAPTER IV

CLASSIFICATION OF URBAN LOCALITIES BY PECULIARITIES IN AGE STRUCTURE

There is no doubt that peculiarities in the age type of any locality are associated with some event or events in the history of that locality. It may be heavy emigration or immigration at certain dates; it may be the influence of this migration upon the birth rate of subsequent dates; it may be a rise or fall in the birth rate for some other reason; but there is no doubt that such irregularities or peculiarities are significant. The reason we do not mention death rates is because it is not probable that changes in death rate in any locality were ever sufficient to cause changes in the age structure. Irregularities are more likely to occur in urban localities than in rural. On the whole, rural localities in Canada have gone through a process of steady drainage and this has occurred at certain ages so that the effect on their age distribution has been to give them a sort of rural age type more or less regular—except, of course, such rural localities in the newer parts of Canada as have received instead of lost migrants. The populations of urban localities in Canada are likely to be of age types similar to rural parts receiving migrants—more irregular because the growth of any urban centre is more or less spasmodic. Unfortunately we are not able to measure the amount of immigration to an urban centre since all we know from the census of the number of migrants in any locality is derived from two sources of information: (1) the number of immigrants in that locality; (2) the number of persons born in some other province of Canada than that in which the locality is situated. We do not know the number of persons in a certain urban locality who were born in the province in which it is situated but were not born in the locality itself, and this number probably constitutes the greater part of the adults and some of the children of some of these localities.

Types of Irregularities.—Accordingly, an attempt was made to classify the irregularities in age structure of cities with populations of 5,000 or more. In the first place, the irregularities may be divided into two main types: (1) an irregularity affecting the whole age structure—what may be termed a regular irregularity—and (2) localized irregularities, affecting a specific portion of the age structure. Thus the normal age distribution is a maximum number in the first age group with a diminishing number at each successive quinquennium. If instead of the maximum occurring in the first age group it occurs in the second (5–9 years of age), then we have the type peculiar to Canada as a whole in 1931. Probably the reason for this type was not necessarily a genuine decline in the birth rate in 1926-31 but a decline from what was probably an abnormally high birth rate in 1921-26. This is mentioned because it is probable that too much importance has been attached to this defect in the number at 0–4. It is also probable that the numbers at 5–9 are overstated and those at 0–4 are understated. However, it will appear in Table 3, Part II, page 76, that there are only some places that conform to this type. Maxima are occurring at other points as well. The relative number of cities of 5,000 or more with maximum at different points are given in Statement XIX as follows:—

XIX.—FREQUENCY DISTRIBUTION OF CITIES OF 5,000 POPULATION AND OVER ACCORDING TO AGE GROUP CONTAINING THE MODE, FOR (A) TOTAL POPULATION, (B) MALE POPULATION AND (C) FEMALE POPULATION, 1931

Age Group Containing the Mode	Distribution of Cities		
	Total Population	Male Population	Female Population
0- 4	11	12	10
5- 9	30	30	18
10-14	5	15	5
15-19	26	14	34
20-24	9	4	16
25-29	1	3	-
30-34	-	-	-
35-39	-	-	-
40-44	1	1	-
45-49	-	4	-
Total	83	83[1]	83

[1] Male population of Grand'Mère, Que., at age groups 5-9 and 10-14 the same; entered in group 5-9.

It is seen that while the 5–9 maximum—the type of Canada as a whole—is the most common, it is not much more common than the 15–19 maximum. If we look at it from the point of view of the date of birth and remember that the 5–9's are those born in 1921-26, a period of high birth rates, and that the 15–19's are those born in 1911-16, we can see that in all probability the causes of the two maxima are quite different. The 5–9's are probably largely due to a decline in birth rate in 1926-31 (as compared with 1921-26) but the 15–19's are probably due to migration. In the case of females especially, this and the following age group are the ones in which they move in greatest numbers into cities. We find that this age group (20–24) is also largely represented among the females. One of the most striking characteristics of these irregularities is the difference between those for males and those for females. We find the males distributed over more age groups and the modal representation in age groups different from that of the females. The modal representation for males is at 5–9; for females at 15–19. Thus these differences in age types portray real differences in the manner of movement as between the two sexes. There is another point which is suggestive. Were we to look at the age distribution only from the point of view of both sexes combined we would be apt to conclude that the modal maximum for the cities and the type for Canada as a whole (age 5–9) was due entirely to decline in birth rate. This conclusion breaks down, however, on observing that the mode is at 15–19 in the case of females and that the 5–9's are only slightly more represented than the 20–24's. Consequently, we have to look for some explanation in addition to declining birth rate for the typical age structure of Canada as a whole in 1931 (*viz.*, a maximum at 5–9).

Secondary Peaks.—Before drawing any conclusion, let us examine the irregularities more thoroughly. When we say, for example, that the age group 5–9 is the largest quinquennial group of the population we mean that it is larger than any other single quinquennial group, not that there is a steady progression from this age on of diminishing groups. The truth is that there are, or may be, several modal groups in the age range of which the 5–9 is the chief. We cannot ignore minor peaks in the age structure. Thus if the modal age group was 20–24 but at the same time there was a minor peak at 5–9, then this would indicate a tendency for the 5–9's to strive for the position of modal group. Accordingly, we give below Statement XX similar to Statement XIX except that we include the minor peaks as well as the modal group.

XX.—FREQUENCY DISTRIBUTION OF CITIES OF 5,000 POPULATION AND OVER ACCORDING TO AGE GROUPS CONTAINING THE MODE AND SECONDARY PEAKS, FOR (A) TOTAL POPULATION, (B) MALE POPULATION AND (C) FEMALE POPULATION, 1931

Age Group Containing Mode or Peak	Distribution of Cities		
	Total Population	Male Population	Female Population
0– 4	12	15	11
5– 9	41	37	31
10–14	5	18	5
15–19	40	28	48
20–24	20	10	26
25–29	8	20	6
30–34	5	16	9
35–39	38	27	34
40–44	25	26	16
45–49	21	19	6
50–54	-	-	1
55–59	-	-	-
60–64	-	-	1
Total[1]	215	216	194

[1] Including duplicates since one city might have two or more peaks.

It is seen from Statement XX that the observations on female as compared with male cityward movements are emphasized still more when the secondary peaks are included; however, it is also seen that the secondary peaks bring the female more in line with the male and the average for Canada than was manifested when the modal group alone was shown. At the same time, the comparison of the group 5–9 in the case of both sexes as compared with the same group when the sexes are shown separately convinces us that the fall in the birth rate between 1926 and 1931 was not sufficient to explain why 5–9 was the modal age for Canada as a whole—in other words, while 5–9 was the *largest* group for Canada as a whole it was not the *typical* group and we would expect a typical group if the cause was such a single or simple one as decreasing birth rate. It certainly was not the typical group for cities. The groups 15–19 and 35–39 in the case of males and 15–19, 20–24 and 35–39 in the case of females had claims just as strong as the 5–9 group. About 60 p.c. of the males and over 70 p.c. of the females were concentrated in modes between 15–19 and 40–44. Movement was clearly more important than birth rate in determining age distribution. We gather from this that fine conclusions on vital statistics from age distribution are, to say the least, dangerous.

Single-Mode Cities.—Now it would seem reasonable to expect that such cities as show a simple age type, *i.e.* a single modal group undisturbed by minor modes, should have had a less disturbed history than the remaining cities, no matter at what age this single mode occurred. We may classify these cities as pure types.

XXI.—CITIES OF 5,000 POPULATION AND OVER HAVING A SINGLE MODAL AGE GROUP, BY AGE GROUP AT WHICH THIS MODE OCCURS, FOR (A) MALE POPULATION, (B) FEMALE POPULATION, 1931

Age Group Containing the Mode	Single-Mode Cities
(A) MALE POPULATION	
0– 4	Cap-de-la-Madeleine, Chicoutimi, Joliette, Quebec, Thetford Mines
5– 9	Grand'Mère, Rivière-du-Loup
10–14	Lévis
15–19	St-Hyacinthe
(B) FEMALE POPULATION	
0– 4	Chicoutimi, Shawinigan Falls, Thetford Mines
5– 9	Cap-de-la-Madeleine, Grand'Mère, Hull
10–14	Lachine, Sault Ste. Marie, Welland
15–19	Galt, Ottawa, Weyburn
20–24	Outremont, Westmount

Statement XXII shows the combined population for each of the groups of Statement XXI, by quinquennial age groups.

XXII.—POPULATION OF SINGLE-MODE CITIES OF 5,000 POPULATION AND OVER ARRANGED IN CLASSES ACCORDING TO THE AGE GROUP CONTAINING THE MODE, BY QUINQUENNIAL AGE GROUPS, FOR (A) MALE POPULATION, (B) FEMALE POPULATION, 1931

Age Group	Modal Quinquennial Group								
	Male Population				Female Population				
	0–4	5–9	10–14	15–19	0–4	5–9	10–14	15–19	20–24
All ages	82,085	7,206	5,769	6,087	18,908	22,379	25,781	77,258	30,283
0– 4	10,997	862	659	598	2,999	2,971	2,613	5,889	1,248
5– 9	10,503	1,021	788	624	2,742	3,203	2,836	6,475	1,708
10–14	8,830	1,013	882	627	2,273	2,821	2,899	6,632	2,080
15–19	8,147	759	596	856	2,086	2,491	2,846	7,874	3,091
20–24	7,564	588	476	553	1,855	1,940	2,430	7,623	4,171
25–29	6,620	427	397	474	1,567	1,579	1,978	6,508	3,050
30–34	5,594	401	369	363	1,266	1,519	1,875	6,103	2,587
35–39	5,049	409	307	306	996	1,371	1,758	5,889	2,448
40–44	4,365	362	247	311	752	1,148	1,696	5,139	2,234
45–49	3,644	340	247	296	650	932	1,323	4,575	2,048
50–54	3,125	286	215	272	520	696	1,075	3,884	1,632
55–59	2,364	239	177	195	390	534	772	3,059	1,244
60–64	1,792	176	114	167	332	399	617	2,496	1,008
65–69	1,388	110	95	154	219	305	451	1,997	713
70–74	1,062	116	95	120	130	250	332	1,514	473
75–79	609	59	61	87	76	135	162	915	316
80–84	297	23	35	66	34	54	82	441	151
85–89	107	11	5	14	18	23	26	177	66
90–94	24	2	3	3	2	8	8	51	14
95–99	4	2	1	1	1	–	2	16	1
100 and over	–	–	–	–	–	–	–	1	–

Sample for Analysis.—It is obviously impossible to examine separately every one of the 83 cities of 5,000 or more population with a view to ascertaining the reasons for their particular type of age irregularity. If, however, we take several cities and find an explanation for each one, it would seem sufficient. By taking the largest cities, we can procure more reliable results because of the weight of large numbers. Consequently, we select for special examination the following:—

Toronto,	maximum	population	at 20–24,	peak	at	5– 9 and 35–39;
Winnipeg,	"	"	" 15–19,	"	"	35–49;
Ottawa,	"	"	" 15–19,	"	"	5– 9, small peak at 35–44;
Hamilton,	"	"	" 5– 9,	"	"	15–19;
Quebec,	"	"	" 0– 4,	"	"	15–24;
Windsor,	"	"	" 5– 9,	"	"	25–39;
Halifax,	"	"	" 20–24,	"	"	5– 9;
Victoria,	"	"	" 15–19,	"	"	30–59.

Method of Analysis.—The only way to examine these is to compare their age distribution census by census, beginning with the last one, to see how and when these peaks came about.

If we take the cities in order and submit them severally to the same kind of treatment, we may be able to ascertain how they have arrived at their peculiar type of age distribution. The method of examination is to take the population of 1911, 1921 and 1931 (no good purpose is served by going back further) by quinquennial age groups. From expectations based upon the *Canadian Life Tables, 1931*, the numbers at each of these censuses expected to survive (at the appropriate age) until the next census are calculated.* The excess over the expected survivors in, say, 1921 from the population of 1911 is, in the actual population of 1921, approximately the number coming in from points outside the city during the decade, less, of course, the number moving out in the decade. No doubt some allowance should be made for mis-statement of age, but this cannot be done and further, it will be seen, the movements occur at ages where mis-statements are usually not prevalent, especially such mis-statements as are not ironed out by the use of the quinquennial group (instead of single years). Chart 9 shows for each city the actual population, 1921 and 1931 as compared with the expected, the differences giving a picture of the volume of the in-movement and of its affect upon the age structure. Also, in Statement XXIV the second differences of the age groups of each city are summed for: (1) population in 1911; (2) survivors of this population (at appropriate ages) in 1921; (3) population in 1921; (4) survivors of these in 1931; (5) population in 1931. It is desired to show by this means the comparative effects of death and of in-movement upon the smoothness of the age structure. The difference in the smoothness of the population of 1911 and its survivors in 1921 is caused by death and ageing; the difference between the survivors for 1911 and 1921 and the actual population of 1921 is caused by in- and out-movements. The second difference† is used because it is rather a good criterion of smoothness. If the age distribution were perfectly linear there would be no second difference. Although it is not expected to be linear, the arithmetic sum of the second difference as a percentage of the total population examined should furnish a basis of comparison that will enable us to see whether the effect of the various processes is to make the age structure more or less smooth.

* Although the survival expectations change as time goes on, it was considered that the one life table would be sufficient since the changes in survival rates would only mean small numbers which would not materially affect the general picture it is desired to show here.
† See Statement XXIV.

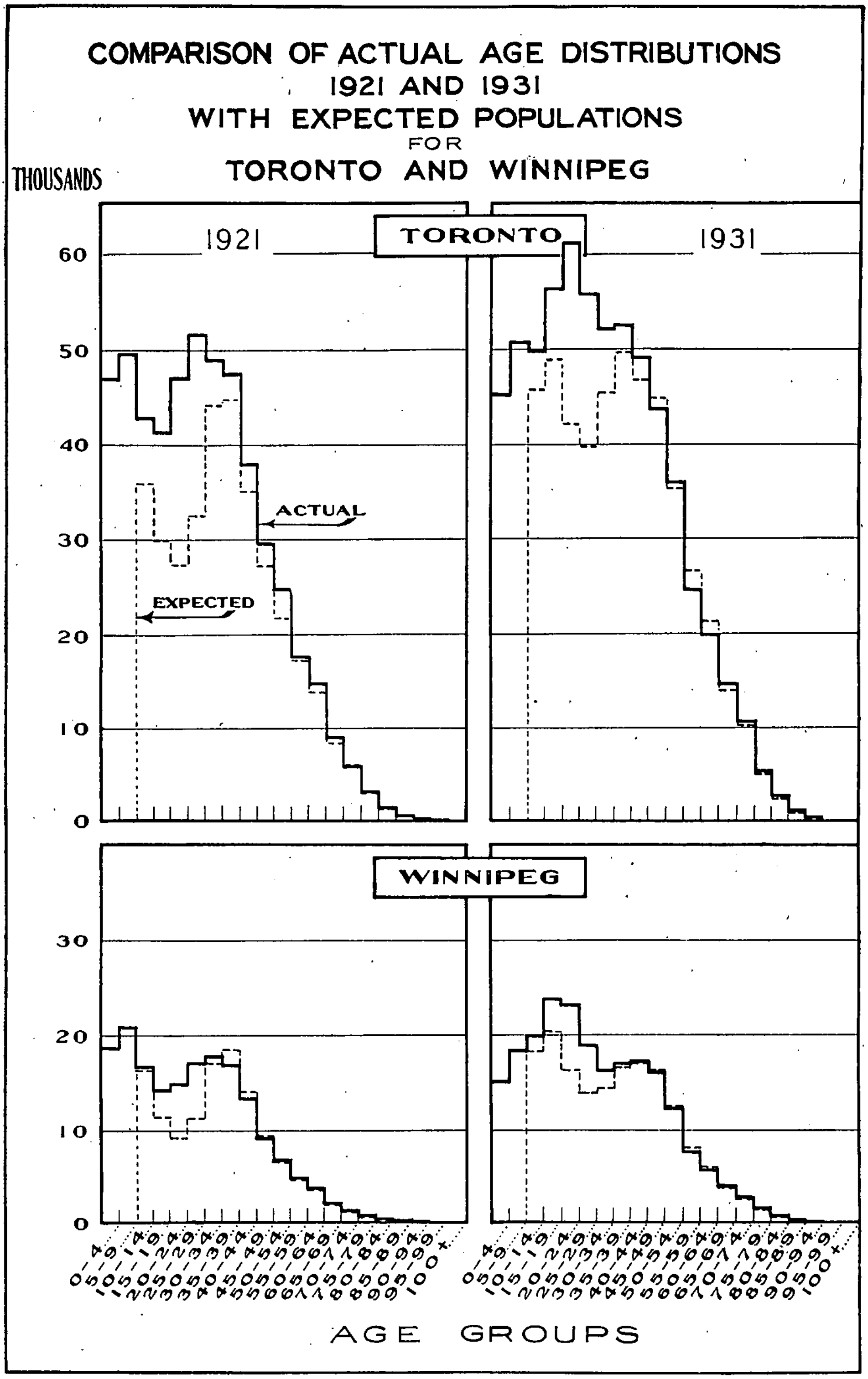

COMPARISON OF ACTUAL AGE DISTRIBUTIONS
1921 AND 1931
WITH EXPECTED POPULATIONS
FOR
TORONTO AND WINNIPEG
THOUSANDS
TORONTO
1921
1931
ACTUAL
EXPECTED
WINNIPEG
0
10
20
30
40
50
60
AGE GROUPS

Chart 9

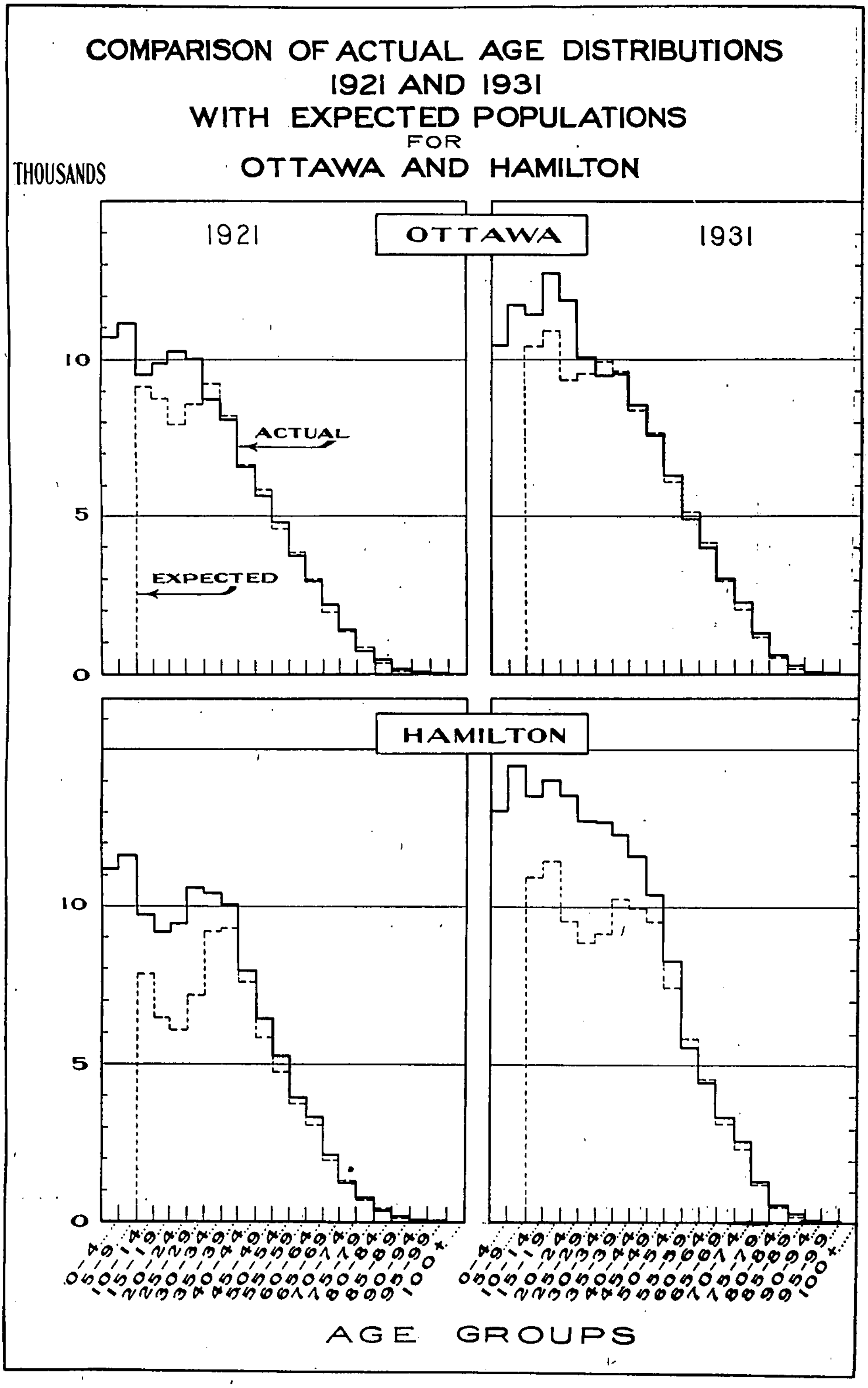

COMPARISON OF ACTUAL AGE DISTRIBUTIONS
1921 AND 1931
WITH EXPECTED POPULATIONS
FOR
OTTAWA AND HAMILTON
THOUSANDS
1921
OTTAWA
1931
ACTUAL
EXPECTED
HAMILTON
10
5
0
AGE GROUPS

Chart 9—Con.

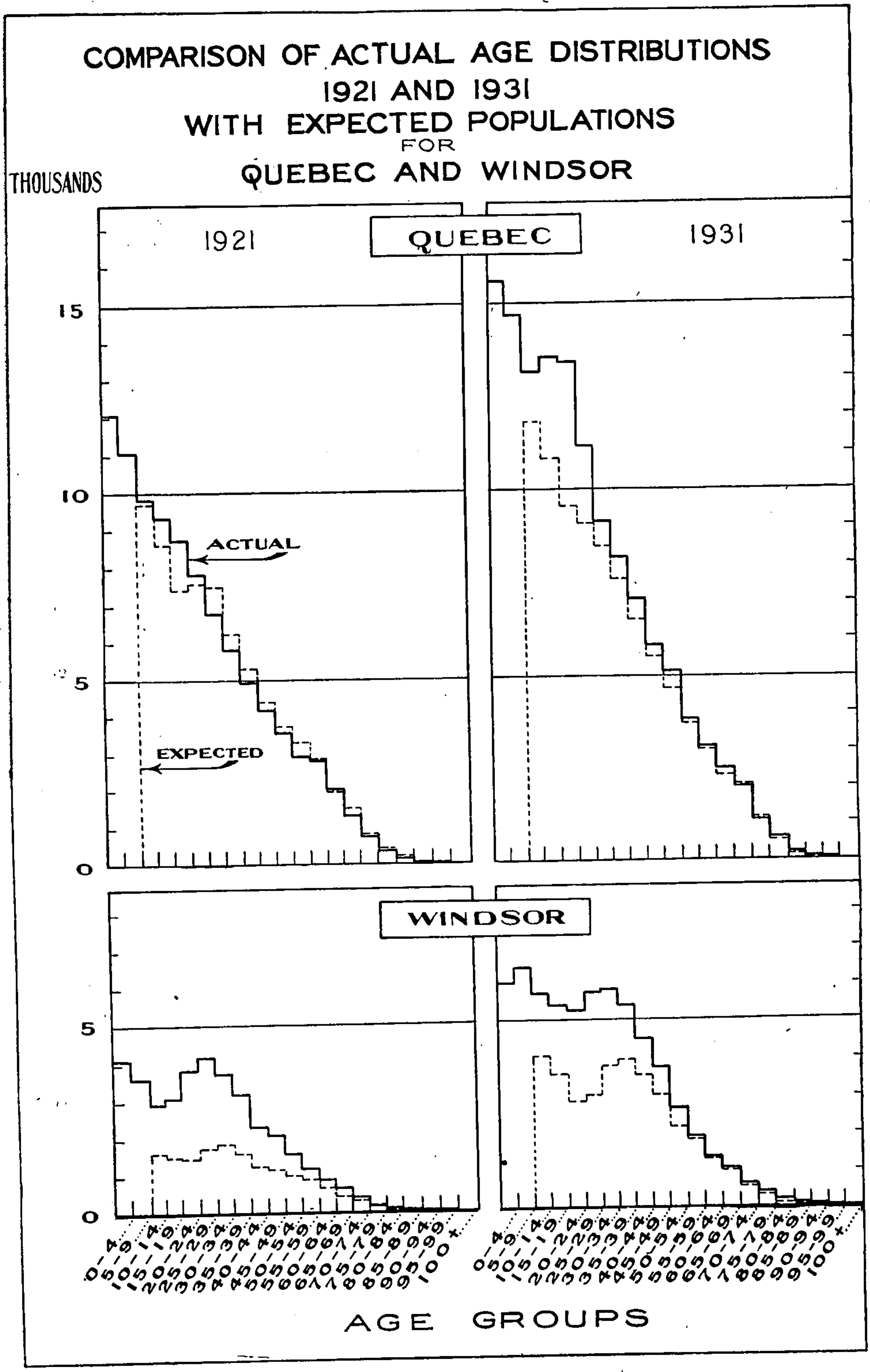

COMPARISON OF ACTUAL AGE DISTRIBUTIONS
1921 AND 1931
WITH EXPECTED POPULATIONS
FOR
QUEBEC AND WINDSOR
THOUSANDS
1921
QUEBEC
1931
15
10
ACTUAL
5
EXPECTED
0
WINDSOR
5
0
AGE GROUPS

Chart 9—Con.

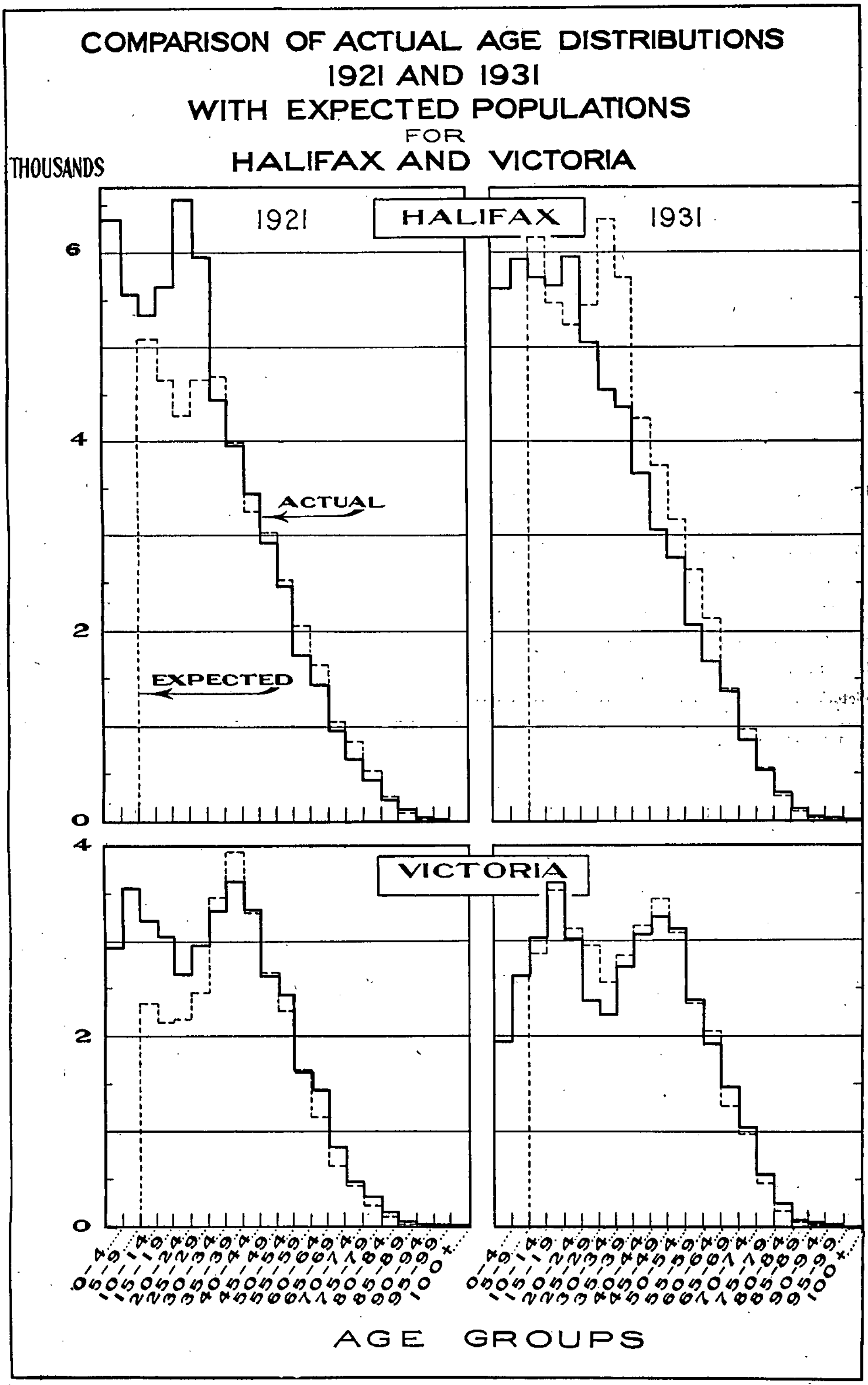

COMPARISON OF ACTUAL AGE DISTRIBUTIONS
1921 AND 1931
WITH EXPECTED POPULATIONS
FOR
HALIFAX AND VICTORIA
THOUSANDS
1921
HALIFAX
1931
ACTUAL
EXPECTED
VICTORIA
0
2
4
6
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85-89
90-94
95-99
100+
AGE GROUPS

Chart 9—Con.

Since only one set of rates of survival is used for all the cities and since, of course, differences are certain to exist between the survival rate of one city and another, it should follow, as a rule, that small differences in the charts and tables must be ignored. It is also probable that part of the differences between the actual population at a certain age and the survivors at that age from a previous census is due to mis-statement of age, *i.e.*, the person giving his or her age as less or greater than it really is. However, large differences are, without doubt, significant of movements and should be so regarded.

Statement XXIII shows the total population (of stated age) of each city for the census years 1911 and 1921, their survivors ten years later and the population in 1931. Statement XXIV shows the sums of the second differences of these populations and their survivors and also gives these sums as percentages of the population 10 years of age and over.

XXIII.—EIGHT SELECTED CITIES SHOWING TOTAL POPULATION OF EACH, 1911, 1921 AND 1931 AND SURVIVORS 10 YEARS LATER OF 1911 AND 1921 POPULATIONS

City	Actual Population, 1911[1]	Survivors in 1921 of 1911 Population	Actual Population, 1921[1]	Survivors in 1931 of 1921 Population	Actual Population, 1931[1]
Toronto	375,684	348,248	520,991	479,313	630,952
Winnipeg	134,060	126,527	178,834	166,961	218,720
Ottawa	86,917	80,362	107,383	98,458	126,824
Hamilton	81,919	75,556	114,041	104,779	155,516
Quebec	78,588	71,988	94,995	87,107	130,543
Windsor	17,787	16,354	38,540	35,711	63,094
Halifax	46,468	42,648	58,277	53,680	59,251
Victoria	31,367	29,063	38,686	35,140	38,766

[1] Stated age only.

XXIV.—SUM OF SECOND DIFFERENCES BETWEEN THE NUMBERS AT SUCCESSIVE QUINQUENNIAL AGES OF ACTUAL POPULATIONS 1911, 1921 AND 1931 AND SURVIVORS OF THESE POPULATIONS IN 1921 AND 1931, AND THESE SUMS AS PERCENTAGES OF POPULATION 10 YEARS OF AGE AND OVER

City	Sum of Second Differences					Second Differences as P.C. of Population 10 Years and over				
	Actual Population, 1911	Survivors in 1921 of 1911 Population	Actual Population, 1921	Survivors in 1931 of 1921 Population	Actual Population, 1931	Actual Population, 1911	Survivors in 1921 of 1911 Population	Actual Population, 1921	Survivors in 1931 of 1921 Population	Actual Population, 1931
Toronto	44,343	52,246	45,576	61,278	43,189	14·4	15·0	10·7	12·8	8·1
Winnipeg	20,947	26,814	15,788	22,930	21,898	19·8	21·2	11·3	13·7	11·8
Ottawa	6,423	7,825	5,196	9,217	8,035	9·4	9·7	6·1	9·4	7·7
Hamilton	7,545	9,667	8,255	11,290	8,484	11·2	12·8	9·1	10·8	6·6
Quebec	4,571	5,324	3,049	3,599	7,247	7·6	7·4[1]	4·2	4·1[1]	7·2[2]
Windsor	1,691	1,879	3,675	4,539	3,554	11·7	11·5[1]	12·0[2]	12·7	7·0
Halifax	3,245	3.771	5,636	6,209	4,844	8·9	8·8[1]	12·2[2]	11·6[1]	10·2
Victoria	3,953	4,109	4,507	5,210	4,456	14·8	14·1[1]	14·0	14·8	13·0
Unweighted mean	....	....	....	....	....	12·2	12·6	10·0	11·2	9·0

[1] More smooth than expected.
[2] Less smooth than expected.

Effects on Age Structure of Movement, Death and Ageing.—Chart 9 and Statements XXIII and XXIV show so many features that considerable comment is required. Probably the best method of approach is to take the unweighted means at the foot of Statement XXIV as giving a general picture. Here we see that the general effect of death and ageing in the ten years is to make the age distribution rougher and that the effect of movement is to make it smoother; also, that the age structure grows smoother as time goes on. In so far as the eight cities and the period from 1911 to 1921 are concerned it was not movement that caused the peaks and depressions. The movements tended to fill in the depressions and merely exaggerated the peaks. This filling in of depressions by in-movements is in itself remarkable and apt to lead us off into dangerous speculations. What is really useful and consistently true is that the major in-movement (to cities) occurs during a limited span of years. Since this movement took place over ten years we have to conclude that, on the average, it occurred five years sooner than indicated on the chart; *e.g.*, the movement shown for ages 25–29 should be regarded as occurring when this group was, on the average, 22 years old; if for 20–24, when they were 17 years old, etc. The vast bulk of the movement, then, occurs at approximately ages 17–26 and this is true of all the cities examined. For the eight cities we find the mean age of the incomers (by 5-year groups) to be as follows:—

XXV.—EIGHT SELECTED CITIES, SHOWING MEAN AGE OF INCOMERS DURING THE PRECEDING 10 YEARS, 1931 AND 1921

City	Mean Age of Incomers of Preceding 10 Years	
	1931	1921
	years	years
Toronto	22·03	22·64
Winnipeg	19·47	20·52
Ottawa	21·34	21·61
Hamilton	24·67	22·23
Quebec	21·38	16·71
Windsor	24·48	25·86
Halifax	20·00	18·34
Victoria	44·74	24·02
Unweighted mean[1]	21·91	21·13
Unweighted mean of both sets[1]	21·52	
Standard deviation of both sets[1]	2·40	
Range of ages[1]	23·92 — 19·12	

[1] Victoria omitted.

Of course, it is not strictly correct to allow 5 years as the average period of residence of those moving in in the 10 years, as some cities would show more recent movements than others. This would probably explain Quebec in 1921. However, we have not sufficient data to correct this error.

We now come to differences shown as between cities. The general tendency for the age structure to be roughened by death and ageing and to be smoothed by movement has six exceptions as seen in Statement XXIV. These are: Quebec both in 1911 and 1921; Windsor in 1911; Halifax in 1911 and 1921, and Victoria in 1911. In these cases the expected survivors ten years later are smoother than the original population. There are, however, only three cases in which the actual population of 1921 and 1931 are less smooth than the expected survivors for the previous census, *viz.*, Quebec, 1931, Windsor, 1921 and Halifax, 1921. The reasons for these exceptions are not clear but an examination of the charts helps. A movement that was highly concentrated in age structure took place in Halifax between 1911 and 1921 making the age structure of the total population very rough. In Quebec, between 1921 and 1931, a very large inflow at fairly concentrated ages was superimposed upon a smooth population.

What seems remarkable about the influence of movement upon the age structure is that it is different for cities from what it has been for Canada as a whole. Previous to 1911 the Canadian population age structure was comparatively smooth and in 1911 suddenly roughened through the influence of immigration. Immigrants came in at certain ages and they followed heavy emigration which also took place at certain ages. The immigration began before 1901 (say, 1896) and by 1901 had succeeded in filling in the depressions left by emigration in the same manner as in the cities. The continuance of heavy immigration at the same ages occurring over a short period of time succeeded in making our population structure abnormal. Had the emigration been spread over 30 or 40 years it would have a smoothing effect. This draws attention to the fact that the very heavy immigration created an excess at certain ages. It did not merely fill in gaps; it upset our age structure. Going back to the cities, we take the case of Toronto in 1921. Without doubt, there was a serious gap at the age of 20 left by the survivors of 1911. This gap was more than half filled by incomers between 1911 and 1921 but the worst was that instead of being content to fill the gap they kept on until, by 1931, they produced an excess. Clearly, the trouble with Toronto's age structure in 1931 was that there were too many at ages 20–30 and too few—far too few—at earlier ages.

Turning now to the quantitative effect upon ageing as measured by average ages of movement, we have in Statement XXVI a description of the mean age of: (1) the total populations in 1911, 1921 and 1931; (2) the population over 10 years for the same dates, and (3) the expected survivors at the following censuses of the populations of 1911 and 1921.

XXVI.—EIGHT SELECTED CITIES, SHOWING MEAN AGE OF (1) TOTAL POPULATION, 1911, 1921 AND 1931, (2) POPULATION 10 YEARS OF AGE AND OVER, 1911, 1921 AND 1931 AND (3) SURVIVORS IN 1921 AND 1931 OF TOTAL POPULATIONS, 1911 AND 1921

City	Mean Age							
	Total Population			Population 10 Years and over			Survivors 10 Years Later of Total Population of	
	1911	1921	1931	1911	1921	1931	1911	1921
	years	years	years	years	years	years	years	years
Toronto	28·18	29·41	31·50	33·31	34·96	36·22	36·57	37·57
Winnipeg	25·41	27·09	30·02	31·01	33·29	34·46	34·45	35·75
Ottawa	27·19	28·59	30·38	33·12	34·63	35·76	35·32	36·48
Hamilton	28·65	29·11	30·31	33·85	35·14	35·76	36·82	37·18
Quebec	27·21	26·88	26·82	34·22	33·98	33·46	34·87	34·56
Windsor	28·58	27·94	28·51	33·95	33·92	34·29	36·60	36·30
Halifax	27·65	27·66	28·95	33·86	33·53	34·74	35·45	35·66
Victoria	29·54	31·68	35·86	33·76	37·03	39·94	38·03	39·53

In the first place, we ask the question "How much in ten years does a population age by the process of time and the influence of death, unassisted by migration?" An individual, of course, ages 10 years; but the differential death rates at different ages—higher at the older ages—and an increasing number of births from year to year cause a population to age less than this. Thus, we have the following:—

XXVII.—EIGHT SELECTED CITIES, SHOWING THE NUMBER OF YEARS EXPECTED SURVIVORS OF TOTAL POPULATIONS, 1911 AND 1921, AGED IN 10 YEARS

City	Years Aged in 10 Years by Survivors of Total Population of	
	1911	1921
Toronto	8·39	8·16
Winnipeg	9·04	8·66
Ottawa	8·13	7·89
Hamilton	8·17	8·07
Quebec	7·66	7·68
Windsor	8·02	8·36
Halifax	7·80	8·00
Victoria	8·49	7·85
Unweighted mean	8·21	8·08
Unweighted mean of both sets	8·15	
Standard deviation of both sets	0·36	

From the standard deviation we see that a good figure for the process of ageing is from 7·07 to 9·23 (3 times the standard deviation subtracted from or added to 8·15); also, that this ageing varies within the range of about 1 year. In only one of the above cases (Winnipeg, 1911-21) did it cover more than half of this range, so that we may say that the range is less than one year. The high birth rates of Quebec undoubtedly is the reason why it aged so much less, and the aforementioned gap at 20 why the population of Winnipeg, Victoria and Toronto aged more than others. The chart illustrates this point.

Turning now to the population over 10 years of age, this including all the survivors for the population 10 years earlier, we find the following phenomena:—

XXVIII.—EIGHT SELECTED CITIES SHOWING INCREASE IN AGE OF THE POPULATION 10 YEARS OF AGE AND OVER (A) FROM THE ORIGINAL POPULATIONS, 1911 AND 1921, TO THE SURVIVORS 10 YEARS LATER AND (B) FROM THE SURVIVORS 10 YEARS LATER TO THE ACTUAL POPULATIONS 10 YEARS LATER

City	Increase in Age			
	From the Original Population to the Survivors 10 Years Later in		From the Survivors 10 Years Later to the Actual Population 10 Years Later in	
	1921	1931	1921	1931
	years	years	years	years
Toronto	3·26	2·61	−1·61	−1·35
Winnipeg	3·44	2·46	−1·16	−1·29
Ottawa	2·20	1·85	−0·69	−0·72
Hamilton	2·97	2·04	−1·68	−1·42
Quebec	0·65	0·58	−0·89	−1·10
Windsor	2·65	2·38	−2·68	−2·01
Halifax	1·59	2·13	−1·92	−0·92
Victoria	4·27	2·50	−1·00	0·41
Unweighted mean	2·63	2·07	−1·45	−1·15
Unweighted mean of both sets	2·35		−1·30	

In the single case of Victoria (1931) we find the in- and out-movements increasing the age of the population; in all other cases they decrease it. In all cases the survivors are older than those of the actual population over 10 years of age and this is not a function of the passage of years but the displacement at the older ages of small numbers by larger. It is the true process of "ageing" of a population as distinguished from ageing of individuals. This statement is different from the immediately preceding statement in that the latter supposed the same persons at two dates ten years apart. The persons who were 0–4 in 1911 were 10–14 in 1921 and so on. In Statement XXVIII we are comparing the same age groups (not the same persons) at the different dates in every case and it is only the displacement of small by large figures at older ages by the sliding along of the population that increases the mean age. Now it is highly significant that the movements of the population rejuvenate these cities. On the average, the survivors were 2 years older than the original and the actual population (as affected by movement) was one year younger than the survivors (who would not be so affected), *i.e.*, the movement reduced the process of ageing by one-half. This is, of course, because the incomers are at the early adult ages and the outgoers are at somewhat later ages. This is illustrated in the chart. The most striking case is that of Windsor (1921) where the incomers actually succeeded in making the actual population younger in 1921 than it was in 1911, in spite of the passage of ten years. The same happened to Quebec but through somewhat different causes (see Statement XXVIII).

PART II

TABLE 1a. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, males, 1931

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IA			
	–		years	
Nova Scotia	Cape Breton	55·5	22·4	4·5
New Brunswick	Madawaska	61·4	21·4	3·7
	Restigouche	60·9	21·4	3·8
Quebec	Abitibi	58·8	20·0	2·2
	Arthabaska	59·7	22·4	6·1
	Beauce	63·7	21·9	4·9
	Champlain	59·6	21·2	4·1
	Charlevoix	61·2	21·2	5·1
	Chicoutimi	63·4	20·2	2·9
	Dorchester	62·9	22·2	5·1
	Drummond	58·9	21·5	5·0
	Frontenac	65·0	21·9	4·2
	Gaspé	61·5	22·4	4·9
	Hull	56·8	21·6	4·9
	Labelle	61·2	21·5	3·9
	Lac-St-Jean	64·7	20·7	3·2
	Laprairie	55·6	22·1	6·1
	Lévis	59·8	22·1	5·5
	L'Islet	60·8	21·9	4·9
	Matane	64·8	21·0	3·3
	Mégantic	60·5	22·2	5·4
	Montmagny	60·1	22·3	6·1
	Montmorency	60·4	21·7	6·0
	Jesus Island	52·1	20·9	5·1
	Papineau	56·4	21·4	5·3
	Portneuf	58·9	22·2	5·7
	Quebec	55·4	21·2	4·6
	Richmond	57·1	22·2	6·0
	Rimouski	64·5	21·2	4·2
	Saguenay	59·6	20·9	3·9
	Sherbrooke	52·6	22·0	5·6
	St-Jean	53·8	21·5	5·6
	St-Maurice	58·3	20·9	3·6
	Temiskaming	52·2	19·0	2·4
	Témiscouta	63·6	21·8	4·5
	Terrebonne	56·9	22·1	5·4
Ontario	Nipissing	55·3	21·8	4·7
	District of Patricia	52·6	19·4	2·3
Manitoba	Division No. 1	59·0	21·8	4·6
	Division No. 2	58·9	21·4	4·5
	Division No. 5	53·8	21·9	4·0
	Division No. 14	55·5	22·2	5·3
Saskatchewan	Division No. 1	51·5	22·4	4·6
	Division No. 3	53·6	22·0	3·0
	Division No. 5	53·5	21·9	5·1
	Division No. 8	52·0	21·6	2·6
	Division No. 9	57·7	21·7	4·2
	Division No. 10	56·2	22·2	3·9
	Division No. 13	52·2	21·8	2·8
	Division No. 14	51·6	21·5	3·4
	Division No. 15	55·7	21·0	3·8
	Division No. 18	56·7	19·8	3·4
Alberta	Division No. 10	55·2	21·2	3·8
	Division No. 13	56·1	21·6	3·6
	Division No. 14	52·3	21·5	3·5
	Division No. 17	52·7	20·9	3·9
	TYPE IB			
			years	
New Brunswick	Gloucester	61·9	22·6	5·8
	Victoria	58·1	23·2	5·1
Quebec	Argenteuil	56·8	23·2	5·1
	Bonaventure	60·5	22·9	6·1
	Chambly	52·1	22·7	4·8
	Wolfe	61·4	22·7	5·7
Manitoba	Division No. 10	52·2	23·2	6·2
	Division No. 12	57·0	23·3	5·8
	Division No. 13	55·9	22·9	5·5
	Division No. 15	54·0	22·6	4·8
Saskatchewan	Division No. 2	51·5	22·5	3·7

[1] For explanation of this term see page 24.

TABLE 1a. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, males, 1931—Con.

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IIA			
			years	
Nova Scotia	Hants	52·2	19·5	8·9
Quebec	Joliette	56·9	22·2	6·3
	Kamouraska	60·8	22·4	6·5
	Richelieu	53·2	21·9	6·3
	Shefford	55·7	22·3	6·3
	Vaudreuil	53·5	22·3	6·4
	TYPE IIB			
			years	
Prince Edward Island	Prince	52·7	23·3	8·7
Nova Scotia	Inverness	54·2	24·7	9·2
	Richmond	52·9	24·4	10·5
	Yarmouth	52·7	24·2	8·8
New Brunswick	Kent	58·8	23·3	7·5
	Northumberland	57·1	23·3	6·8
	Sunbury	52·5	23·2	6·4
	Westmorland	54·0	22·5	6·5
Quebec	Bagot	56·4	23·0	8·0
	Bellechasse	61·7	22·9	6·7
	Berthier	56·1	22·9	6·7
	Châteauguay	51·4	23·4	8·0
	Compton	55·1	23·0	6·8
	Deux-Montagnes	53·8	22·9	8·0
	Iberville	55·7	22·8	6·4
	L'Assomption	53·4	22·5	7·9
	Lotbinière	58·8	22·9	6·6
	Maskinongé	58·4	22·8	6·3
	Missisquoi	51·7	22·7	7·5
	Montcalm	55·6	22·9	6·9
	Napierville	56·7	22·7	7·9
	Nicolet	57·1	23·1	6·9
	Pontiac	53·8	23·6	7·3
	Rouville	54·8	23·0	7·9
	Soulanges	54·9	23·3	7·6
	Stanstead	53·8	23·1	7·0
	St-Hyacinthe	54·4	22·6	7·6
	Verchères	56·7	22·6	7·0
	Yamaska	57·7	22·9	7·8
Ontario	Haliburton	52·1	23·3	7·2
	Prescott	56·1	23·1	7·0
	Renfrew	52·4	22·8	9·0
	Russell	59·0	22·9	6·7
	TYPE IIIA			
			years	
Nova Scotia	Halifax	50·2	22·3	6·0
Quebec	Beauharnois	49·9	20·2	4·5
	Montreal Island	48·2	21·0	3·7
Ontario	Algoma	48·9	22·4	5·3
	Cochrane	44·9	18·5	1·8
	Essex	47·1	20·9	4·3
	Kenora	46·3	21·5	3·8
	Sudbury	49·6	19·9	3·0
	Thunder Bay	45·0	21·0	2·7
	Timiskaming	47·0	20·5	2·9
	Welland	45·1	21·4	4·9
	Wentworth	44·0	22·0	5·3
	York	43·6	21·6	4·7
Manitoba	Division No. 3	50·9	22·4	5·7
	Division No. 6	45·0	22·2	4·1
	Division No. 16	48·1	20·2	3·2
Saskatchewan	Division No. 4	49·1	22·0	3·4
	Division No. 6	50·3	21·4	3·3
	Division No. 7	50·8	22·3	3·1
	Division No. 11	49·2	21·8	3·1
	Division No. 12	50·5	22·3	3·5
	Division No. 16	51·1	21·5	3·4
	Division No. 17	50·5	21·9	3·6

TABLE 1a. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, males, 1931—Con.

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IIIA—Con.			
			years	
Alberta	Division No. 1	49·1	22·1	4·0
	Division No. 2	48·3	21·6	3·2
	Division No. 3	48·4	21·5	3·4
	Division No. 4	45·3	21·8	3·7
	Division No. 6	43·9	21·9	3·4
	Division No. 8	48·8	22·4	5·0
	Division No. 9	45·8	22·0	4·0
	Division No. 11	47·8	21·9	3·9
	Division No. 12	43·6	21·1	2·9
	Division No. 15	49·9	20·6	2·8
	Division No. 16	46·6	21·1	3·3
British Columbia	Division No. 1	38·9	21·9	3·8
	Division No. 7	34·1	21·6	3·8
	Division No. 10	42·8	21·3	3·4
	TYPE IIIB			
			years	
Ontario	Carleton	48·5	22·6	5·9
	Rainy River	49·4	22·6	5·8
Manitoba	Division No. 4	48·4	22·6	6·1
	Division No. 8	48·6	22·8	6·1
	Division No. 9	49·9	22·7	4·6
	Division No. 11	51·0	22·7	5·5
Alberta	Division No. 5	48·0	22·5	3·6
	Division No. 7	50·3	22·6	3·9
British Columbia	Division No. 2	41·1	22·5	5·6
	Division No. 4	38·3	23·6	5·4
	Division No. 8	38·9	23·6	5·9
	Division No. 9	33·0	22·8	4·5
	TYPE IVA			
			years	
Ontario	Dufferin	44·7	22·2	9·5
	Waterloo	46·4	22·2	6·8
	TYPE IVB			
			years	
Prince Edward Island	Kings	50·2	23·8	10·8
	Queens	48·0	23·8	10·1
Nova Scotia	Annapolis	46·6	24·7	12·2
	Antigonish	49·7	24·8	11·8
	Colchester	50·3	23·7	8·4
	Cumberland	50·9	23·5	7·9
	Digby	50·7	24·7	10·1
	Guysborough	48·5	23·4	8·3
	Kings	50·6	23·5	8·5
	Lunenburg	48·7	23·6	9·6
	Pictou	49·1	23·6	7·8
	Queens	49·1	23·3	8·1
	Shelburne	51·3	23·7	9·8
	Victoria	48·1	24·3	11·5
New Brunswick	Albert	50·2	23·8	9·6
	Carleton	50·6	23·8	8·4
	Charlotte	46·8	23·8	8·9
	Kings	48·3	24·3	9·8
	Queens	50·2	23·6	7·6
	St. John	46·9	23·0	6·9
	York	49·9	23·4	7·6
Quebec	Brome	49·9	24·0	8·5
	Huntingdon	49·3	23·5	8·6

TABLE 1a. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, males, 1931—Con.

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IVB—Con.			
			years	
Ontario	Addington	46·6	23·7	12·6
	Brant	45·1	23·0	7·8
	Bruce	45·3	24·1	10·5
	Dundas	46·8	24·2	10·4
	Durham	45·7	24·2	10·4
	Elgin	42·5	24·1	10·4
	Frontenac	44·8	23·0	8·2
	Glengarry	51·2	23·3	9·0
	Grenville	43·0	24·4	11·6
	Grey	45·0	23·8	10·3
	Haldimand	44·9	23·8	9·8
	Halton	44·1	23·4	8·1
	Hastings	49·0	23·4	8·5
	Huron	42·7	24·6	12·1
	Kent	45·8	22·9	8·2
	Lambton	43·9	23·3	9·0
	Lanark	45·7	23·9	9·8
	Leeds	43·3	24·0	9·8
	Lennox	41·0	22·9	11·5
	Lincoln	44·5	23·1	6·7
	Manitoulin	50·1	22·9	7·7
	Middlesex	42·3	23·5	8·6
	Muskoka	47·9	22·8	8·1
	Norfolk	44·8	23·1	9·2
	Northumberland	45·2	24·1	10·3
	Ontario	44·0	22·5	7·6
	Oxford	44·0	23·6	9·8
	Parry Sound	49·9	22·6	6·9
	Peel	43·8	22·8	8·2
	Perth	45·0	23·8	9·3
	Peterborough	47·5	23·6	8·4
	Prince Edward	44·7	24·4	11·8
	Simcoe	47·2	23·7	8·6
	Stormont	51·2	22·6	7·3
	Victoria	44·0	24·1	11·0
	Wellington	44·6	23·4	8·8
Manitoba	Division No. 7	45·9	23·0	6·9
British Columbia	Division No. 3	41·8	23·9	6·7
	Division No. 5	36·8	24·5	7·3
	Division No. 6	40·1	23·3	6·3

TABLE 1b. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, females, 1931

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IA			
			years	
Nova Scotia	Cape Breton	58·2	22·0	5·0
New Brunswick	Gloucester	62·8	22·2	5·5
	Madawaska	65·1	20·7	3·2
	Restigouche	64·1	20·9	3·6
	Victoria	62·1	21·6	4·1
Quebec	Abitibi	67·8	19·6	1·6
	Arthabaska	60·8	22·0	5·4
	Beauce	64·9	21·3	4·5
	Beauharnois	54·4	21·3	5·2
	Berthier	57·2	22·4	6·1
	Chambly	51·4	22·0	5·3
	Champlain	62·9	21·0	3·7
	Charlevoix	62·6	21·0	5·1
	Chicoutimi	67·0	19·8	2·6
	Dorchester	64·2	21·8	5·1
	Drummond	60·7	21·2	4·4
	Frontenac	66·5	20·9	3·9
	Gaspé	64·0	21·9	4·9
	Hull	59·0	21·2	4·5
	Jesus Island	59·4	21·5	5·1
	Labelle	65·2	20·8	3·5
	Lac-St-Jean	68·5	20·3	2·8
	Laprairie	57·0	21·9	5·9

[1] For explanation of this term see page 24.

TABLE 1b. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, females, 1931—Con.

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IA—Con.			
			years	
Quebec—Con.	Lévis	57·1	21·8	6·2
	L'Islet	63·0	21·7	5·0
	Maskinongé	60·1	22·2	5·4
	Matane	67·8	20·6	3·1
	Mégantic	61·5	21·7	5·0
	Montmorency	60·6	21·6	5·7
	Papineau	60·7	21·8	5·1
	Portneuf	60·5	21·9	5·2
	Québec	54·1	21·2	5·4
	Richelieu	55·4	21·9	6·1
	Richmond	57·8	21·9	5·8
	Rimouski	65·5	21·0	4·2
	Saguenay	65·1	20·6	3·6
	Shefford	56·3	22·2	6·0
	Sherbrooke	52·7	21·4	5·1
	St-Jean	53·7	21·3	5·5
	St-Maurice	59·8	20·6	3·4
	Témiscouata	65·2	21·1	4·3
	Temiskaming	65·4	19·6	1·8
	Terrebonne	58·4	21·7	4·9
	Wolfe	63·2	22·4	4·6
Ontario	Algoma	55·1	21·6	4·7
	Cochrane	60·4	18·3	1·5
	Haliburton	55·3	22·4	6·2
	Kenora	55·1	21·1	3·5
	Nipissing	60·0	21·1	3·8
	Parry Sound	56·0	22·3	5·4
	Rainy River	57·8	21·2	3·8
	Sudbury	60·6	19·8	2·4
	Thunder Bay	54·2	20·6	2·7
	Timiskaming	57·4	20·3	2·5
	District of Patricia	60·9	20·6	3·8
Manitoba	Division No. 1	64·9	21·5	3·4
	Division No. 2	60·9	20·8	3·9
	Division No. 3	54·2	22·0	4·9
	Division No. 5	58·2	21·2	3·4
	Division No. 9	52·1	21·8	4·6
	Division No. 11	55·0	22·0	4·8
	Division No. 12	60·7	22·4	5·5
	Division No. 13	59·5	22·1	4·7
	Division No. 14	60·5	21·6	4·3
	Division No. 15	58·2	21·5	3·8
	Division No. 16	60·8	20·6	3·3
Saskatchewan	Division No. 1	57·2	21·8	3·8
	Division No. 2	58·5	21·5	3·0
	Division No. 3	60·8	20·3	2·4
	Division No. 4	58·5	20·6	2·7
	Division No. 5	58·9	21·6	4·6
	Division No. 6	55·4	20·6	3·2
	Division No. 7	56·5	21·3	3·1
	Division No. 8	60·4	20·3	2·4
	Division No. 9	63·1	21·2	3·8
	Division No. 10	62·2	21·2	3·4
	Division No. 11	55·4	20·9	3·1
	Division No. 12	56·6	21·4	3·3
	Division No. 13	60·1	20·7	2·7
	Division No. 14	61·0	20·7	2·4
	Division No. 15	62·6	20·6	3·1
	Division No. 16	59·2	21·0	3·2
	Division No. 17	58·7	21·2	3·0
	Division No. 18	63·4	19·5	3·3
Alberta	Division No. 1	56·6	21·6	3·5
	Division No. 2	56·6	21·0	3·0
	Division No. 3	58·5	20·6	2·2
	Division No. 4	54·6	21·3	3·0
	Division No. 5	57·3	21·1	2·7
	Division No. 7	57·5	21·4	3·4
	Division No. 8	54·8	21·7	4·2
	Division No. 9	55·4	21·1	3·5
	Division No. 10	62·9	20·9	3·2
	Division No. 11	53·6	21·1	3·6
	Division No. 12	57·0	19·9	2·0
	Division No. 13	63·7	20·4	2·9
	Division No. 14	61·7	20·6	2·6
	Division No. 15	61·8	19·7	2·0
	Division No. 16	59·0	19·7	2·4
	Division No. 17	61·6	20·4	2·4
British Columbia	Division No. 1	53·5	21·3	2·5
	Division No. 8	54·8	21·5	2·9
	Division No. 9	52·6	20·9	2·7
	Division No. 10	58·3	20·4	1·7

TABLE 1b. Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, females, 1931—Con.

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IB			
			years	
New Brunswick	Northumberland	58·5	22·6	6·1
	Sunbury	55·5	22·6	6·2
Quebec	Compton	57·4	22·8	6·2
Manitoba	Division No. 10	56·0	22·5	5·2
	TYPE IIA			
			years	
New Brunswick	Westmorland	53·4	22·0	6·7
Quebec	Bellechasse	61·3	22·2	6·5
	Bonaventure	61·9	22·4	6·5
	Deux-Montagnes	56·0	22·3	7·3
	Joliette	58·1	21·9	6·3
	Kamouraska	61·8	22·3	6·5
	Montmagny	59·7	21·8	6·4
	Vaudreuil	54·0	21·7	6·8
	Verchères	55·8	22·0	6·4
	Yamaska	58·2	22·4	6·6
	TYPE IIB			
			years	
Prince Edward Island	Prince	52·5	23·5	8·7
Nova Scotia	Hants	51·6	23·3	9·0
	Inverness	53·1	24·8	10·9
	Richmond	51·6	24·1	11·8
New Brunswick	Kent	58·9	23·2	7·9
	Queens	51·6	23·4	8·3
Quebec	Argenteuil	54·6	22·5	6·7
	Bagot	57·0	22·8	7·1
	Châteauguay	51·5	23·3	9·0
	Iberville	56·3	22·6	6·3
	L'Assomption	55·6	22·6	6·8
	Lotbinière	60·8	22·7	6·4
	Missisquoi	52·1	22·5	7·1
	Montcalm	58·6	22·6	6·3
	Napierville	56·3	23·4	7·6
	Nicolet	57·6	22·5	6·7
	Pontiac	57·2	22·6	6·9
	Rouville	53·2	22·8	7·5
	Soulanges	55·1	22·9	7·3
	Stanstead	53·8	22·7	6·4
Ontario	Manitoulin	53·4	22·7	6·3
	Prescott	56·4	22·9	7·2
	Renfrew	52·7	22·8	7·1
	Russell	58·7	22·6	6·4
	Stormont	51·9	22·5	7·4
	TYPE IIIA			
			years	
Quebec	Montreal Island	49·3	20·9	4·3
Ontario	Essex	49·7	20·8	4·5
	Welland	48·4	21·6	5·5
	York	42·8	21·7	5·6
Manitoba	Division No. 6	49·3	21·3	4·0
Alberta	Division No. 6	50·1	21·3	3·4
British Columbia	Division No. 2	50·9	22·0	4·3
	Division No. 6	51·0	22·0	4·6
	Division No. 7	50·5	19·8	2·5
	TYPE IIIB			
			years	
Manitoba	Division No. 4	51·0	22·5	5·2
	Division No. 7	49·9	22·6	5·9
	Division No. 8	51·3	22·7	5·6
British Columbia	Division No. 3	49·4	22·8	5·2
	Division No. 4	44·2	22·5	5·2

TABLE 1b.—Percentages under 25 years of age and 65 years of age and over, with standard age, 220 counties and census divisions, by age class, Canada, females, 1931—Con.

Province	County or Census Division	P.C. under 25 Years	Standard Age[1]	P.C. 65 Years and over
	TYPE IVA			
			years	
Nova Scotia	Halifax	50·4	21·8	6·4
Quebec	St-Hyacinthe	50·4	22·1	7·6
Ontario	Carleton	46·4	22·0	6·5
	Wentworth	44·2	22·1	6·3
	TYPE IVB			
			years	
Prince Edward Island	Kings	50·5	24·2	10·7
	Queens	47·5	23·3	10·9
Nova Scotia	Annapolis	45·3	24·7	12·2
	Antigonish	49·3	24·9	12·8
	Colchester	50·4	23·3	8·7
	Cumberland	50·7	23·1	7·9
	Digby	50·2	24·2	9·8
	Guysborough	51·1	23·7	9·4
	Kings	49·9	23·3	9·1
	Lunenburg	48·7	23·5	9·7
	Pictou	48·6	23·2	8·9
	Queens	50·7	23·2	8·6
	Shelburne	50·3	23·6	10·5
	Victoria	49·1	24·8	13·5
	Yarmouth	50·3	23·8	10·2
New Brunswick	Albert	51·0	23·3	9·7
	Carleton	51·3	23·4	8·1
	Charlotte	47·5	23·7	9·2
	Kings	47·7	23·9	9·4
	St. John	45·7	22·5	7·5
	York	50·6	22·8	7·4
Quebec	Brome	48·7	23·8	8·7
	Huntingdon	49·6	23·4	10·0
Ontario	Addington	47·1	24·1	10·4
	Brant	44·0	23·5	8·5
	Bruce	44·2	24·2	10·7
	Dufferin	42·4	24·0	10·0
	Dundas	43·8	24·3	10·6
	Durham	41·3	24·2	11·5
	Elgin	40·3	24·3	11·1
	Frontenac	44·3	23·4	9·0
	Glengarry	49·7	24·0	9·9
	Grenville	40·7	24·4	12·2
	Grey	44·1	24·1	10·0
	Haldimand	43·5	23·8	10·2
	Halton	42·8	23·4	8·5
	Hastings	47·8	23·3	8·8
	Huron	40·5	25·2	12·1
	Kent	46·8	23·1	8·0
	Lambton	43·8	23·6	9·1
	Lanark	43·1	23·9	10·0
	Leeds	41·6	24·2	11·1
	Lennox	42·3	24·5	12·0
	Lincoln	44·0	22·8	7·4
	Middlesex	40·8	23·5	9·4
	Muskoka	50·2	22·7	7·0
	Norfolk	44·3	23·3	10·1
	Northumberland	42·0	24·2	11·5
	Ontario	44·8	22·7	8·1
	Oxford	41·8	23·9	10·4
	Peel	43·2	23·2	8·5
	Perth	43·2	24·0	9·8
	Peterborough	45·9	23·5	8·2
	Prince Edward	40·7	24·7	13·8
	Simcoe	45·9	23·7	8·7
	Victoria	42·3	24·3	10·6
	Waterloo	45·7	22·5	7·3
	Wellington	43·0	23·6	9·8
British Columbia	Division No. 5	43·1	23·5	6·9

TABLE 2a. Age rank of the counties and census divisions of Canada (male population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age settlement of the area and (3) resident death rate, 1931

Index[1] of Age Rank as Correlated with			County or Census Division	Age Structure			Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with		
(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate		P.C. under 25	Standard Age[2]	P.C. 65 and over					(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years				years				
100	**100**	**100**	**Average of 220 counties and census divisions...**	**51·4**	**22·5**	**6·3**	**–**	**75·6**	**38**	**10·8**	**64·0**	**30·6**	**9·5**
195	197	178	Hants, N.S.	52·2*	19·5	8·9	IIA	94·2	49	9·3	124·7	60·3	16·9
180	214	161	Addington, Ont.	46·6	23·7	12·6	IVB	93·5	53	13·3	115·3	65·6	15·3
168	199	145	Antigonish, N.S.	49·7	24·8	11·8	IVB	94·9	53	14·2	107·5	60·9	13·8
166	190	146	Kings, P.E.I.	50·2*	23·8	10·8	IVB	93·8	50	7·7	106·5	58·2	13·9
166	187	141	Richmond, N.S.	52·9	24·4	10·5	IIB	95·9	51	9·3	106·0	57·3	13·4
163	198	144	Annapolis, N.S.	46·6	24·7	12·2	IVB	93·6	50	12·3	104·2	60·7	13·7
163	193	144	Victoria, N.S.	48·1	24·3	11·5	IVB	93·1	52	10·2	104·1	59·0	13·7
161	163	137	Yamaska, Que.	57·7	22·9	7·8	IIB	98·1	51	13·6	103·2	49·8	13·0
161	164	138	Napierville, Que.	56·7	22·7*	7·9	IIB	97·4	57	10·9	103·0	50·1	13·1
161	153	133	Bellechasse, Que.	61·7	22·9	6·7*	IIB	98·8	47	12·1	102·8	46·9	12·6
160	152	133	Kamouraska, Que.	60·8	22·4*	6·5*	IIA	98·5	50	11·7	102·3	46·4	12·6
159	171	141	Renfrew, Ont.	52·4*	22·8	9·0	IIB	88·5	41	12·3	102·0	52·4	13·4
158	147	136	Montmorency, Que.	60·4	21·7	6·0*	IA	98·8	47	12·7	101·4	45·0	12·9
158	162	136	Bagot, Que.	56·4	23·0	8·0	IIB	97·7	50	14·4	101·1	49·6	12·9
157	175	138	Shelburne, N.S.	51·3*	23·7	9·8	IVB	97·4	49	13·9	100·4	53·6	13·1
157	157	131	Kent, N.B.	58·8	23·3	7·5	IIB	95·9	46	12·3	100·2	48·0	12·4
154	137	132	Charlevoix, Que.	61·2	21·2	5·1	IA	99·3	46	16·3	98·5	41·8	12·5
153	129	128	Rimouski, Que.	64·5	21·2	4·2	IA	98·6	43	11·2	98·2	39·4	12·2
153	134	127	Beauce, Que.	63·7	21·9	4·9	IA	99·0	42	11·9	97·8	41·0	12·1
153	188	140	Prince Edward, Ont.	44·7	24·4	11·8	IVB	87·0	52	12·9	97·7	57·5	13·3
153	175	139	Queens, P.E.I.	48·0	23·3	10·1	IVB	93·2	50	12·9	97·7	53·5	13·2
152	143	129	Montmagny, Que.	60·1	22·3*	6·1*	IA	98·7	46	10·6	97·3	43·7	12·2
151	140	126	Gloucester, N.B.	61·9	22·6*	5·8*	IB	97·1	41	12·0	96·8	42·7	12·0
150	185	145	Lennox, Ont.	41·0	22·9	11·5	IVB	84·8	53	12·9	96·2	56·5	13·8
150	162	134	Prince, P.E.I.	52·7*	23·3	8·7	IIB	95·2	46	9·9	96·2	49·5	12·7
150	156	134	L'Assomption, Que.	53·4	22·5*	7·9	IIB	97·3	52	16·5	96·1	47·6	12·7
150	156	132	Rouville, Que.	54·8	23·0	7·9	IIB	95·3	54	12·9	96·0	47·6	12·5
150	145	127	Russell, Ont.	59·0	22·9	6·7*	IIB	87·0	40	9·7	95·9	44·5	12·1
149	141	126	Arthabaska, Que.	59·7	22·4*	6·1*	IA	97·5	42	11·9	95·6	43·1	12·0
149	133	124	Dorchester, Que.	62·9	22·2	5·1	IA	99·5	45	12·9	95·5	40·7	11·8
149	163	134	Glengarry, Ont.	51·2*	23·3	9·0	IVB	85·5	50	11·9	95·2	50·0	12·7
149	155	132	Deux-Montagnes, Que.	53·8	22·9	8·0	IIB	98·0	53	14·4	95·1	47·5	12·5
149	152	132	St-Hyacinthe, Que.	54·4	22·6*	7·6	IIB	96·2	48	13·6	95·1	46·5	12·5
149	147	128	Verchères, Que.	56·7	22·6*	7·0	IIB	96·1	52	11·7	95·1	45·1	12·2
148	167	133	Albert, N.B.	50·2*	23·8	9·6	IVB	92·3	50	13·2	94·9	51·2	12·6
148	164	125	Inverness, N.S.	54·2	24·7	9·2	IIB	96·5	49	13·5	94·7	50·1	11·9
148	127	123	Témiscouata, Que.	63·6	21·8	4·5	IA	96·7	41	10·6	94·5	38·8	11·7
148	124	122	Frontenac, Que.	65·0	21·9	4·2	IA	97·8	34	12·2	94·4	38·0	11·6
148	143	125	Lotbinière, Que.	58·8	22·9	6·6*	IIB	98·4	49	14·4	94·4	43·8	11·9
147	171	128	Digby, N.S.	50·7*	24·7	10·1	IVB	96·0	48	12·5	94·3	52·2	12·2
147	186	137	Huron, Ont.	42·7	24·6	12·1	IVB	91·1	48	13·2	94·0	57·0	13·0
147	139	123	Bonaventure, Que.	60·5	22·9	6·1*	IB	96·6	42	11·2	93·9	42·4	11·7
147	135	123	Wolfe, Que.	61·4	22·7*	5·7	IB	97·7	40	11·8	93·8	41·4	11·7
145	115	123	Lac-St-Jean, Que.	64·7	20·7	3·2	IA	97·7	28	12·0	92·7	35·1	11·7
144	165	132	Lunenburg, N.S.	48·7	23·6	9·6	IVB	97·4	45	11·2	92·4	50·4	12·5
144	132	123	Lévis, Que.	59·8	22·1	5·5	IA	98·8	45	12·7	92·2	40·4	11·7
144	131	123	Mégantic, Que.	60·5	22·2	5·4	IA	97·3	42	11·5	92·2	40·2	11·7
143	114	121	Matane, Que.	64·8	21·0	3·3	IA	97·8	33	13·3	91·8	35·0	11·5
143	138	126	Joliette, Que.	56·9	22·2	6·3*	IIA	96·9	48	15·9	91·7	42·2	12·0
143	163	138	Dufferin, Ont.	44·7	22·2	9·5	IVA	88·6	46	11·3	91·6	50·0	13·1
143	142	123	Nicolet, Que.	57·1	23·1	6·9	IIB	98·9	47	15·0	91·5	43·5	11·7
143	179	135	Grenville, Ont.	43·0	24·4	11·6	IVB	88·1	53	14·4	91·4	54·8	12·8
143	137	122	Maskinongé, Que.	58·4	22·8	6·3*	IIB	98·4	49	12·5	91·3	42·0	11·6
143	148	125	Soulanges, Que.	54·9	23·3	7·6	IIB	93·5	53	12·9	91·2	45·2	11·9
142	132	124	Portneuf, Que.	58·9	22·2	5·7	IA	98·8	45	12·9	91·0	40·5	11·8
142	169	129	Dundas, Ont.	46·8	24·2	10·4	IVB	91·3	50	12·1	90·9	51·8	12·3
141	156	124	Yarmouth, N.S.	52·7*	24·2	8·8	IIB	94·4	47	12·6	90·5	47·7	11·8
141	125	121	L'Islet, Que.	60·8	21·9	4·9	IA	98·2	46	11·4	90·4	38·4	11·5
141	174	133	Victoria, Ont.	44·0	24·1	11·0	IVB	89·6	47	12·1	90·4	53·1	12·6
141	110	122	Chicoutimi, Que.	63·4	20·2	2·9	IA	96·0	33	11·9	90·2	33·6	11·6
141	141	122	Prescott, Ont.	56·1	23·1	7·0	IIB	87·1	45	14·9	90·0	43·2	11·6
140	125	123	Drummond, Que.	58·9	21·5	5·0	IA	93·7	41	12·2	89·5	38·3	11·7
140	133	123	Richmond, Que.	57·1	22·2	6·0*	IA	92·7	40	12·9	89·3	40·7	11·7
139	140	122	Montcalm, Que.	55·6	22·9	6·9	IIB	97·3	50	11·1	89·1	42·7	11·6
139	139	120	Northumberland, N.B.	57·1	23·3	6·8*	IIB	95·1	44	11·8	89·0	42·4	11·4
139	168	128	Bruce, Ont.	45·3	24·1	10·5	IVB	92·1	45	12·4	88·9	51·4	12·2

[1] Base: average of 220 counties and census divisions.
[2] For explanation of this term see page 24.
[3] Death rates for Montreal and Jesus Islands separately are not available.

TABLE 2a. Age rank of the counties and census divisions of Canada (male population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931—Con.

Index[1] of Age Rank as Correlated with (1) P.C.[1] Born in Province of Residence	(2) Age of Settlement	(3) Death Rate	County or Census Division	Age Structure: P.C. under 25	Age Structure: Standard Age[2]	Age Structure: P.C. 65 and over	Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years				years				
138	137	121	Berthier, Que.	56·1	22·9	6·7*	IIB	97·4	50	13·6	88·5	41·9	11·5
138	123	117	Gaspé, Que.	61·5	22·4*	4·9	IA	98·4	40	12·8	88·5	37·7	11·1
138	166	129	Grey, Ont.	45·0	23·8	10·3	IVB	90·8	45	12·5	88·4	50·7	12·3
138	161	125	Kings, N.B.	48·3	24·3	9·8	IVB	87·8	51	11·3	88·3	49·3	11·9
138	166	127	Durham, Ont.	45·7	24·2	10·4	IVB	81·6	54	11·2	88·1	50·8	12·1
138	134	121	Shefford, Que.	55·7	22·3*	6·3*	IIA	94·9	45	12·3	88·0	40·9	11·5
137	151	123	Kings, N.S.	50·6*	23·5	8·5	IVB	92·3	48	10·0	87·5	46·1	11·7
136	131	122	Laprairie, Que.	55·6	22·1	6·1*	IA	93·8	52	10·5	87·3	40·2	11·6
136	125	122	Papineau, Que.	56·4	21·4	5·3	IA	87·0	41	10·0	86·8	38·1	11·6
135	164	126	Northumberland, Ont.	45·2	24·1	10·3	IVB	85·9	52	13·4	86·7	50·1	12·0
135	142	123	Missisquoi, Que.	51·7*	22·7*	7·5	IIB	89·2	49	11·6	86·5	43·3	11·7
135	136	119	Compton, Que.	55·1	23·0	6·8*	IIB	91·1	41	9·6	86·1	41·5	11·3
133	144	121	Châteauguay, Que.	51·4*	23·4	8·0	IIB	94·2	53	12·1	85·4	44·1	11·5
133	117	118	Division No. 2, Man.	58·9	21·4	4·5	IA	70·1	30	8·0	85·4	35·7	11·2
133	131	117	Iberville, Que.	55·7	22·8	6·4*	IIB	95·5	56	12·8	85·4	40·2	11·1
133	149	122	Huntingdon, Que.	49·3	23·5	8·6	IVB	89·8	53	14·0	85·2	45·5	11·6
133	111	119	Saguenay, Que.	59·6	20·9	3·9	IA	96·6	37	10·7	85·0	34·1	11·3
133	111	115	Labelle, Que.	61·2	21·5	3·9	IA	97·1	24	12·7	84·8	34·0	10·9
132	113	117	Champlain, Que.	59·6	21·2	4·1	IA	96·7	39	14·6	84·7	34·5	11·1
132	157	124	Lanark, Ont.	45·7	23·9	9·8	IVB	88·0	49	12·4	84·6	48·1	11·8
132	130	122	Richelieu, Que.	53·2	21·9	6·3*	IIA	96·7	50	16·2	84·5	39·8	11·6
132	146	119	Carleton, N.B.	50·6*	23·8	8·4	IVB	88·4	47	8·8	84·4	44·7	11·3
132	146	119	Colchester, N.S.	50·3*	23·7	8·4	IVB	90·7	48	10·7	84·3	44·6	11·3
132	131	118	Westmorland, N.B.	54·0	22·5*	6·5*	IIB	86·3	42	8·8	84·2	40·1	11·2
131	146	121	Hastings, Ont.	49·0	23·4	8·5	IVB	87·8	47	12·6	84·1	44·8	11·5
131	108	115	Madawaska, N.B.	61·4	21·4	3·7	IA	85·3	36	13·3	84·1	33·2	10·9
131	135	118	Stanstead, Que.	53·8	23·1	7·0	IIB	88·5	43	11·7	84·1	41·2	11·2
131	137	121	Stormont, Ont.	51·2*	22·6*	7·3	IVB	83·2	45	12·3	84·0	41·9	11·5
131	122	117	Terrebonne, Que.	56·9	22·1	5·4	IA	95·4	43	11·5	83·8	37·2	11·1
131	115	116	Division No. 1, Man.	59·0	21·8	4·6	IA	64·7	26	8·1	83·7	35·3	11·0
131	109	115	Restigouche, N.B.	60·9	21·4	3·8	IA	76·0	34	10·0	83·7	33·4	10·9
130	156	123	Haldimand, Ont.	44·9	23·8	9·8	IVB	86·2	51	13·5	83·4	47·7	11·7
130	129	118	Vaudreuil, Que.	53·5	22·3*	6·4*	IIA	92·8	50	11·9	83·4	39·5	11·2
130	136	115	Pontiac, Que.	53·8	23·6	7·3	IIB	89·9	45	10·1	83·3	41·6	10·9
129	139	121	Manitoulin, Ont.	50·1*	22·9	7·7	IVB	94·0	35	11·3	82·8	42·4	11·5
129	155	124	Oxford, Ont.	44·0	23·6	9·8	IVB	79·4	49	11·6	82·5	47·4	11·8
129	140	117	Cumberland, N.S.	50·9*	23·5	7·9	IVB	84·8	43	13·3	82·4	42·8	11·1
129	117	117	Hull, Que.	56·8	21·6	4·9	IA	87·0	38	11·9	82·4	35·7	11·1
129	150	124	Norfolk, Ont.	44·8	23·1	9·2	IVB	75·8	50	13·4	82·4	45·9	11·8
129	122	120	St-Jean, Que.	53·8	21·5	5·6	IA	90·9	50	10·9	82·3	37·3	11·4
128	144	116	Brome, Que.	49·9	24·0	8·5	IVB	86·9	50	10·1	82·0	44·0	11·0
128	141	121	Muskoka, Ont.	47·9	22·8	8·1	IVB	82·5	34	10·6	81·9	43·2	11·5
127	121	113	Argenteuil, Que.	56·8	22·8	5·7	IB	89·4	47	10·5	81·4	37·1	10·7
127	140	119	Queens, N.S.	49·1	23·3	8·1	IVB	92·6	49	11·5	81·3	42·9	11·3
126	103	119	Division No. 18, Sask.	56·7	19·8	3·4	IA	78·1	27	10·3	80·9	31·6	11·3
126	141	118	Guysborough, N.S.	48·5	23·4	8·3	IVB	92·5	48	10·9	80·9	43·2	11·2
126	158	122	Elgin, Ont.	42·5	24·1	10·4	IVB	80·7	47	11·5	80·8	48·3	11·6
125	132	114	Haliburton, Ont.	52·1*	23·3	7·2	IIB	91·6	38	6·9	80·2	40·3	10·8
124	144	117	Charlotte, N.B.	46·8	23·8	8·9	IVB	79·2	51	11·7	79·5	44·2	11·1
124	119	108	Division No. 12, Man.	57·0	23·3	5·8*	IB	61·6	23	8·1	79·2	36·5	10·3
123	110	115	Québec, Que.	55·4	21·2	4·6	IA	96·5	43	16·3	78·8	33·7	10·9
123	102	114	St-Maurice, Que.	58·3	20·9	3·6	IA	94·8	38	14·6	78·8	31·3	10·8
123	147	118	Perth, Ont.	45·0	23·8	9·3	IVB	85·9	46	13·7	78·7	44·9	11·2
123	115	112	Division No. 14, Man.	55·5	22·2	5·3	IA	58·1	23	7·4	78·6	35·2	10·6
122	141	116	Simcoe, Ont.	47·2	23·7	8·6	IVB	85·6	43	12·8	78·3	43·0	11·0
122	139	114	Peterborough, Ont.	47·5	23·6	8·4	IVB	82·4	43	11·9	77·9	42·4	10·8
122	149	118	Leeds, Ont.	43·3	24·0	9·8	IVB	84·5	50	14·0	77·8	45·7	11·2
122	132	114	York, N.B.	49·9	23·4	7·6	IVB	91·3	47	12·8	77·8	40·4	10·8
121	113	117	Jesus Island, Que.	52·1*	20·9	5·1	IA	93·1	47	12·2[3]	77·5	34·5	11·1
121	105	108	Division No. 9, Sask.	57·7	21·7	4·2	IA	54·7	21	7·1	77·3	32·1	10·3
120	131	112	Queens, N.B.	50·2*	23·6	7·6	IVB	86·0	52	11·1	77·1	40·2	10·6
120	125	114	Parry Sound, Ont.	49·9	22·6*	6·9	IVB	84·5	33	9·5	76·8	38·4	10·8
120	136	117	Kent, Ont.	45·8	22·9	8·2	IVB	78·7	43	13·7	76·7	41·5	11·1
120	142	118	Lambton, Ont.	43·9	23·3	9·0	IVB	83·2	43	10·9	76·6	43·5	11·2
119	114	106	Division No. 13, Man.	55·9	22·9	5·5	IB	59·4	22	9·9	76·4	34·9	10·1
119	132	112	Pictou, N.S.	49·1	23·6	7·8	IVB	86·7	47	12·2	76·2	40·3	10·6
119	110	103	Victoria, N.B.	58·1	23·2	5·1	IB	84·0	37	11·6	76·0	33·7	9·8
118	139	117	Wellington, Ont.	44·6	23·4	8·8	IVB	81·2	47	12·2	75·8	42·6	11·1
118	114	112	Sherbrooke, Que.	52·6*	22·0	5·6	IA	87·8	35	13·2	75·6	34·9	10·6

TABLE 2a. Age rank of the counties and census divisions of Canada (male population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931—Con.

Index[1] of Age Rank as Correlated with			County or Census Division	Age Structure			Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with		
(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate		P.C. under 25	Standard Age[2]	P.C. 65 and over					(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years				years				
118	106	109	Nipissing, Ont.	55·3	21·8	4·7	IA	73·5	26	8·7	75·3	32·5	10·4
116	118	106	Sunbury, N.B.	52·5*	23·2	6·4*	IIB	87·7	50	9·9	74·2	36·2	10·1
115	108	108	Division No. 5, Sask.	53·5	21·9	5·1	IA	53·7	22	8·7	73·8	33·1	10·3
115	97	108	Division No. 15, Sask.	55·7	21·0	3·8	IA	51·7	20	8·3	73·4	29·8	10·3
115	132	114	Frontenac, Ont.	44·8	23·0	8·2	IVB	79·9	48	13·8	73·4	40·4	10·8
114	85	106	Abitibi, Que.	58·8	20·0	2·2	IA	92·1	16	9·1	73·2	26·0	10·1
113	131	114	Peel, Ont.	43·8	22·8	8·2	IVB	73·1	51	8·8	72·4	40·0	10·8
112	114	104	Division No. 10, Man.	52·2*	23·2	6·2*	IB	56·8	27	9·6	71·6	34·8	9·9
111	101	113	Beauharnois, Que.	49·9	20·2	4·5	IIIA	80·5	45	12·5	71·2	30·9	10·7
111	112	107	Halifax, N.S.	50·2*	22·3*	6·0*	IIIA	83·7	43	12·6	71·1	34·3	10·2
110	94	104	Division No. 10, Alta.	55·2	21·2	3·8	IA	48·0	19	6·8	70·6	28·8	9·9
110	125	111	Brant, Ont.	45·1	23·0	7·8	IVB	72·7	44	11·7	70·4	38·4	10·5
109	117	111	Waterloo, Ont.	46·4	22·2	6·8*	IVA	78·0	42	10·3	69·8	35·8	10·5
109	98	99	Cape Breton, N.S.	55·5	22·4*	4·5	IA	79·6	36	10·9	69·5	30·1	9·4
108	123	112	Ontario, Ont.	44·0	22·5*	7·6	IVB	75·4	47	13·0	69·4	37·6	10·6
108	108	104	Division No. 3, Man.	50·9*	22·4*	5·7	IIIA	57·4	28	7·3	69·2	32·9	9·9
106	90	100	Division No. 13, Alta.	56·1	21·6	3·6	IA	48·3	17	11·7	68·1	27·5	9·5
106	125	107	Halton, Ont.	44·1	23·4	8·1	IVB	72·3	49	9·8	67·8	38·2	10·2
105	92	105	Division No. 17, Alta.	52·7*	20·9	3·9	IA	59·6	25	10·0	67·4	28·0	10·0
105	128	107	Middlesex, Ont.	42·3	23·5	8·6	IVB	75·8	45	12·8	67·3	39·3	10·2
105	98	98	Division No. 15, Man.	54·0	22·6*	4·8	IB	46·6	20	6·7	67·0	29·9	9·3
104	91	97	Division No. 10, Sask.	56·2	22·2	3·9	IA	48·8	18	6·7	66·8	27·7	9·2
104	114	103	St. John, N.B.	46·9	23·0	6·9	IVB	82·8	48	15·0	66·3	34·8	9·8
103	78	107	Temiskaming, Que.	52·2*	19·0	2·4	IA	67·9	22	10·4	65·6	23·9	10·2
102	102	97	Division No. 11, Man.	51·0*	22·7*	5·5	IIIB	56·5	27	7·2	65·4	31·1	9·2
102	106	101	Division No. 4, Man.	48·4	22·6*	6·1*	IIIB	51·5	28	5·7	65·3	32·5	9·6
101	103	100	Rainy River, Ont.	49·4	22·6*	5·8*	IIIB	52·2	23	9·7	64·9	31·6	9·5
101	105	100	Division No. 8, Man.	48·6	22·8	6·1*	IIIB	51·6	29	7·7	64·4	32·2	9·5
100	88	97	Division No. 5, Man.	53·8	21·9	4·0	IA	53·9	24	6·7	63·9	27·0	9·2
100	111	101	Division No. 7, Man.	45·9	23·0	6·9	IVB	51·0	27	8·9	63·7	33·9	9·6
99	103	100	Carleton, Ont.	48·5	22·6*	5·9*	IIIB	70·2	37	11·9	63·6	31·4	9·5
98	74	103	District of Patricia, Ont.	52·6*	19·4	2·3	IA	80·8	–	–	62·8	22·6	9·8
96	92	93	Chambly, Que.	52·1*	22·7*	4·8	IB	79·0	43	9·1	61·5	28·0	8·8
94	94	95	Algoma, Ont.	48·9	22·4*	5·3	IIIA	69·5	29	10·1	60·4	28·9	9·0
94	89	93	Division No. 1, Sask.	51·5*	22·4*	4·6	IA	44·6	21	6·7	60·2	27·2	8·8
91	78	92	Division No. 14, Alta.	52·3*	21·5	3·5	IA	40·5	16	7·2	58·2	23·8	8·7
91	74	99	Sudbury, Ont.	49·6	19·9	3·0	IIIA	61·3	21	10·7	58·1	22·7	9·4
90	102	96	Lincoln, Ont.	44·5	23·1	6·7*	IVB	66·9	44	10·1	57·5	31·2	9·1
89	89	92	Division No. 8, Alta.	48·8	22·4*	5·0	IIIA	42·4	21	8·9	57·2	27·1	8·7
89	83	98	Essex, Ont.	47·1	20·9	4·3	IIIA	65·2	35	9·1	57·0	25·4	9·3
87	74	88	Division No. 14, Sask.	51·6*	21·5	3·4	IA	39·5	16	7·0	55·5	22·5	8·4
85	72	87	Division No. 16, Sask.	51·1*	21·5	3·4	IIIA	42·4	18	8·2	54·3	22·1	8·3
85	84	95	Welland, Ont.	45·1	21·4	4·9	IIIA	59·4	39	9·9	54·1	25·8	9·0
84	71	95	Division No. 16, Man.	48·1	20·2	3·2	IIIA	54·2	19	10·0	54·0	21·7	9·0
84	81	86	Division No. 9, Man.	49·9	22·7*	4·6	IIIB	51·3	26	8·8	53·9	24·9	8·2
83	74	93	Montreal Island, Que.	48·2	21·0	3·7	IIIA	74·9	31	12·2[3]	53·4	22·5	8·8
83	68	83	Division No. 3, Sask.	53·6	22·0	3·0	IA	44·0	17	6·1	53·0	20·7	7·9
81	69	86	Division No. 6, Sask.	50·3*	21·4	3·3	IIIA	45·2	20	6·9	51·9	21·1	8·2
81	65	89	Division No. 15, Alta.	49·9	20·6	2·8	IIIA	35·2	14	10·0	51·9	19·9	8·5
81	71	85	Division No. 17, Sask.	50·5*	21·9	3·6	IIIA	40·7	17	8·2	51·6	21·8	8·1
80	71	81	Division No. 2, Sask.	51·5*	22·5*	3·7	IB	43·6	19	8·0	50·9	21·6	7·7
79	83	91	Wentworth, Ont.	44·0	22·0	5·3	IIIA	59·4	38	10·9	50·8	25·5	8·6
79	73	85	Division No. 1, Alta.	49·1	22·1	4·0	IIIA	38·0	20	7·7	50·6	22·2	8·1
77	61	81	Division No. 13, Sask.	52·2*	21·8	2·8	IA	41·8	18	5·7	49·1	18·8	7·7
76	70	80	Division No. 7, Alta.	50·3*	22·6*	3·9	IIIB	38·6	18	7·1	48·9	21·4	7·6
75	59	80	Division No. 8, Sask.	52·0*	21·6	2·6	IA	40·3	17	5·5	48·0	18·1	7·6
75	69	83	Division No. 11, Alta.	47·8	21·9	3·9	IIIA	38·3	19	8·0	47·7	21·1	7·9
75	66	78	Division No. 12, Sask.	50·5*	22·3*	3·5	IIIA	42·0	19	6·4	47·7	20·1	7·4
74	64	82	Division No. 3, Alta.	48·4	21·5	3·4	IIIA	32·1	19	5·0	47·4	19·7	7·8
73	75	87	York, Ont.	43·6	21·6	4·7	IIIA	58·9	31	10·1	46·9	22·8	8·3
72	60	86	Timiskaming, Ont.	47·0	20·5	2·9	IIIA	58·2	19	8·9	46·3	18·3	8·2
72	66	83	Kenora, Ont.	46·3	21·5	3·8	IIIA	50·7	26	8·8	45·8	20·1	7·9
71	62	79	Division No. 4, Sask.	49·1	22·0	3·4	IIIA	37·9	18	5·8	45·5	19·0	7·5
70	50	92	Cochrane, Ont.	44·9	18·5	1·8	IIIA	42·2	16	9·9	44·9	15·2	8·7
70	87	80	Division No. 3, B.C.	41·8	23·9	6·7*	IVB	30·2	–	–	44·8	26·7	7·6
70	59	75	Division No. 7, Sask.	50·8*	22·3*	3·1	IIIA	41·9	19	6·4	44·7	18·0	7·1
70	61	82	Division No. 16, Alta.	46·6	21·1	3·3	IIIA	26·1	13	6·3	44·7	18·6	7·8
69	59	79	Division No. 2, Alta.	48·3	21·6	3·2	IIIA	40·7	21	7·5	44·3	18·2	7·5
69	58	78	Division No. 11, Sask.	49·2	21·8	3·1	IIIA	38·9	18	6·0	44·3	17·9	7·4

TABLE 2a. Age rank of the counties and census divisions of Canada (male population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931—Con.

Index[1] of Age Rank as Correlated with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate	County or Census Division	Age Structure: P.C. under 25	Standard Age[2]	P.C. 65 and over	Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years				years				
67	64	79	Division No. 9, Alta......	45·8	22·0	4·0	IIIA	35·2	19	6·5	42·9	19·6	7·5
67	76	82	Division No. 2, B.C......	41·1	22·5*	5·6	IIIB	28·3	–	–	42·7	23·4	7·8
64	59	73	Division No. 5, Alta......	48·0	22·5*	3·6	IIIB	35·0	18	5·8	41·0	18·0	6·9
64	80	79	Division No. 6, B.C......	40·1	23·3	6·3*	IVB	40·0	–	–	40·9	24·5	7·5
63	58	77	Division No. 4, Alta......	45·3	21·8	3·7	IIIA	35·8	19	6·6	40·2	17·9	7·3
63	62	77	Division No. 6, Man......	45·0	22·2	4·1	IIIA	43·1	23	8·2	40·2	19·0	7·3
55	46	75	Thunder Bay, Ont.........	45·0	21·0	2·7	IIIA	49·2	22	8·9	35·5	14·0	7·1
54	50	73	Division No. 10, B.C......	42·8	21·3	3·4	IIIA	16·0	–	–	34·5	15·3	6·9
52	79	71	Division No. 5, B.C......	36·8	24·5	7·3	IVB	35·3	–	–	33·5	24·1	6·7
52	45	72	Division No. 12, Alta......	43·6	21·1	2·9	IIIA	27·9	16	7·3	33·3	13·7	6·8
51	48	68	Division No. 6, Alta......	43·9	21·9	3·4	IIIA	32·8	19	8·1	32·9	14·7	6·5
50	66	68	Division No. 8, B.C......	38·9	23·6	5·9*	IIIB	34·0	–	–	31·9	20·3	6·5
40	55	61	Division No. 4, B.C......	38·3	23·6	5·4	IIIB	28·7	–	–	25·5	16·9	5·8
38	41	64	Division No. 1, B.C......	38·9	21·9	3·8	IIIA	28·5	–	–	24·0	12·6	6·1
22	30	57	Division No. 7, B.C......	34·1	21·6	3·8	IIIA	32·5	–	–	14·0	9·1	5·4
15	30	48	Division No. 9, B.C......	33·0	22·8	4·5	IIIB	35·5	–	–	9·3	9·1	4·6

TABLE 2b. Age rank of the counties and census divisions of Canada (female population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931

Index[1] of Age Rank as Correlated with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate	County or Census Division	Age Structure: P.C. under 25	Standard Age[2]	P.C. 65 and over	Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years				years				
100	**100**	**100**	**Average (male) of 220 counties and census divisions...................**	**51·4**	**22·5**	**6·3**	–	**75·6**	**38**	**10·8**	**64·0**	**30·6**	**9·5**
183	229	163	Victoria, N.S.............	49·1	24·8	13·5	IVB	94·2	52	12·7	117·4	70·2	15·5
176	210	157	Richmond, N.S...........	51·6*	24·1	11·8	IIB	96·6	51	13·2	112·4	64·4	14·9
173	216	155	Antigonish, N.S..........	49·3	24·9	12·8	IVB	94·7	53	16·2	110·4	66·1	14·7
160	192	141	Inverness, N.S............	53·1	24·8	10·9	IIB	96·5	49	15·1	102·6	58·7	13·4
157	155	136	Kamouraska, Que.........	61·8	22·3*	6·5*	IIA	98·7	50	10·5	100·5	47·5	12·9
157	187	144	Shelburne, N.S............	50·3*	23·6	10·5	IVB	96·8	49	12·1	100·2	57·1	13·7
156	155	136	Bonaventure, Que..	61·9	22·4*	6·5*	IIA	96·5	42	10·2	100·1	47·4	12·9
156	155	137	Bellechasse, Que..........	61·3	22·2	6·5*	IIA	98·8	47	13·7	99·9	47·3	13·0
156	165	138	Kent, N.B.................	58·9	23·2	7·9	IIB	95·4	46	9·4	99·9	50·6	13·1
156	212	151	Prince Edward, Ont.......	40·7	24·7	13·8	IVB	89·9	52	12·8	99·6	64·8	14·3
155	189	147	Queens, P.E.I.............	47·5	23·3	10·9	IVB	93·1	50	10·0	99·2	57·7	14·0
154	142	138	Charlevoix, Que..........	62·6	21·0	5·1	IA	99·1	46	14·3	98·5	43·5	13·1
153	186	141	Kings, P.E.I..............	50·5*	24·2	10·7	IVB	93·6	50	8·8	98·2	56·8	13·4
153	151	137	Montmagny, Que..........	59·7	21·8	6·4*	IIA	98·8	46	14·0	97·9	46·3	13·0

[1] Base: Average for males of 220 counties and census divisions.
[2] For explanation of this term see page 24.
[3] Death rates for Montreal and Jesus Islands separately are not available.

TABLE 2b. Age rank of the counties and census divisions of Canada (female population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931—Con.

Index of Age Rank as Correlated with			County or Census Division	Age Structure			Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with		
(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate		P.C. under 25	Standard Age[2]	P.C. 65 and over					(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years					years			
153	132	133	Frontenac, Que.	66·5	20·9	3·9	IA	97·7	34	12·2	97·6	40·3	12·6
152	133	134	Rimouski, Que.	65·5	21·0	4·2	IA	98·4	43	10·4	97·2	40·8	12·7
151	140	132	Dorchester, Que.	64·2	21·8	5·1	IA	99·4	45	10·9	96·8	42·8	12·5
151	134	132	Témiscouata, Que.	65·2	21·1	4·3	IA	97·0	41	9·1	96·7	40·9	12·5
151	176	141	Albert, N.B.	51·0*	23·3	9·7	IVB	91·3	50	11·1	96·5	53·8	13·4
151	122	131	Lac-St-Jean, Que.	68·5	20·3	2·8	IA	98·2	28	12·1	96·5	37·2	12·4
151	135	131	Beauce, Que.	64·9	21·3	4·5	IA	99·1	42	10·1	96·4	41·3	12·4
150	195	141	Annapolis, N.S.	45·3	24·7	12·2	IVB	92·6	50	13·4	95·9	59·6	13·4
150	179	139	Yarmouth, N.S.	50·3*	23·8	10·2	IVB	94·4	47	11·3	95·9	54·8	13·2
149	123	129	Matane, Que.	67·8	20·6	3·1	IA	97·7	33	12·7	95·4	37·6	12·3
149	177	141	Huntingdon, Que.	49·6	23·4	10·0	IVB	89·3	53	11·6	95·1	54·1	13·4
148	142	134	Montmorency, Que.	60·6	21·6	5·7	IA	98·6	47	11·7	94·8	43·6	12·7
148	118	132	Chicoutimi, Que.	67·0	19·8	2·6	IA	97·1	33	11·1	94·5	36·1	12·5
147	123	135	Division No. 18, Sask.	63·4	19·5	3·3	IA	89·1	27	16·6	94·2	37·7	12·8
147	140	128	Gloucester, N.B.	62·8	22·2	5·5	IA	97·4	41	12·9	94·1	42·9	12·2
147	147	128	Lotbinière, Que.	60·8	22·7*	6·4*	IIB	98·4	49	13·1	94·1	45·0	12·2
146	135	128	Gaspé, Que.	64·0	21·9	4·9	IA	98·9	40	14·1	93·5	41·2	12·2
146	136	129	L'Islet, Que.	63·0	21·7	5·0	IA	98·5	46	10·1	93·5	41·5	12·3
146	153	134	Deux-Montagnes, Que.	56·0	22·3*	7·3	IIA	98·6	53	14·0	93·4	46·9	12·7
146	125	131	Saguenay, Que.	65·1	20·6	3·6	IA	98·4	37	12·0	93·3	38·1	12·4
144	144	132	Joliette, Que.	58·1	21·9	6·3*	IIA	96·5	48	12·8	92·0	44·1	12·5
143	146	129	Yamaska, Que.	58·2	22·4*	6·6*	IIA	98·1	51	13·7	91·5	44·7	12·3
143	164	134	Hants, N.S.	51·6*	23·3	9·0	IIB	93·4	49	10·4	91·2	50·3	12·7
143	121	126	Labelle, Que.	65·2	20·8	3·5	IA	97·7	24	11·2	91·2	37·1	12·0
142	164	134	Châteauguay, Que.	51·5*	23·3	9·0	IIB	95·4	53	13·9	91·0	50·3	12·7
142	167	132	Guysborough, N.S.	51·1*	23·7	9·4	IVB	96·2	48	10·9	91·0	51·1	12·5
141	148	128	Bagot, Que.	57·0	22·8	7·1	IIB	96·9	50	9·6	90·4	45·4	12·2
141	147	128	Pontiac, Que.	57·2	22·6*	6·9	IIB	91·9	45	8·1	90·4	44·9	12·2
141	145	128	Nicolet, Que.	57·6	22·5*	6·7*	IIB	98·3	47	13·3	90·3	44·4	12·2
141	170	133	Glengarry, Ont.	49·7	24·0	9·9	IVB	86·0	50	11·8	90·0	52·0	12·6
140	131	126	Mégantic, Que.	61·5	21·7	5·0	IA	97·5	42	11·7	89·6	40·1	12·0
140	134	125	Arthabaska, Que.	60·8	22·0	5·4	IA	97·5	42	11·3	89·5	41·0	11·9
140	142	125	Russell, Ont.	58·7	22·6*	6·4*	IIB	86·9	40	12·4	89·4	43·3	11·9
140	140	129	Lévis, Que.	57·1	21·8	6·2*	IA	98·6	45	12·8	89·3	42·8	12·3
140	159	129	Prince, P.E.I.	52·5*	23·5	8·7	IIB	94·9	46	11·4	89·3	48·8	12·3
139	168	134	Lunenburg, N.S.	48·7	23·5	9·7	IVB	97·5	45	10·7	89·2	51·3	12·7
139	151	127	Napierville, Que.	56·3	23·4	7·6	IIB	97·9	57	13·4	89·1	46·1	12·1
139	147	127	Prescott, Ont.	56·4	22·9	7·2	IIB	86·3	45	11·1	89·1	45·1	12·1
139	168	131	Digby, N.S.	50·2*	24·2	9·8	IVB	94·5	48	12·9	88·9	51·3	12·4
139	116	124	Madawaska, N.B.	65·1	20·7	3·2	IA	84·6	36	11·2	88·7	35·4	11·8
138	119	125	Restigouche, N.B.	64·1	20·9	3·6	IA	77·0	34	9·8	88·6	36·4	11·9
138	103	124	Abitibi, Que.	67·8	19·6	1·6	IA	94·7	16	8·7	88·2	31·5	11·8
138	140	124	Montcalm, Que.	58·6	22·6*	6·3*	IIB	97·5	50	11·1	88·2	42·7	11·8
137	161	132	Kings, N.S.	49·9	23·3	9·1	IVB	91·3	48	9·5	87·9	49·3	12·5
137	130	124	Papineau, Que.	60·7	21·8	5·1	IA	90·5	41	11·1	87·9	39·7	11·8
137	184	136	Lennox, Ont.	42·3	24·5	12·0	IVB	93·0	53	11·3	87·8	56·3	12·9
137	143	132	Vaudreuil, Que.	54·0	21·7	6·8*	IIA	92·0	50	8·3	87·8	43·9	12·5
137	171	132	Addington, Ont.	47·1	24·1	10·4	IVB	95·3	53	16·2	87·5	52·4	12·5
137	130	124	Portneuf, Que.	60·5	21·9	5·2	IA	99·0	45	10·8	87·5	39·8	11·8
136	132	121	Division No. 12, Man.	60·7	22·4*	5·5	IA	64·3	23	8·0	87·3	40·5	11·5
136	129	125	Jesus Island, Que.	59·4	21·5	5·1	IA	96·4	32	11·2[3]	86·8	39·4	11·9
135	146	125	Soulanges, Que.	55·1	22·9	7·3	IIB	94·1	53	10·8	86·7	44·6	11·9
135	184	136	Grenville, Ont.	40·7	24·4	12·2	IVB	90·0	53	9·9	86·4	56·3	12·9
135	134	126	Richmond, Que.	57·8	21·9	5·8*	IA	93·3	40	11·6	86·4	40·9	12·0
135	139	127	Verchères, Que.	55·8	22·0	6·4*	IIA	96·7	52	10·4	86·4	42·4	12·1
135	130	122	Maskinongé, Que.	60·1	22·2	5·4	IA	98·3	49	13·5	86·2	39·9	11·6
134	136	122	Northumberland, N.B.	58·5	22·6*	6·1*	IB	95·5	44	10·8	86·0	41·5	11·6
134	116	122	Champlain, Que.	62·9	21·0	3·7	IA	97·6	39	12·5	85·8	35·6	11·6
134	155	129	Queens, N.S.	50·7*	23·2	8·6	IVB	92·9	49	12·4	85·8	47·5	12·3
134	117	121	Division No. 9, Sask.	63·1	21·2	3·8	IA	60·4	21	7·0	85·7	35·8	11·5
133	155	128	Colchester, N.S.	50·4*	23·3	8·7	IVB	90·6	48	10·8	85·4	47·5	12·2
133	122	122	Drummond, Que.	60·7	21·2	4·4	IA	94·4	41	13·4	85·4	37·2	11·6
133	133	125	Laprairie, Que.	57·0	21·9	5·9*	IA	96·2	52	11·2	85·4	40·8	11·9
133	140	124	L'Assomption, Que.	55·6	22·6*	6·8*	IIB	97·6	52	14·7	85·3	42·9	11·8
133	123	117	Wolfe, Que.	63·2	22·4*	4·6	IA	97·4	40	10·0	85·0	37·5	11·1
132	109	121	Division No. 13, Alta.	63·7	20·4	2·9	IA	57·0	17	9·3	84·6	33·3	11·5
132	145	125	Rouville, Que.	53·2	22·8	7·5	IIB	95·0	54	10·4	84·6	44·4	11·9
132	116	123	District of Patricia, Ont.	60·9	20·6	3·8	IA	95·9	–	–	84·5	35·5	11·7
132	112	116	Division No. 1, Man.	64·9	21·5	3·4	IA	69·7	26	7·8	84·4	34·3	11·0
132	176	133	Northumberland, Ont.	42·0	24·2	11·5	IVB	87·4	52	15·4	84·3	53·9	12·6
132	134	121	Berthier, Que.	57·2	22·4*	6·1*	IA	97·1	50	12·8	84·2	40·9	11·5
131	116	123	Division No. 2, Man.	60·9	20·8	3·9	IA	72·7	30	7·3	84·1	35·6	11·7
131	100	121	Temiskaming, Que.	65·4	19·6	1·8	IA	77·3	22	9·1	84·0	30·5	11·5

TABLE 2b. Age rank of the counties and census divisions of Canada (female population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931—Con.

Index[1] of Age Rank as Correlated with			County or Census Division	Age Structure			Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with		
(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate		P.C. under 25	Standard Age[2]	P.C. 65, and over					(1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
					years				years				
131	150	124	Queens, N.B.	51·6*	23·4	8·3	IIB	88·0	52	9·0	83·8	45·9	11·8
131	145	129	St-Hyacinthe, Que.	50·4*	22·1	7·6	IVA	95·5	48	12·6	83·6	44·3	12·3
130	155	128	Pictou, N.S.	48·6	23·2	8·9	IVB	86·5	47	11·5	83·4	47·3	12·2
130	164	132	Norfolk, Ont.	44·3	23·3	10·1	IVB	80·2	50	12·9	83·2	50·2	12·5
130	133	124	Richelieu, Que.	55·4	21·9	6·1*	IA	96·9	50	13·5	83·2	40·6	11·8
130	117	118	Victoria, N.B.	62·1	21·6	4·1	IA	84·6	37	10·0	83·2	35·8	11·2
130	137	126	Westmorland, N.B.	53·4	22·0	6·7*	IIA	86·7	42	8·6	83·2	41·9	12·0
129	132	119	Compton, Que.	57·4	22·8	6·2*	IB	92·0	41	8·7	82·8	40·5	11·3
129	136	122	Argenteuil, Que.	54·6	22·5*	6·7*	IIB	89·4	47	9·8	82·7	41·7	11·6
129	174	131	Durham, Ont.	41·3	24·2	11·5	IVB	85·1	54	12·2	82·5	53·3	12·4
129	142	124	Stormont, Ont.	51·9*	22·5*	7·4	IIB	83·8	45	12·8	82·5	43·4	11·8
129	133	120	Iberville, Que.	56·3	22·6*	6·3*	IIB	95·1	56	11·0	82·3	40·6	11·4
129	131	122	Shefford, Que.	56·3	22·2	6·0*	IA	95·1	45	10·5	82·3	40·0	11·6
128	167	128	Bruce, Ont.	44·2	24·2	10·7	IVB	93·2	45	10·3	82·2	51·2	12·2
128	108	119	Division No. 15, Sask.	62·6	20·6	3·1	IA	59·1	20	7·1	82·1	33·0	11·3
128	119	120	Hull, Que.	59·0	21·2	4·5	IA	87·3	38	11·8	82·1	36·3	11·4
128	108	117	Division No. 10, Alta.	62·9	20·9	3·2	IA	55·0	19	5·9	81·6	33·0	11·1
127	146	122	Carleton, N.B.	51·3*	23·4	8·1	IVB	87·6	47	10·2	81·2	44·6	11·6
127	116	117	Division No. 14, Man.	60·5	21·6	4·3	IA	63·7	23	6·2	81·0	35·4	11·1
126	156	123	Kings, N.B.	47·7	23·9	9·4	IVB	87·6	51	11·2	80·8	47·6	11·7
126	120	119	Terrebonne, Que.	58·4	21·7	4·9	IA	95·7	43	10·6	80·8	36·8	11·3
126	130	119	Haliburton, Ont.	55·3	22·4*	6·2*	IA	92·9	38	12·7	80·4	39·7	11·3
125	137	121	Missisquoi, Que.	52·1*	22·5*	7·1	IIB	90·4	49	10·4	80·1	41·9	11·5
125	153	122	Charlotte, N.B.	47·5	23·7	9·2	IVB	87·2	51	11·2	79·9	46·7	11·6
125	143	122	Cumberland, N.S.	50·7*	23·1	7·9	IVB	84·8	43	11·9	79·8	43·7	11·6
125	117	118	Division No. 5, Sask.	58·9	21·6	4·6	IA	58·6	22	7·5	79·8	35·8	11·2
125	150	124	Hastings, Ont.	47·8	23·3	8·8	IVB	89·9	47	11·2	79·7	45·8	11·8
124	107	114	Division No. 10, Sask.	62·2	21·2	3·4	IA	55·2	18	7·3	79·6	32·7	10·8
124	163	125	Dundas, Ont.	43·8	24·3	10·6	IVB	92·4	50	11·7	79·6	49·9	11·9
124	106	117	Division No. 16, Man.	60·8	20·6	3·3	IA	70·7	19	9·6	79·5	32·5	11·1
124	167	127	Leeds, Ont.	41·6	24·2	11·1	IVB	87·4	50	12·3	79·5	51·2	12·1
124	136	120	Renfrew, Ont.	52·7*	22·8	7·1	IIB	88·9	41	11·4	79·4	41·6	11·4
124	128	117	Sunbury, N.B.	55·5	22·6*	6·2*	IB	88·8	50	12·5	79·4	39·3	11·1
123	119	116	Cape Breton, N.S.	58·2	22·0	5·0	IA	81·8	36	10·0	79·0	36·4	11·0
123	175	125	Huron, Ont.	40·5	25·2	12·1	IVB	93·0	48	11·7	79·0	53·4	11·9
123	116	115	Division No. 13, Man.	59·5	22·1	4·7	IA	63·4	22	7·3	78·8	35·5	10·9
123	159	125	Haldimand, Ont.	43·5	23·8	10·2	IVB	88·9	51	11·7	78·6	48·8	11·9
123	109	116	Nipissing, Ont.	60·0	21·1	3·8	IA	78·6	26	6·9	78·6	33·4	11·0
122	122	120	Quebec, Que.	54·1	21·2	5·4	IA	96·7	43	14·1	78·2	37·2	11·4
122	91	122	Cochrane, Ont.	60·4	18·3	1·5	IA	54·1	16	8·6	77·9	27·9	11·6
122	105	116	St-Maurice, Que.	59·8	20·6	3·4	IA	95·4	38	12·7	77·9	32·2	11·0
121	122	120	St-Jean, Que.	53·7	21·3	5·5	IA	92·6	50	9·8	77·5	37·2	11·4
121	146	119	Brome, Que.	48·7	23·8	8·7	IVB	87·8	50	9·8	77·4	44·7	11·3
120	136	119	York, N.B.	50·6*	22·8	7·4	IVB	91·4	47	10·2	77·0	41·5	11·3
119	118	118	Beauharnois, Que.	54·4	21·3	5·2	IA	89·1	45	9·5	76·4	36·0	11·2
119	127	115	Stanstead, Que.	53·8	22·7*	6·4*	IIB	89·3	43	7·7	76·2	38·8	10·9
119	95	116	Sudbury, Ont.	60·6	19·8	2·4	IA	71·4	21	9·0	76·2	29·2	11·0
119	92	115	Division No. 15, Alta.	61·8	19·7	2·0	IA	46·3	14	9·2	76·1	28·3	10·9
119	155	121	Grey, Ont.	44·1	24·1	10·0	IVB	92·5	45	11·2	76·0	47·4	11·5
118	159	122	Victoria, Ont.	42·3	24·3	10·6	IVB	92·3	47	11·8	75·7	48·6	11·6
118	162	123	Elgin, Ont.	40·3	24·3	11·1	IVB	82·9	47	10·4	75·4	49·7	11·7
118	158	122	Oxford, Ont.	41·8	23·9	10·4	IVB	84·1	49	12·2	75·4	48·2	11·6
117	96	112	Division No. 14, Alta.	61·7	20·6	2·6	IA	50·4	16	8·0	75·1	29·3	10·6
117	117	112	Parry Sound, Ont.	56·0	22·3*	5·4	IA	88·4	33	8·6	75·0	35·9	10·6
117	154	121	Lanark, Ont.	43·1	23·9	10·0	IVB	90·4	49	11·2	74·9	47·0	11·5
117	152	122	Wellington, Ont.	43·0	23·6	9·8	IVB	83·9	47	11·2	74·9	46·5	11·6
116	93	111	Division No. 17, Alta.	61·6	20·4	2·4	IA	76·0	25	12·9	74·3	28·5	10·5
116	125	118	Halifax, N.S.	50·4*	21·8	6·4*	IVA	85·2	43	11·8	74·2	38·1	11·2
116	124	113	Manitoulin, Ont.	53·4	22·7*	6·3*	IIB	95·9	35	8·6	74·2	37·8	10·7
114	92	109	Division No. 3, Sask.	60·8	20·3	2·4	IA	51·0	17	4·2	73·0	28·1	10·4
114	128	115	Muskoka, Ont.	50·2*	22·7*	7·0	IVB	84·5	34	9·1	72·9	39·1	10·9
114	92	114	Division No. 16, Alta.	59·0	19·7	2·4	IA	34·6	13	7·0	72·8	28·1	10·8
113	149	118	Perth, Ont.	43·2	24·0	9·8	IVB	88·2	46	13·4	72·5	45·6	11·2
113	151	119	Dufferin, Ont.	42·4	24·0	10·0	IVB	92·6	46	12·1	72·4	46·1	11·3
113	102	111	Rainy River, Ont.	57·8	21·2	3·8	IA	57·2	23	7·1	72·2	31·1	10·5
112	91	109	Division No. 8, Sask.	60·4	20·3	2·4	IA	48·1	17	5·4	71·9	27·8	10·4
112	142	118	Frontenac, Ont.	44·3	23·4	9·0	IVB	83·9	48	10·6	71·9	43·6	11·2
112	112	107	Division No. 10, Man.	56·0	22·5*	5·2	IB	61·1	27	8·1	71·7	34·2	10·2
112	96	108	Division No. 16, Sask.	59·2	21·0	3·2	IA	51·3	18	8·7	71·5	29·4	10·3
111	92	108	Division No. 13, Sask.	60·1	20·7	2·7	IA	49·9	18	5·9	71·2	28·2	10·3
111	108	111	Algoma, Ont.	55·1	21·6	4·7	IA	75·8	29	8·5	71·1	33·0	10·5
111	100	107	Division No. 15, Man.	58·2	21·5	3·8	IA	50·3	20	6·7	71·1	30·7	10·2
111	139	114	Simcoe, Ont.	45·9	23·7	8·7	IVB	89·1	43	11·1	71·0	42·4	10·8

TABLE 2b. Age rank of the counties and census divisions of Canada (female population), 1931, as based upon the correlation between age structure and (1) percentage born in the province of residence in 1931, (2) average age of settlement of the area and (3) resident death rate, 1931—Con.

Index[1] of Age Rank as Correlated with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate	County or Census Division	Age Structure: P.C. under 25	Standard Age[2]	P.C. 65 and over	Age Type	P.C. Born in Province of Residence	Age of Settlement	Death Rate	Age Rank as Calculated on Basis of Correlation with (1) P.C. Born in Province of Residence	(2) Age of Settlement	(3) Death Rate
				years					years				
111	133	115	Kent, Ont.	46·8	23·1	8·0	IVB	81·3	43	10·6	70·9	40·8	10·9
110	89	106	Division No. 14, Sask.	61·0	20·7	2·4	IA	48·2	16	5·4	70·6	27·2	10·1
110	110	113	Sherbrooke, Que.	52·7*	21·4	5·1	IA	89·3	35	11·7	70·4	33·7	10·7
110	141	115	Lambton, Ont.	43·8	23·6	9·1	IVB	85·5	43	12·0	70·2	43·1	10·9
109	133	116	Ontario, Ont.	44·8	22·7*	8·1	IVB	78·8	47	11·9	69·7	40·7	11·0
108	95	105	Division No. 5, Man.	58·2	21·2	3·4	IA	57·6	24	6·0	69·4	29·2	10·0
108	106	107	Division No. 11, Man.	55·0	22·0	4·8	IA	62·2	27	7·6	69·0	32·4	10·2
106	106	107	Division No. 3, Man.	54·2	22·0	4·9	IA	62·3	28	6·8	67·9	32·3	10·2
106	89	106	Division No. 4, Sask.	58·5	20·6	2·7	IA	46·5	18	5·2	67·8	27·1	10·1
106	126	113	St. John, N.B.	45·7	22·5*	7·5	IVB	83·8	48	13·5	67·7	38·5	10·7
106	131	109	Peterborough, Ont.	45·9	23·5	8·2	IVB	84·8	43	10·9	67·6	40·1	10·4
104	89	102	Division No. 17, Sask.	58·7	21·2	3·0	IA	49·3	17	6·0	66·8	27·3	9·7
104	95	102	Division No. 1, Sask.	57·2	21·8	3·8	IA	50·4	21	7·0	66·4	29·0	9·7
104	92	102	Division No. 7, Alta.	57·5	21·4	3·4	IA	45·8	18	6·9	66·3	28·1	9·7
103	139	113	Middlesex, Ont.	40·8	23·5	9·4	IVB	78·0	45	11·9	66·2	42·6	10·7
103	122	111	Waterloo, Ont.	45·7	22·5*	7·3	IVB	80·5	42	8·0	65·8	37·3	10·5
103	131	109	Brant, Ont.	44·0	23·5	8·5	IVB	75·2	44	11·1	65·7	40·2	10·4
103	131	112	Peel, Ont.	43·2	23·2	8·5	IVB	78·2	51	7·8	65·7	40·2	10·6
102	84	104	Timiskaming, Ont.	57·4	20·3	2·5	IA	67·0	19	7·3	65·3	25·7	9·9
101	96	103	Division No. 8, Alta.	54·8	21·7	4·2	IA	48·5	21	8·1	64·9	29·5	9·8
101	89	105	Division No. 6, Sask.	55·4	20·6	3·2	IA	50·3	20	5·8	64·7	27·1	10·0
101	105	105	Chambly, Que.	51·4*	22·0	5·3	IA	79·9	43	8·1	64·6	32·1	10·0
100	86	99	Division No. 2, Sask.	58·5	21·5	3·0	IA	50·4	19	6·0	64·2	26·4	9·4
100	90	102	Division No. 9, Alta.	55·4	21·1	3·5	IA	43·7	19	4·7	64·0	27·6	9·7
99	113	108	Carleton, Ont.	46·4	22·0	6·5*	IVA	71·2	37	10·8	63·5	34·6	10·3
99	90	99	Division No. 1, Alta.	56·6	21·6	3·5	IA	44·1	20	8·0	63·4	27·4	9·4
99	128	108	Halton, Ont.	42·8	23·4	8·5	IVB	75·4	49	9·3	63·3	39·3	10·3
99	90	101	Kenora, Ont.	55·1	21·1	3·5	IA	59·1	26	8·1	63·2	27·4	9·6
98	85	101	Division No. 2, Alta.	56·6	21·0	3·0	IA	47·8	21	6·3	63·0	26·0	9·6
98	79	100	Division No. 3, Alta.	58·5	20·6	2·2	IA	42·1	19	6·3	63·0	24·2	9·5
98	87	99	Division No. 12, Sask.	56·6	21·4	3·3	IA	48·5	19	6·6	63·0	26·7	9·4
98	76	102	Division No. 12, Alta.	57·0	19·9	2·0	IA	39·7	16	7·3	62·4	23·4	9·7
97	107	102	Division No. 7, Man.	49·9	22·6*	5·9*	IIIB	56·0	27	8·2	62·2	32·6	9·7
97	105	101	Division No. 8, Man.	51·3*	22·7*	5·6	IIIB	56·7	29	7·4	62·2	32·0	9·6
97	104	105	Welland, Ont.	48·4	21·6	5·5	IIIA	64·8	39	10·0	61·8	31·7	10·0
96	84	101	Division No. 11, Sask.	55·4	20·9	3·1	IA	44·3	18	5·2	61·6	25·8	9·6
96	84	98	Division No. 7, Sask.	56·5	21·3	3·1	IA	47·3	19	5·6	61·5	25·8	9·3
96	95	106	Essex, Ont.	49·7	20·8	4·5	IIIA	68·4	35	8·0	61·4	29·2	10·1
95	81	98	Division No. 5, Alta.	57·3	21·1	2·7	IA	42·8	18	5·4	61·1	24·7	9·3
95	95	101	Division No. 9, Man.	52·1*	21·8	4·6	IA	53·9	26	6·7	61·1	29·2	9·6
94	87	100	Division No. 11, Alta.	53·6	21·1	3·6	IA	42·8	19	5·8	60·4	26·6	9·5
94	116	105	Lincoln, Ont.	44·0	22·8	7·4	IVB	69·0	44	9·1	60·2	35·6	10·0
93	71	97	Division No. 10, B.C.	58·3	20·4	1·7	IA	25·8	–	–	59·2	21·6	9·2
92	97	97	Division No. 4, Man.	51·0*	22·5*	5·2	IIIB	56·4	28	5·0	59·0	29·8	9·2
90	89	102	Montreal Island, Que.	49·3	20·9	4·3	IIIA	77·0	32	11·2[3]	57·6	27·3	9·7
89	76	98	Thunder Bay, Ont.	54·2	20·6	2·7	IA	58·3	22	6·8	56·9	23·3	9·3
89	91	97	Division No. 6, B.C.	51·0*	22·0	4·6	IIIA	54·8	–	–	56·8	27·7	9·2
87	77	93	Division No. 4, Alta.	54·6	21·3	3·0	IA	44·6	19	4·8	55·7	23·5	8·8
86	102	101	Wentworth, Ont.	44·2	22·1	6·3*	IVA	63·0	38	9·5	55·2	31·2	9·6
84	74	91	Division No. 8, B.C.	54·8	21·5	2·9	IA	49·6	–	–	53·9	22·5	8·6
84	84	93	Division No. 2, B.C.	50·9*	22·0	4·3	IIIA	36·2	–	–	53·6	25·8	8·8
82	90	91	Division No. 3, B.C.	49·4	22·8	5·2	IIIB	36·9	–	–	52·7	27·6	8·6
81	80	94	Division No. 6, Man.	49·3	21·3	4·0	IIIA	47·6	23	6·4	51·9	24·6	8·9
80	68	96	Division No. 7, B.C.	50·5*	19·8	2·5	IIIA	49·5	–	–	51·4	20·9	9·1
79	69	91	Division No. 9, B.C.	52·6*	20·9	2·7	IA	56·0	–	–	50·6	21·0	8·6
75	64	84	Division No. 1, B.C.	53·5	21·3	2·5	IA	40·0	–	–	48·1	19·6	8·0
75	71	88	Division No. 6, Alta.	50·1*	21·3	3·4	IIIA	37·5	19	6·5	48·1	21·8	8·4
75	98	89	Division No. 5, B.C.	43·1	23·5	6·9	IVB	41·6	–	–	48·0	30·1	8·5
75	88	95	York, Ont.	42·8	21·7	5·6	IIIA	61·8	31	8·9	47·8	27·0	9·0
65	78	83	Division No. 4, B.C.	44·2	22·5*	5·2	IIIB	33·0	–	–	41·7	23·8	7·9

TABLE 3. Cities of 5,000 population and over classified according to the age group containing maximum population, and showing secondary peaks, for (a) total population, (b) male population and (c) female population, 1931

Class	City
(A) TOTAL POPULATION	
I—Maximum in age group 0-4—	
A—Follows natural curve	Chicoutimi, Que.[1]
	Joliette, Que.
	Shawinigan Falls, Que.[1]
	Thetford Mines, Que.[1]
B—Peak at 15-24	Granby, Que.
	Québec, Que.[1]
	Valleyfield, Que.[1]
C—Peak at 20-24	Trois-Rivières, Que.[1] (small).
D—Peak at 15-34	Sudbury, Ont.
E—Peak at 20-34	Oshawa, Ont.[1]
	Verdun, Que.[1]
II—Maximum in age group 5-9—	
A—Follows natural curve	Cap-de-la-Madeleine, Que.
	Grand'Mère, Que.[1]
	Hull, Que.[1]
	Lachine, Que.
	Lévis, Que.
	Longueuil, Que.
	Prince Albert, Sask.
	Rivière-du-Loup, Que.[1] (also small peak at 35-39).
	St. Boniface, Man.
	Welland, Ont.
B—Peak at 15-19	Belleville, Ont. (also small peak at 35-39).
	Hamilton, Ont. (decrease from 20 to 49 is very slow).
	Sorel, Que.[1]
	Stratford, Ont. (small).
C—Peak at 15-24	Charlottetown and Royalty, P.E.I. (also small peak at 35-39)
	Guelph, Ont.
	Montreal, Que.
	St-Jean, Que. (small).
	Sherbrooke, Que.
D—Peaks at 15-19 and 30-34	Niagara Falls, Ont.[1]
E—Peaks at 20-24 and 30-34	Moncton, N.B.
F—Peak at 25-39	East Windsor, Ont.[1]
	Windsor, Ont.[1]
G—Peak at 30-34	Sarnia, Ont.[1]
H—Peak at 35-39	Fort William, Ont.[1]
	North Bay, Ont.[1]
	St-Lambert, Que.
	St. Thomas, Ont.
	Saint John, N.B.
I—Peak at 35-44	Sydney, N.S.
III—Maximum in age group 10-14—	
A—Peak at 35-44	St. Catharines, Ont.[1]
	Sault Ste. Marie, Ont.[1]
B—Peak at 35-49	Portage la Prairie, Man.
	Swift Current, Sask.[1]
C—Peak at 40-49	Brandon, Man.
IV—Maximum in age group 15-19—	
A—Follows natural curve	Brantford, Ont.[1]
	Galt, Ont.[1]
	Lethbridge, Alta.
	Peterborough, Ont.[1]
	Port Arthur, Ont.[1]
	Yorkton, Sask[1].
B—Dip at 10-14	Chatham, Ont.
C—Peak at 5-9	St-Hyacinthe, Que.[1]
	Ottawa, Ont. (also small peak at 35-44).
	Owen Sound, Ont. (also small peak at 35-39).
D—Peak at 35-39	Fredericton, N.B.
E—Peak at 35-44	Edmonton, Alta.[2]
	Saskatoon, Sask.
F—Peak at 35-49	Calgary, Alta.
	Medicine Hat, Alta.
	Moose Jaw, Sask.
	New Westminster, B.C.[1]
	North Battleford, Sask.
	Vancouver, B.C.
	Weyburn, Sask.
	Winnipeg, Man.
G—Peak at 40-49	Kamloops, B.C.[1]
	Nelson, B.C.[1]
H—Peak at 30-54	North Vancouver, B.C.
I—Peak at 30-59	Victoria, B.C.
Other	Nanaimo, B.C.[1] (very erratic—peaks at 5-9, 25-29, 35-39 and 45-49).

[1] Mode in the same class for male population as for female population.
[2] Population the same at age groups 5-9 and 10-14.

TABLE 3. Cities of 5,000 population and over classified according to the age group containing maximum population, and showing secondary peaks, for (a) total population, (b) male population and (c) female population, 1931—Con.

Class	City
(A) TOTAL POPULATION—Con.	
V—Maximum in age group 20-24—	
A—Follows natural curve	Regina, Sask.
B—Peak at 5-9	Halifax, N.S.
	Kitchener, Ont.
	Woodstock, Ont.[1]
C—Peaks at 5-9 and 35-39	Kingston, Ont.
	London, Ont.
	Toronto, Ont.[1]
D—Peak at 35-44	Outremont, Que.[1]
E—Peak at 40-49	Westmount, Que.
VI—Maximum in age group 25-29—	
A—Peak at 0-4	Trail, B.C.
VII—Maximum in age group 40-44—	
A—Peak at 5-9	Prince Rupert, B.C (also peaks at 15-19 and 25-39).
(B) MALE POPULATION	
I—Maximum in age group 0-4—	
A—Follows natural curve	Cap-de-la-Madeleine, Que.
	Chicoutimi, Que.
	Joliette, Que.
	Quebec, Que.
	Thetford Mines, Que.
B—Peak at 15-24	Granby, Que.
	Valleyfield, Que.
C—Peak at 20-24	Trois-Rivières, Que.
D—Peak at 20-34	Verdun, Que.
E—Peak at 25-29	Shawinigan Falls, Que.
F—Peak at 25-39	Oshawa, Ont.
Other	Regina, Sask. (peaks at 10-19, 25-29 and 40-44).
II—Maximum in age group 5-9—	
A—Follows natural curve	Grand'Mère, Que.[2]
	Rivière-du-Loup, Que.
B—Peak at 15-19	Sorel, Que.
C—Peaks at 15-19 and 35-39	Guelph, Ont.
	London, Ont.
	Ottawa, Ont.
D—Peaks at 15-19 and 30-34	Niagara Falls, Ont.
	Stratford, Ont.
	Welland, Ont.
E—Peaks at 15-19 and 45-49	Owen Sound, Ont.
F—Peaks at 20-24 and 35-39	Halifax, N.S.
G—Peaks at 20-24 and 30-34	Sarnia, Ont.
H—Peak at 20-34	Kitchener, Ont.
I—Dip at 25-29	Chatham, Ont.
	Hull, Que.
J—Peak at 25-29	Montreal, Que.
K—Peak at 25-34	Hamilton, Ont.
L—Peak at 25-44	East Windsor, Ont.
M—Peak at 25-49	Fort William, Ont.
N—Peaks at 25-29 and 35-39	North Bay, Ont.
O—Peak at 30-34	Windsor, Ont.
P—Peak at 35-39	Belleville, Ont.
	Charlottetown and Royalty, P.E.I.
	Lachine, Que.
	Moncton, N.B.
	Saint John, N.B.
	Sydney, N.S.
Q—Peak at 40-44	St. Boniface, Man.
	St-Lambert, Que.
R—Peak at 45-49	Sherbrooke, Que.
III—Maximum in age group 10-14—	
A—Follows natural curve	Grand'Mère, Que.[2]
	Lévis, Que.
B—Peaks at 25-29 and 40-44	Lethbridge, Alta.
	Saskatoon, Sask.
	Swift Current, Sask.
C—Peak at 30-39	Fredericton, N.B.
D—Peak at 30-54	Portage la Prairie, Man.
	St. Thomas, Ont.
E—Peaks at 30-34 and 40-44	St. Catharines, Ont.
F—Peak at 35-44	Sault Ste. Marie, Ont.

TABLE 3. Cities of 5,000 population and over classified according to the age group containing maximum population, and showing secondary peaks, for (a) total population, (b) male population and (c) female population, 1931—Con.

Class	City
(B) MALE POPULATION—Con.	
III—Maximum in age group 10-14—Con.	
G—Peak at 35–49	Brandon, Man.
	Edmonton, Alta.
	Medicine Hat, Alta.
	Moose Jaw, Sask.
	North Vancouver, B.C.
H—Peak at 40–44	Longueuil, Que.
IV—Maximum in age group 15-19—	
A—Follows natural curve	St-Hyacinthe, Que.
B—Peak at 0–4	St-Jean, Que.
C—Peaks at 5–9 and 45–49	New Westminister, B.C.
D—Peaks at 5–9 and 30–34	Port Arthur, Ont.
E—Peaks at 5–9, 35–39 and 45–49	Galt, Ont.
F—Peaks at 25–29 and 40–44	Calgary, Alta.
	Nanaimo, B.C.
G—Peak at 35–39	Peterborough, Ont.
H—Peak at 40–44	Brantford, Ont.
	Winnipeg, Man.
	Yorkton, Sask.
I—Peak at 45–49	Kamloops, B.C.
	Nelson, B.C.
	Westmount, Que.
V—Maximum in age group 20-24—	
A—Peak at 5–9	Kingston, Ont.
	Woodstock, Ont.
B—Peak at 35–39	Toronto, Ont.
C—Peak at 35–49	Outremont, Que.
VI—Maximum in age group 25-29—	
A—Peak at 0–4	Sudbury, Ont.
	Trail, B.C.
B—Peaks at 5–9 and 40–44	Prince Albert, Sask.
VII—Maximum in age group 40-44—	
A—Peak at 15–19	Weyburn, Sask.
VIII—Maximum in age group 45-49—	
A—Peak at 15–19	Vancouver, B.C.
	Victoria, B.C.
B—Peaks at 5–9 and 25–29	Prince Rupert, B.C.
C—Peaks at 10–14 and 25–29	North Battleford, Sask.
(C) FEMALE POPULATION	
I—Maximum in age group 0-4—	
A—Follows natural curve	Chicoutimi, Que.
	Shawinigan Falls, Que.
	Thetford Mines, Que.
B—Peak at 15–19	Valleyfield, Que.
C—Peak at 15–24	Québec, Que.
	Sudbury, Ont.
	Trois-Rivières, Que.
D—Peak at 15–29	Trail, B.C.
	Verdun, Que.
E—Peak at 20–34	Oshawa, Ont.
II—Maximum in age group 5-9—	
A—Follows natural curve	Cap-de-la-Madeleine, Que.
	Grand'Mère, Que.
	Hull, Que.
B—Peak at 15–19	Joliette, Que.
	Lévis, Que.
C—Peaks at 15–19 and 35–39	North Bay, Ont.
	Sydney, N.S.
D—Peak at 15–34	Windsor, Ont.
E—Peak at 15–29	St-Jean, Que.
F—Peaks at 15–24 and 30–34	Niagara Falls, Ont.
G—Peaks at 15–19 and 40–44	Sorel, Que.
H—Peaks at 20–24 and 35–39	Prince Albert, Sask.
I—Peak at 25–39	East Windsor, Ont.
J—Peak at 30–34	Sarnia, Ont.
K—Peak at 35–39	Rivière-du-Loup, Que.
L—Peak at 35–44	Fort William, Ont.
	Prince Rupert, B.C.
M—Peaks at 35–39 and 45–49	Longueuil, Que.

TABLE 3. Cities of 5,000 population and over classified according to the age group containing maximum population, and showing secondary peaks, for (a) total population, (b) male population and (c) female population, 1931—Con.

Class	City
(C) FEMALE POPULATION—Con.	
III—Maximum in age group 10-14—	
A—Follows natural curve	Lachine, Que.
	Sault Ste. Marie, Ont.
	Welland, Ont.
B—Peak at 35-44	St. Catharines, Ont.
	Swift Current, Sask.
IV—Maximum in age group 15-19—	
A—Follow natural curve	Ottawa, Ont.
	Galt, Ont.
	Weyburn, Sask.
B—Peaks at 0-4 and 35-39	Owen Sound, Ont.
C—Peak at 5-9	St. Boniface, Man.
D—Dip at 5-9	Lethbridge, Alta.
E—Peaks at 5-9 and 35-39	Fredericton, N.B.
	Kingston, Ont.
	North Battleford, Sask.
	St. Thomas, Ont.
	Charlottetown and Royalty, P.E.I
F—Peaks at 5-9 and 40-44	St-Hyacinthe, Que.
	Yorkton, Sask.
G—Peaks at 5-9 and 45-49	Nanaimo, B.C.
H—Peaks at 5-9 and 60-64	Belleville, Ont.
I—Peaks at 5-9, 35-39 and 50-54	Chatham, Ont.
J—Dip at 10-14	Sherbrooke, Que.
K—Peak at 30-49	North Vancouver, B.C.
L—Peak at 35-39	Brantford, Ont.
	Edmonton, Alta.
	Medicine Hat, Alta.
	Portage la Prairie, Man.
	Port Arthur, Ont.
	St-Lambert, Que.
	Saint John, N.B.
M—Peak at 35-44	Brandon, Man.
	Moose Jaw, Sask.
	Peterborough, Ont.
N—Peaks at 30-34 and 40-44	New Westminster, B.C.
O—Peaks at 30-34 and 45-49	Kamloops, B.C.
P—Peak at 35-49	Vancouver, B.C.
Q—Peaks at 35-39 and 45-49	Victoria, B.C.
R—Peak at 40-44	Nelson, B.C.
	Stratford, Ont.
V—Maximum in age group 20-24—	
A—Follows natural curve	Outremont, Que.
	Westmount, Que.
B—Dip at 5-14	Granby, Que.
C—Dip at 10-14	Guelph, Ont.
	Halifax, N.S.
	Kitchener, Ont.
	Montreal, Que.
D—Dip at 10-14, peak at 30-34	Moncton, N.B.
E—Peak at 5-9	Hamilton, Ont.
	Regina, Sask.
	Toronto, Ont.
F—Peak at 35-39	London, Ont.
	Saskatoon, Sask.
	Woodstock, Ont.
	Winnipeg, Man.
G—Peak at 40-44	Calgary, Alta.

TABLE 4. Eight selected cities showing total population, 1911, 1921 and 1931, survivors 10 years later of 1911 and 1921 populations and accretions from outside in the decades 1911-1921 and 1921-1931, by quinquennial age groups

Age Group	Approximate P.C. Surviving 10 Years[2]	Population, 1911	Number Surviving at Appropriate Age, 1921	Population, 1921	Number Surviving at Appropriate Age, 1931	Population, 1931	Accretions from Outside 1911-21	Accretions from Outside 1921-31
				TORONTO[1]				
All ages[3]	-	**375,684**	**348,248**	**520,991**	**479,313**	**630,952**	-	-
0- 4	97·3	36,945	-	46,933	-	45,244	-	-
5- 9	98·2	30,531	-	49,867	-	50,636	-	-
10-14	97·6	28,059	35,947	42,957	45,666	49,982	7,010	4,316
15-19	96·9	33,313	29,981	41,269	48,969	56,224	11,288	7,255
20-24	96·7	45,659	27,386	47,137	41,926	60,787	19,751	18,861
25-29	96·4	46,226	32,280	51,640	39,990	55,709	19,360	15,719
30-34	95·8	36,712	44,152	48,949	45,581	51,919	4,797	6,338
35-39	94·7	28,735	44,562	47,394	49,781	52,269	2,832	2,488
40-44	93·0	23,060	35,170	37,826	46,893	49,270	2,656	2,377
45-49	90·1	19,110	27,212	29,549	44,882	43,646	2,337	-
50-54	85·7	15,759	21,446	24,819	35,178	36,343	3,373	1,165
55-59	79·4	10,562	17,218	17,505	26,624	24,835	287	-
60-64	69·9	8,497	13,505	14,664	21,270	19,820	1,159	-
65-69	56·5	5,336	8,386	9,023	13,899	14,519	637	620
70-74	40·0	3,544	5,939	5,873	10,250	10,603	-	353
75-79	23·8	2,103	3,015	3,149	5,098	5,418	134	320
80-84	11·2	1,020	1,418	1,630	2,349	2,524	212	175
85-89	3·8	382	501	640	749	925	139	176
90-94	0·76	120	114	135	183	232	21	49
95-99	-	9	15	28	24	41	13	17
100 and over	-	2	1	4	1	6	3	5
				WINNIPEG				
All ages[3]	-	**134,060**	**126,527**	**178,834**	**166,961**	**218,720**	-	-
0- 4	97·3	16,815	-	18,673	-	14,990	-	-
5- 9	98·2	11,551	-	20,702	-	18,261	-	-
10-14	97·6	9,636	16,361	16,656	18,169	19,975	295	1,806
15-19	96·9	11,468	11,343	14,288	20,329	23,538	2,945	3,209
20-24	96·7	17,650	9,405	14,808	16,256	22,941	5,403	6,685
25-29	96·4	19,351	11,112	17,103	13,845	18,809	5,991	4,964
30-34	95·8	14,766	17,068	17,778	14,319	16,274	710	1,955
35-39	94·7	10,046	18,654	16,898	16,487	16,875	-	388
40-44	93·0	7,022	14,146	13,227	17,031	17,033	-	2
45-49	90·1	5,249	9,514	9,077	16,002	15,849	-	-
50-54	85·7	4,123	6,530	6,793	12,301	12,193	263	-
55-59	79·4	2,552	4,729	4,771	8,178	7,756	42	-
60-64	69·9	1,774	3,533	3,603	5,822	5,596	70	-
65-69	56·5	953	2,026	2,169	3,788	3,920	143	132
70-74	40·0	586	1,240	1,279	2,518	2,561	39	43
75-79	23·8	321	538	606	1,225	1,300	68	75
80-84	11·2	139	234	279	512	604	45	92
85-89	3·8	49	76	100	144	195	24	51
90-94	0·76	6	16	18	31	35	2	4
95-99	-	2	2	4	4	10	2	6
100 and over	-	1	-	2	-	5	2	5
				OTTAWA				
All ages[3]	-	**86,917**	**80,362**	**107,383**	**98,458**	**126,824**	-	-
0- 4	97·3	9,401	-	10,733	-	10,499	-	-
5- 9	98·2	8,878	-	11,187	-	11,785	-	-
10-14	97·6	8,102	9,147	9,555	10,443	11,494	408	1,051
15-19	96·9	8,794	8,718	9,895	10,986	12,725	1,177	1,739
20-24	96·7	9,551	7,908	10,290	9,326	11,931	2,382	2,605
25-29	96·4	8,568	8,521	10,003	9,588	10,074	1,482	486
30-34	95·8	6,854	9,236	8,758	9,950	9,506	-	-
35-39	94·7	6,155	8,260	8,102	9,643	9,562	-	-
40-44	93·0	4,928	6,566	6,559	8,390	8,594	-	204
45-49	90·1	4,313	5,829	5,697	7,673	7,610	-	-
50-54	85·7	3,498	4,583	4,819	6,100	6,342	236	242
55-59	79·4	2,461	3,886	3,721	5,133	4,998	-	-
60-64	69·9	2,010	2,998	2,965	4,130	4,005	-	-
65-69	56·5	1,419	1,954	2,201	2,954	3,087	247	133
70-74	40·0	952	1,405	1,457	2,073	2,297	52	224
75-79	23·8	540	802	777	1,244	1,353	-	109
80-84	11·2	313	381	453	583	638	72	55
85-89	3·8	109	129	167	185	242	38	57
90-94	0·76	44	35	30	51	62	-	11
95-99	-	27	4	10	6	19	-	13
100 and over	-	-	-	4	-	1	-	1

[1] The area of Toronto in 1911 varied in a small degree from that of 1921, but the difference was not of sufficient importance to affect the comparison.
[2] See Canadian Life Tables, 1931.
[3] Stated age only.

TABLE 4. Eight selected cities showing total population, 1911, 1921 and 1931, survivors 10 years later of 1911 and 1921 populations and accretions from outside in the decades 1911-1921 and 1921-1931, by quinquennial age groups—Con.

Age Group	Approximate P.C. Surviving 10 Years[2]	Population, 1911	Number Surviving at Appropriate Age, 1921	Population, 1921	Number Surviving at Appropriate Age, 1931	Population, 1931	Accretions from Outside	
							1911-21	1921-31
HAMILTON								
All ages[3]	-	**81,919**	**75,556**	**114,041**	**104,779**	**155,516**	-	-
0- 4	97·3	8,049	-	11,212	-	13,088	-	-
5- 9	98·2	6,592	-	11,637	-	14,568	-	-
10-14	97·6	6,212	7,832	9,758	10,909	13,658	1,926	2,749
15-19	96·9	7,373	6,473	9,143	11,428	14,083	2,670	2,655
20-24	96·7	9,445	6,063	9,470	9,524	13,646	3,407	4,122
25-29	96·4	9,643	7,144	10,592	8,860	12,791	3,448	3,931
30-34	95·8	7,869	9,133	10,437	9,157	12,757	1,304	3,600
35-39	94·7	6,157	9,296	10,051	10,211	12,339	755	2,128
40-44	93·0	5,106	7,539	7,979	9,999	11,655	440	1,656
45-49	90·1	4,212	5,831	6,460	9,518	10,351	629	833
50-54	85·7	3,608	4,749	5,258	7,420	8,305	509	885
55-59	79·4	2,493	3,795	3,974	5,820	5,598	179	-
60-64	69·9	1,874	3,092	3,327	4,506	4,472	235	-
65-69	56·5	1,375	1,979	2,143	3,155	3,385	164	230
70-74	40·0	947	1,310	1,253	2,326	2,623	-	297
75-79	23·8	541	777	791	1,211	1,356	14	145
80-84	11·2	278	379	368	501	555	-	54
85-89	3·8	106	129	137	188	215	8	27
90-94	0·76	29	31	41	41	60	10	19
95-99	-	9	4	8	5	9	4	4
100 and over	-	1	-	2	-	2	2	2
QUEBEC								
All ages[3]	-	**78,588**	**71,988**	**94,995**	**87,107**	**130,543**	-	-
0- 4	97·3	9,967	-	12,139	-	15,633	-	-
5- 9	98·2	8,733	-	11,045	-	14,758	-	-
10-14	97·6	7,594	9,698	9,837	11,811	13,221	139	1,410
15-19	96·9	7,828	8,576	9,340	10,846	13,528	764	2,682
20-24	96·7	7,791	7,412	8,745	9,601	13,445	1,333	3,844
25-29	96·4	6,516	7,585	7,883	9,050	11,175	298	2,125
30-34	95·8	5,530	7,534	6,773	8,456	9,124	-	668
35-39	94·7	4,640	6,281	5,793	7,599	8,221	-	622
40-44	93·0	4,061	5,298	4,984	6,489	7,073	-	584
45-49	90·1	3,720	4,394	4,193	5,486	5,817	-	331
50-54	85·7	3,424	3,777	3,579	4,635	5,149	-	514
55-59	79·4	2,616	3,352	2,945	3,778	3,797	-	19
60-64	69·9	2,230	2,934	2,844	3,067	3,109	-	42
65-69	56·5	1,493	2,077	2,090	2,338	2,535	13	197
70-74	40·0	1,117	1,559	1,340	1,988	1,919	-	-
75-79	23·8	708	844	805	1,181	1,175	-	-
80-84	11·2	401	447	431	536	578	-	42
85-89	3·8	171	169	163	192	222	-	30
90-94	0·76	41	45	46	48	50	1	2
95-99	-	6	6	20	6	14	14	8
100 and over	-	1	-	-	-	-	-	-
WINDSOR								
All ages[3]	-	**17,787**	**16,354**	**38,540**	**35,711**	**63,094**	-	-
0- 4	97·3	1,703	-	4,243	-	6,025	-	-
5- 9	98·2	1,586	-	3,680	-	6,460	-	-
10-14	97·6	1,562	1,657	2,998	4,128	5,749	1,341	1,621
15-19	96·9	1,817	1,557	3,146	3,614	5,474	1,589	1,860
20-24	96·7	1,996	1,525	3,974	2,926	5,370	2,449	2,444
25-29	96·4	1,736	1,761	4,175	3,048	5,809	2,414	2,761
30-34	95·8	1,385	1,930	3,730	3,843	5,863	1,800	2,020
35-39	94·7	1,271	1,674	3,185	4,025	5,483	1,511	1,458
40-44	93·0	1,074	1,327	2,317	3,573	4,582	990	1,009
45-49	90·1	1,019	1,204	2,060	3,016	3,793	856	777
50-54	85·7	843	999	1,603	2,155	2,754	604	599
55-59	79·4	560	918	1,251	1,856	1,962	333	106
60-64	69·9	474	722	885	1,374	1,411	163	37
65-69	56·5	333	445	598	993	1,064	153	71
70-74	40·0	193	331	363	619	667	32	48
75-79	23·8	126	188	187	338	376	-	38
80-84	11·2	71	77	103	145	160	26	15
85-89	3·8	25	30	31	45	76	1	31
90-94	0·76	13	8	6	12	13	-	1
95-99	-	-	1	5	1	2	4	1
100 and over	-	-	-	-	-	1	-	1

[1] The area of Toronto in 1911 varied in a small degree from that of 1921, but the difference was not of sufficient importance to affect the comparison.
[2] See Canadian Life Tables, 1931.
[3] Stated age only.

TABLE 4. Eight selected cities showing total population, 1911, 1921 and 1931, survivors 10 years later of 1911 and 1921 populations and accretions from outside in the decades 1911-1921 and 1921-1931, by quinquennial age groups—Con.

Age Group	Approximate P.C. Surviving 10 Years[2]	Population, 1911	Number Surviving at Appropriate Age, 1921	Population, 1921	Number Surviving at Appropriate Age, 1931	Population, 1931	Accretions from Outside 1911-21	Accretions from Outside 1921-31
HALIFAX								
All ages[3]	-	**46,468**	**42,648**	**58,277**	**53,680**	**59,251**	-	-
0- 4	97·3	5,237	-	6,352	-	5,642	-	-
5- 9	98·2	4,725	-	5,575	-	5,908	-	-
10-14	97·6	4,386	5,096	5,366	6,180	5,712	270	-
15-19	96·9	4,799	4,640	5,614	5,475	5,662	974	187
20-24	96·7	4,844	4,281	6,562	5,237	5,956	2,281	719
25-29	96·4	4,135	4,650	5,948	5,440	5,048	1,298	-
30-34	95·8	3,408	4,684	4,441	6,345	4,545	-	-
35-39	94·7	3,173	3,986	3,954	5,734	4,379	-	-
40-44	93·0	2,707	3,265	3,428	4,254	3,643	163	-
45-49	90·1	2,283	3,005	2,912	3,744	3,041	-	-
50-54	85·7	1,922	2,518	2,488	3,188	2,774	-	-
55-59	79·4	1,320	2,057	1,739	2,624	2,053	-	-
60-64	69·9	1,236	1,647	1,420	2,132	1,672	-	-
65-69	56·5	934	1,048	974	1,381	1,366	-	-
70-74	40·0	645	864	681	993	885	-	-
75-79	23·8	407	528	434	550	507	-	-
80-84	11·2	187	258	238	272	300	-	28
85-89	3·8	88	97	113	103	116	16	13
90-94	0·76	28	21	30	27	32	9	5
95-99	-	3	3	8	4	9	5	5
100 and over	-	1	-	-	-	1	-	1
VICTORIA								
All ages[3]	-	**31,367**	**29,063**	**38,686**	**35,140**	**38,766**	-	-
0- 4	97·3	2,389	-	2,928	-	1,939	-	-
5- 9	98·2	2,196	-	3,583	-	2,632	-	-
10-14	97·6	2,229	2,324	3,214	2,849	3,039	890	190
15-19	96·9	2,533	2,156	3,044	3,519	3,610	888	91
20 24	96·7	3,580	2,176	2,674	3,137	3,013	498	-
25-29	96·4	4,100	2,454	2,976	2,950	2,377	522	-
30-34	95·8	3,438	3,462	3,314	2,586	2,203	-	-
35-39	94·7	2,833	3,952	3,655	2,869	2,718	-	-
40-44	93·0	2,460	3,294	3,331	3,175	3,094	37	-
45-49	90·1	1,816	2,683	2,642	3,461	3,251	-	-
50-54	85·7	1,352	2,288	2,408	3,098	3,133	120	35
55-59	79·4	799	1,636	1,629	2,380	2,392	-	12
60-64	69·9	621	1,159	1,429	2,064	1,911	270	-
65-69	56·5	420	634	835	1,293	1,487	201	194
70-74	40·0	310	434	490	999	1,030	56	31
75-79	23·8	163	237	302	472	554	65	82
80-84	11·2	91	124	158	196	251	34	55
85-89	3·8	30	39	62	72	97	23	25
90-94	0·76	6	10	9	18	32	-	14
95-99	-	1	1	2	2	3	1	1
100 and over	-	-	-	1	-	-	1	-

[1] The area of Toronto in 1911 varied in a small degree from that of 1921, but the difference was not of sufficient importance to affect the comparison.
[2] See Canadian Life Tables, 1931.
[3] Stated age only.

APPENDIX

APPENDIX

THE EVOLUTION OF CANADIAN AGE DISTRIBUTION

Introduction.—The following introduction to the appendix is solely explanatory; it is not an argument. It must be emphasized that the conclusions which are arrived at in the appendix proper are not based upon the theoretical considerations to be now mentioned; rather the considerations are themselves based upon the results obtained from observations of the actual data on Canadian age distribution over a period of 50 years.

The conclusion arrived at is that the shape of age distribution, as it develops, passes through degree after degree of an exponential curve. The compound interest curve, *i.e.*, the "geometrical progression" curve, is the first degree, *viz.*, ab^{-x}; the second degree is ac^{-x^2}; the third degree, ad^{-x^3}, where a is the initial number of persons—say, at the age of zero—and x is the age. Usually the number at each successive age is smaller than at the preceding age. This is the reason why x has a minus sign. Throughout this appendix, x is measured in quinquenniums, *i.e.*, x_1 is 5; x_2 is 10 and so on, and the number at each age group is the number per 10,000 population. For convenience, the letters b, c, d, etc., are permanently attached to the x^{-1}, x^{-2}, x^{-3}, etc., and we shall call the successive degrees the b curve (or shape), the c curve, the d curve, etc.

At the outset it will be well to be familiar with the actual shapes of the b curve, the c curve, etc. By the very nature of an age distribution the total number must come between ages 0 and, say, 104, or in 21 quinquenniums. It is tacitly assumed that no one lives over that age. Since we are expressing the age distribution in "per 10,000" the area of the curve must be the same, whatever degree we use. The higher the degree the flatter the curve. However, steepness and flatness are not here considered the important difference between the shapes; rather it is concavity and convexity. The b curve is concave to a line drawn between the points; the c curve, an inverted s while the higher the degree the more convex it becomes until we have a shape which is convex upwards throughout and may be presumed to be an n curve, the value of n being very great.

Now, laying down the condition that the same area must occupy same width, it is well to be clear as to what causes concavity and convexity. Statement A will illustrate this point and Chart I shows b, c and d curves, each describing a population of 10,000 who must be all dead in 104 years or 21 quinquenniums from age zero. A column of differences is given for the purpose of showing the manner of decrease from age to age. The convexity or concavity refers to the shape on the familiar arithmetic scale. It will be noticed that in the case of the b curve the decrease (in absolute numbers, not rates) becomes smaller and smaller from the very beginning. This is what gives it its concave shape. In the c curve the decrease becomes larger up to the age of 30 and then becomes smaller. The reason for this is that the numbers themselves become so small that the same absolute decrease would presuppose a very great *rate* of decrease. This gives the c curve its s shape. In the d curve the decreases become larger and larger up to the age of 50 and then become smaller. Consequently the curve is convex up to the age of 50. An e curve would probably be convex to the age of 65 or of 70, an f curve to a still greater age, and probably a g or h curve would describe the Canadian life table of 1931.

The regular development of the age distribution, then, is in the direction of convexity, away from concavity. The s shape may be considered an intermediate point and we have a case of an s shape (*i.e.*, a pure c curve) in Canadian males in 1901. Each step of the development from the pure b curve means a progressive movement of concavity from the first two quinquenniums to the third and so on. Since the width of the area is limited to 21 quinquenniums the zero end of the curve becomes progressively lower, but this is merely incidental. The important condition of the higher-degree curves is that the decrease between the successive groups increases. In actual cases the shapes are mixed and the shape which fits best is the b-c-d curve.

A.—COMPARATIVE VALUES OF SIMPLE *B*, *C* AND *D* CURVES FULFILLING THE CONDITION THAT A POPULATION OF 10,000 BE INCLUDED IN 21 AGE GROUPS

Age Group	x	Distribution When Fitted to			First Difference		
		ab^{-x}	ac^{-x^2}	ad^{-x^3}	ab^{-x}	ac^{-x^2}	ad^{-x^3}
All ages		10,000	10,000	10,000	-	-	-
0- 4	1	2,807	1,495	1,069	-	-	-
5- 9	2	2,020	1,426	1,063	787	69	6
10-14	3	1,453	1,320	1,048	567	106	15
15-19	4	1,046	1,182	1,020	407	138	28
20-24	5	753	1,026	975	293	156	45
25-29	6	542	865	911	211	161	64
30-34	7	390	705	828	152	160	83
35-39	8	280	558	730	110	147	98
40-44	9	202	428	621	78	130	109
45-49	10	145	318	508	57	110	113
50-54	11	105	228	397	40	90	111
55-59	12	75	160	295	30	68	102
60-64	13	54	108	208	21	52	87
65-69	14	39	71	138	15	37	70
70-74	15	28	45	86	11	26	52
75-79	16	20	28	51	8	17	15
80-84	17	14	17	28	6	11	23
85-89	18	10	10	14	4	7	14
90-94	19	8	5	6	2	5	8
95-99	20	5	3	3	3	2	3
100 and over	21	4	2	1	1	1	2

COMPARATIVE b, c AND d CURVES EACH HAVING 10,000 POPULATION WITHIN 21 AGE GROUPS

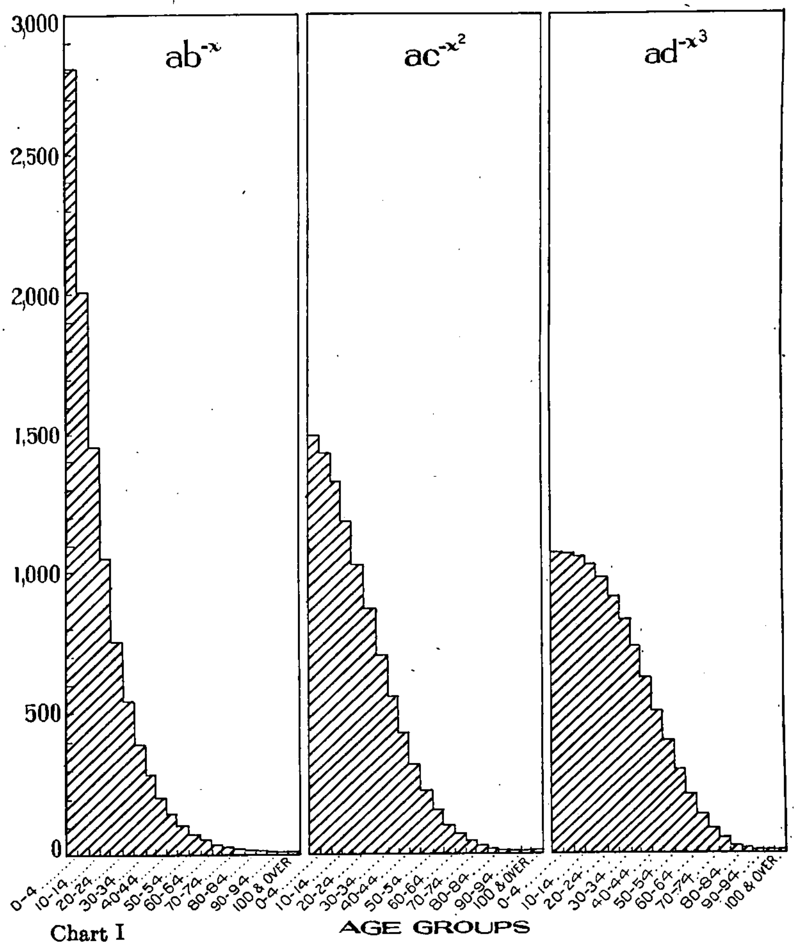


Chart I

The Evolution of Canadian Age Distribution.—The foregoing explanatory materia obviates the necessity of using such terms as "first", "second" and "third" degree, "three or four constant" curves, etc. It will be understood that the successive degrees are designated by the letters *b*, *c*, *d*, etc., while in every case the values assigned to these letters are the values of the logarithms. The reason why curves were used at all was because it was impossible to form a correct idea of the development of the shape of the age distribution by the eye alone. Further, in the literature on age distribution, use is made of smoothing for life-table purposes by the method of differences of the logarithms. If this is done for refined purposes like life tables, it surely may be used for the much rougher purpose of estimating the changes in shape due to stages of development.

It is clear that if age distribution develops by passing from one degree to another, then the development in shape is one of growing convexity caused by the difference in the number at each successive age increasing arithmetically. In a first degree curve this difference decreases from the very outset because the ratio between each successive group is the same and the fraction of a number is arithmetically larger than the same fraction of this number after it has been reduced. Such a shape is concave. If the development were smooth, the moment the curve passed from the first to a higher degree the shape would begin to become convex at the earlier ages; as it proceeded the convexity would spread to later and later ages.

In the search for a criterion to describe the development of the age distribution of Canada, it was assumed that if the age distribution of successive censuses were fitted with exactly the same kind of curve, the changes in the value of the constants for the curve would indicate the development, as long as the curve showed reasonable fit. Accordingly, for every census the age distribution of males in Canada was fitted to *b-c-d*, *b-c* and *b-d* curves; for the censuses from 1891 on it was also fitted to the simple *c* curve; for those from 1901 on, to the *c-d* curve, and for the 1931 Census to the simple *d* curve. Since an earlier stage than Canada, 1881, was clearly indicated in the distribution of Quebec, males, 1881, this also was fitted to the *b-c-d*, *b-c* and *b-d* curves. The results of these fittings are shown in Statements B and C. The criterion of good fitting used was a rough one, *viz.*, the arithmetic sum of the errors from the actual number at each quinquennial age group. It was considered that to use a finer criterion was to aim at greater precision than the data justified. Since the same criterion was used in all cases, the comparison seemed valid.

In further explanation it should be stated that we are considering the succession of ages as 1, 2, 3, etc., instead of 0–4, 5–9, etc. This shift of co-ordinates introduced no inconvenience for our purpose.

B.—DISTRIBUTION BY QUINQUENNIAL AGE GROUPS OF THE MALE POPULATION OF QUEBEC WHEN FITTED[1] TO EXPONENTIAL CURVES, AND SHOWING THE ERROR OF EACH FITTING FROM THE ACTUAL POPULATION, 1881

Age Group	x	Quebec, Males, 1881			
		Actual	Distribution When Fitted to		
			(1) $ab^{-x}c^{-x^2}d^{-x^3}$	(2) $ab^{-x}c^{-x^2}$	(3) $ab^{-x}d^{-x^3}$
0- 4	1	1,541	1,618	1,516	1,549
5- 9	2	1,361	1,366	1,350	1,352
10-14	3	1,176	1,167	1,190	1,178
15-19	4	1,068	1,002	1,039	1,023
20-24	5	952	862	898	883
25-29	6	742	742	769	759
30-34	7	601	636	652	647
35-39	8	524	543	547	547
40-44	9	416	459	455	458
45-49	10	376	384	375	380
50-54	11	312	317	306	311
55-59	12	264	257	247	252
60-64	13	219	205	198	201
65-69	14	169	160	157	158
70-74	15	127	121	123	122
75-79	16	82	90	95	92
80-84	17	45	64	73	69
85-89	18	18	45	56	50
90-94	19	5	30	42	36
95-99	20	2	19	32	25
100 and over	21	-	12	23	17
Error			501	503	449

(1) $\text{Log } y = 3\cdot2836152 - 0\cdot0789662\,x + 0\cdot0028483\,x^2 - 0\cdot0001944\,x^3$
(2) $\text{Log } y = 3\cdot2271183 - 0\cdot0442320\,x - 0\cdot0021086\,x^2$
(3) $\text{Log } y = 3\cdot2484140 - 0\cdot0583175\,x - 0\cdot0000854\,x^3$

[1] Fitted for 16 cases.

C.—DISTRIBUTION BY QUINQUENNIAL AGE GROUPS OF THE MALE POPULATION OF CANADA WHEN FITTED[1] TO EXPONENTIAL CURVES, AND SHOWING THE ERROR OF EACH FITTING FROM THE ACTUAL POPULATIONS, 1881-1931

Age Group	x	Canada, Males, 1881				Canada, Males, 1891				
		Actual	Distribution When Fitted to			Actual	Distribution When Fitted to			
			(1) $ab^{-x}c^{-x^2}$	(2) $ab^{-x}c^{-x^2}d^{-x^3}$	(3) $ab^{-x}d^{-x^3}$		(1) $ab^{-x}c^{-x^2}$	(2) $ab^{-x}c^{-x^2}d^{-x^3}$	(3) ac^{-x^2}	(4) $ab^{-x}d^{-x^3}$
0- 4	1	1,389	1,395	1,497	1,444	1,260	1,275	1,340	1,193	1,330
5- 9	2	1,302	1,286	1,305	1,292	1,224	1,209	1,221	1,160	1,221
10-14	3	1,200	1,168	1,143	1,152	1,152	1,126	1,110	1,101	1,110
15-19	4	1,099	1,046	1,004	1,022	1,063	1,032	1,003	1,026	1,005
20-24	5	980	923	881	900	976	932	901	938	903
25-29	6	765	803	771	786	801	824	801	841	803
30-34	7	607	688	670	679	675	718	704	738	706
35-39	8	533	582	576	580	576	615	611	635	612
40-44	9	453	484	489	488	490	518	522	536	522
45-49	10	402	398	409	405	415	429	438	443	437
50-54	11	333	322	335	330	362	349	360	359	359
55-59	12	266	257	269	264	275	280	289	285	288
60-64	13	241	202	210	206	259	221	227	222	226
65-69	14	169	156	160	158	184	171	173	170	173
70-74	15	121	119	118	118	136	130	129	127	129
75-79	16	76	90	84	86	83	97	93	93	93
80-84	17	43	67	58	61	44	72	64	69	65
85-89	18	15	49	38	42	17	52	43	47	44
90-94	19	4	35	24	28	6	37	28	33	20
95-99	20	2	25	14	18	2	26	17	22	18
100 and over	21	-	17	8	11	-	18	10	13	11
Error			584	651	608		503	548	691	544

1881:

(1) Log $y = 3\cdot1740757 - 0\cdot0260744x - 0\cdot0031388x^2$

(2) Log $y = 3\cdot2389664 - 0\cdot0659705x + 0\cdot0025549x^2 - 0\cdot0002233x^3$

(3) Log $y = 3\cdot2074240 - 0\cdot0474565x - 0\cdot0001255x^3$

[1] Fitted for 16 cases.

1891:

(1) Log $y = 3\cdot1214238 - 0\cdot0122384x - 0\cdot0036647x^2$

(2) Log $y = 3\cdot1669044 - 0\cdot0402007x + 0\cdot0003258x^2 - 0\cdot0001565x^3$

(3) Log $y = 3\cdot0847067 - 0\cdot0043846x$

(4) Log $y = 3\cdot1629169 - 0\cdot0378477x - 0\cdot0001440x^3$

Age Group	x	Canada, Males, 1901						Canada, Males, 1911					
		Actual	Distribution When Fitted to					Actual	Distribution When Fitted to				
			(1) $ab^{-x}c^{-x^2}$	(2) $ab^{-x}c^{-x^2}d^{-x^3}$	(3) $ac^{-x^2}d^{-x^3}$	(4) ac^{-x^2}	(5) $ab^{-x}d^{-x^3}$		(1) $ab^{-x}c^{-x^2}$	(2) $ab^{-x}c^{-x^2}d^{-x^3}$	(3) $ac^{-x^2}d^{-x^3}$	(4) ac^{-x^2}	(5) $ab^{-x}d^{-x^3}$
0- 4	1	1,191	1,157	1,236	1,142	1,174	1,216	1,181	1,043	1,099	1,094	1,209	1,124
5- 9	2	1,143	1,130	1,145	1,115	1,141	1,140	1,041	1,067	1,078	1,076	1,173	1,084
10-14	3	1,086	1,083	1,060	1,069	1,088	1,064	935	1,062	1,047	1,045	1,120	1,039
15-19	4	1,030	1,017	977	1,008	1,018	986	926	1,029	998	1,000	1,045	987
20-24	5	944	937	896	932	935	905	1,017	971	938	940	957	925
25-29	6	795	846	814	846	842	821	976	891	865	867	860	854
30-34	7	691	749	730	753	745	735	818	797	781	782	758	773
35-39	8	634	651	645	658	646	647	679	693	688	690	655	685
40-44	9	558	555	559	562	550	559	561	587	592	592	555	592
45-49	10	462	463	475	471	459	473	471	484	494	494	462	497
50-54	11	390	379	394	386	377	391	402	389	401	400	376	406
55-59	12	302	303	318	309	303	315	298	304	315	314	301	318
60-64	13	267	239	249	242	239	247	249	231	238	238	236	241
65-69	14	200	185	189	185	185	188	178	172	174	174	182	175
70-74	15	144	140	138	138	141	138	126	124	122	122	137	122
75-79	16	90	104	97	101	105	98	80	87	83	83	101	81
80-84	17	48	76	65	72	77	67	41	59	53	53	73	51
85-89	18	18	54	42	50	55	44	16	39	33	33	52	31
90-94	19	5	38	26	33	39	28	4	26	19	20	36	17
95-99	20	2	26	15	22	27	17	1	17	11	11	25	9
100 and over	21	-	18	8	14	18	10	-	9	6	6	17	5
Error..			412	402	464	384	381		739	693	694	958	678

1901:

(1) Log $y = 3\cdot0646378 + 0\cdot0027342x - 0\cdot0042674x^2$

(2) Log $y = 3\cdot1268901 - 0\cdot0355382x + 0\cdot0011944x^2 - 0\cdot0002142x^3$

(3) Log $y = 3\cdot0611816 - 0\cdot0034663x^2 - 0\cdot0000417x^3$

(4) Log $y = 3\cdot0736666 - 0\cdot0041154x^2$

(5) Log $y = 3\cdot1121197 - 0\cdot0268773x - 0\cdot0001685x^3$

[1] Fitted for 16 cases.

1911:

(1) Log $y = 2\cdot9971072 + 0\cdot0271575x - 0\cdot0058343x^2$

(2) Log $y = 3\cdot0445926 - 0\cdot0020370x - 0\cdot0016679x^2 - 0\cdot0001634x^3$

(3) Log $y = 3\cdot0408041 - 0\cdot0019337x^2 - 0\cdot0001536x^3$

(4) Log $y = 3\cdot0867899 - 0\cdot0042246x^2$

(5) Log $y = 3\cdot0552382 - 0\cdot0141361x - 0\cdot0002272x^3$

C.—DISTRIBUTION BY QUINQUENNIAL AGE GROUPS OF THE MALE POPULATION OF CANADA WHEN FITTED[1] TO EXPONENTIAL CURVES, AND SHOWING THE ERROR OF EACH FITTING FROM THE ACTUAL POPULATIONS, 1881-1931—Con.

Age Group	x	Canada, Males, 1921					
		Actual	Distribution When Fitted to				
			(1) $ab^{-x}c^{-x^2}$	(2) $ab^{-x}c^{-x^2}d^{-x^3}$	(3) $ac^{-x^2}d^{-x^3}$	(4) ac^{-x^2}	(5) $ab^{-x}d^{-x^3}$
0- 4	1	1,181	1,029	1,229	1,038	1,183	1,085
5- 9	2	1,170	1,051	1,088	1,027	1,151	1,054
10-14	3	1,021	1,046	989	1,007	1,097	1,018
15-19	4	892	1,014	914	974	1,026	974
20-24	5	777	961	854	928	943	921
25-29	6	769	886	798	868	850	856
30-34	7	760	796	742	734	751	782
35-39	8	758	698	681	710	652	698
40-44	9	634	596	611	618	555	611
45-49	10	524	496	532	522	464	515
50-54	11	432	403	447	427	380	423
55-59	12	328	318	358	337	306	335
60-64	13	280	246	273	257	241	256
65-69	14	201	185	195	187	187	188
70-74	15	134	135	131	131	142	132
75-79	16	79	97	81	87	106	88
80-84	17	40	68	46	56	77	56
85-89	18	16	46	24	34	56	34
90-94	19	4	30	12	19	39	19
95-99	20	-	19	5	10	27	10
100 and over	21	-	12	2	5	18	5
Error			1,044	508	858	1,051	770

(1) $\text{Log } y = 2\cdot9916969 + 0\cdot0259518x - 0\cdot0055562x^2$
(2) $\text{Log } y = 3\cdot1567109 - 0\cdot0754988x + 0\cdot0089218x^2 - 0\cdot0005678x^3$
(3) $\text{Log } y = 3\cdot0171712 - 0\cdot0009832x^2 - 0\cdot0002011x^3$
(4) $\text{Log } y = 3\cdot0773946 - 0\cdot0041135x^2$
(5) $\text{Log } y = 3\cdot0465388 - 0\cdot0108415x - 0\cdot0002263x^3$

[1] Fitted for 16 cases.

Age Group	v	Canada, Males, 1931						
		Actual	Distribution When Fitted to					
			(1) $ab^{-x}c^{-x^2}$	(2) $ab^{-x}c^{-x^2}d^{-x^3}$	(3) $ac^{-x^2}d^{-x^3}$	(4) $ab^{-x}d^{-x^3}$	(5) ac^{-x^2}	(6) ad^{-x^3}
0- 4	1	1,011	951	1,100	980	1,006	1,130	965
5- 9	2	1,065	985	1,014	975	991	1,101	961
10-14	3	1,010	995	950	962	970	1,055	951
15-19	4	977	980	900	939	941	994	932
20-24	5	863	941	855	904	902	920	902
25-29	6	763	882	810	855	851	838	858
30-34	7	685	805	760	796	789	750	800
35-39	8	668	717	703	723	716	660	730
40-44	9	647	623	636	641	634	572	648
45-49	10	598	528	559	552	546	485	559
50-54	11	497	436	474	460	456	406	466
55-59	12	371	351	386	371	368	334	375
60-64	13	292	275	300	288	287	269	290
65-69	14	225	211	221	215	215	214	215
70-74	15	165	157	153	154	154	167	153
75-79	16	93	115	99	104	106	128	134
80-84	17	44	81	60	69	69	97	66
85-89	18	16	56	33	42	43	72	40
90-94	19	4	38	17	25	25	52	23
95-99	20	1	25	8	13	14	38	12
100 and over	21	-	16	3	7	7	26	6
Error			919	616	722	675	1,029	799

(1) $\text{Log } y = 2\cdot9517365 + 0\cdot0317707x - 0\cdot0054722x^2$
(2) $\text{Log } y = 3\cdot0869077 - 0\cdot0513316x + 0\cdot0063872x^2 - 0\cdot0004651x^3$
(3) $\text{Log } y = 2\cdot9920707 - 0\cdot0003485x^2 - 0\cdot0002157x^3$
(4) $\text{Log } y = 3\cdot0080551 - 0\cdot0050476x - 0\cdot0002206x^3$
(5) $\text{Log } y = 3\cdot0566472 - 0\cdot0037060x^2$
(6) $\text{Log } y = 2\cdot9846892 - 0\cdot0002375x^3$

[1] Fitted for 16 cases.

The purpose of this examination was to ascertain whether the ages show any indication of development and in what direction. It will be quite clear that as simple a curve as possible was necessary. Two curves were found to fit consistently well, *i.e.*, the *b-c-d* and *b-d* curves. In the *b-c-d* curve the *b* and *d* showed minus signs and the *c* a plus sign. If the distribution were perfectly smooth, no doubt as the age distribution developed the arithmetic value of *b* would become smaller and that of *d* larger. But the age distributions are not smooth and, consequently, the plus value of *c* becomes very ambiguous as it seems to recognize in the shape certain irregularities which are not normal. For this reason, although the changing values of *b*, *c* and *d* in the *b-c-d* curve are interesting, the development was traced in the changes of the values of *b* and *d* in the *b-d* curve. These changing values are shown in Statement D below.

D.—VALUES OF COEFFICIENTS IN THE *B-D* CURVE FOR QUEBEC, MALES, 1881, AND CANADA, MALES, 1881-1931

Item	Values[1] of Constants When Fitted to $ab^{-x}d^{-x^3}$	
	b	d
Quebec, males, 1881	−0·0583175	−0·0000854
Canada, males—		
1881	−0·0474565	−0·0001255
1891	−0·0378477	−0·0001440
1901	−0·0268773	−0·0001685
1911	−0·0141361	−0·0002272
1921	−0·0108415	−0·0002263
1931	−0·0050476	−0·0002206

[1] Values are of logarithms.

Although no very definite point is indicated when $b^{-x} = d^{-x^3}$, it is important to know whether they become equal at an earlier age as time goes on, *i.e.*, whether the *d* part of the curve becomes as important as the *b* part at an earlier and earlier age. The rate at which this change takes place is some measurement of the rate of development. The age at which $b^{-x} = d^{-x^3}$ in the successive distributions examined is shown below:—

	Age at Which d^{-x^3} is as Important as b^{-x} in Curve $ab^{-x}d^{-x^3}$
Quebec, males, 1881	130·50
Canada, males—	
1881	97·25
1891	81·05
1901	63·15
1911	39·45
1921	34·60
1931	23·90

What is regarded as significant here is that in the Quebec curve the d^{-x^3} never becomes as important as the b^{-x} and the same may be said of Canada, 1881, for 97·25 years is very nearly at the end of the distribution. The *b* curve is always more important than the *d* curve. After this year the *d* rushes back at the rate of about 14 years a census until in 1931 it covers almost the whole age distribution. By 1951 at the same rate the d^{-x^3} would equal b^{-x} at the age of zero or below.

While no definite measurements are made in the foregoing figures, the course of development is clearly indicated. Consequently, it would seem to be quite reasonable to discuss along these lines what took place at each successive census.

As a first step it was desired to obtain an actual case where the age development was earlier than Canada, 1881. Before 1881 the ages for Canada were not given in quinquennial groups and it was considered better not to scale them into these groups for this purpose. Was it possible to find in 1921 or 1931 a case (from a county or city) where the age distribution was at an earlier stage than Canada in 1881? At first it would seem that the steepness of the age distribution would be a definite indication of early development, but we can obtain varying degrees of steepness even in life tables. The life table of the United States in 1881 was much steeper than that of Canada in 1931 and the only conditions that enter into a life table are varying death rates. A very high rate of natural increase and a very high rate of total population increase, provided that this total increase was not brought about by immigration, would undoubtedly give the distribution steepness. Chicoutimi county, Quebec, in 1931, and Shawinigan Falls, Quebec, in 1921, were found to fulfill these conditions, *i.e.*, the natural increase as indicated in the vital statistics and the past rates of population increase were very high. If the development was merely a matter of steepness they would be quite satisfactory as first stages. The fit of these to the various curves is shown in Statements E and F and Chart II.

E.—DISTRIBUTION BY QUINQUENNIAL AGE GROUPS OF THE MALE POPULATION OF SHAWINIGAN FALLS, 1921, AND CHICOUTIMI, 1931, WHEN FITTED[1] TO EXPONENTIAL CURVES, AND SHOWING THE ERROR OF EACH FITTING FROM THE ACTUAL POPULATION

Age Group	x	Shawinigan Falls, Males, 1921					Chicoutimi, Males, 1931				
		Actual	Distribution When Fitted to				Actual	Distribution When Fitted to			
			$ab^{-x}c^{-x^2}d^{-x^3}$	$ab^{-x}d^{-x^3}$	$ab^{-x}c^{-x^2}$	ac^{-x^2}		$ab^{-x}c^{-x^2}d^{-x^3}$	$ab^{-x}d^{-x^3}$	$ab^{-x}c^{-x^2}$	ac^{-x^2}
0- 4	1	1,580	1,591	1,269	1,146	1,599	1,717	1,824	1,615	1,564	1,344
5- 9	2	1,287	1,312	1,238	1,229	1,523	1,580	1,460	1,416	1,416	1,293
10-14	3	1,085	1,132	1,194	1,255	1,406	1,209	1,200	1,235	1,260	1,212
15-19	4	1,053	1,009	1,132	1,223	1,256	973	1,007	1,071	1,102	1,106
20-24	5	978	914	1,048	1,135	1,087	863	853	921	947	984
25-29	6	903	830	943	1,005	911	754	731	783	800	853
30-34	7	774	746	819	848	739	646	625	657	664	721
35-39	8	549	652	683	682	581	518	530	543	542	593
40-44	9	506	548	543	523	442	419	444	442	434	476
45-49	10	461	435	410	383	326	360	364	352	342	372
50-54	11	330	323	292	267	233	282	290	275	265	283
55-59	12	212	220	195	177	161	225	224	209	201	210
60-64	13	120	136	121	112	108	163	165	156	151	152
65-69	14	88	75	70	68	70	122	117	112	111	107
70-74	15	44	37	37	39	44	88	78	79	80	73
75-79	16	13	15	18	21	27	44	49	53	57	49
80-84	17	9	6	8	11	16	28	29	35	40	32
85-89	18	6	2	3	6	9	8	16	22	27	20
90-94	19	2	-	1	3	5	1	8	13	18	13
95-99	20	-	-	-	1	3	1	4	8	12	8
100 and over	21	-	-	-	-	1	-	2	4	8	4
Error		-	525	1,016	1,536	1,371	-	417	646	854	1,350

[1] Fitted for 16 cases.

F.—VALUES OF COEFFICIENTS IN VARIOUS CURVES FOR CHICOUTIMI COUNTY, MALES, 1931, AND SHAWINIGAN FALLS, MALES, 1921

Item	Values[1] of Constants When Fitted to				
	$ab^{-x}c^{-x^2}d^{-x^3}$			$ab^{-x}c^{-x^2}$	
	b	c	d	b	c
Chicoutimi, 1931	−0·1194040	0·0087212	−0·0004895	−0·0319428	−0·0037603
Shawinigan Falls, 1921	−0·1252102	0·0162281	−0·0010436	0·0612522	−0·0103820

Item	$ab^{-x}d^{-x^3}$		ac^{-x^2}
	b	d	c
Chicoutimi, 1931	−0·0562214	−0·0001556	−0·0056393
Shawinigan Falls, 1921	−0·0076135	−0·0004224	−0·0069769

[1] Values are of logarithms.

Age Distribution (male) of Shawinigan Falls and Chicoutimi and Distribution When Fitted to $AB^{-x}C^{-x^2}D^{-x^3}$

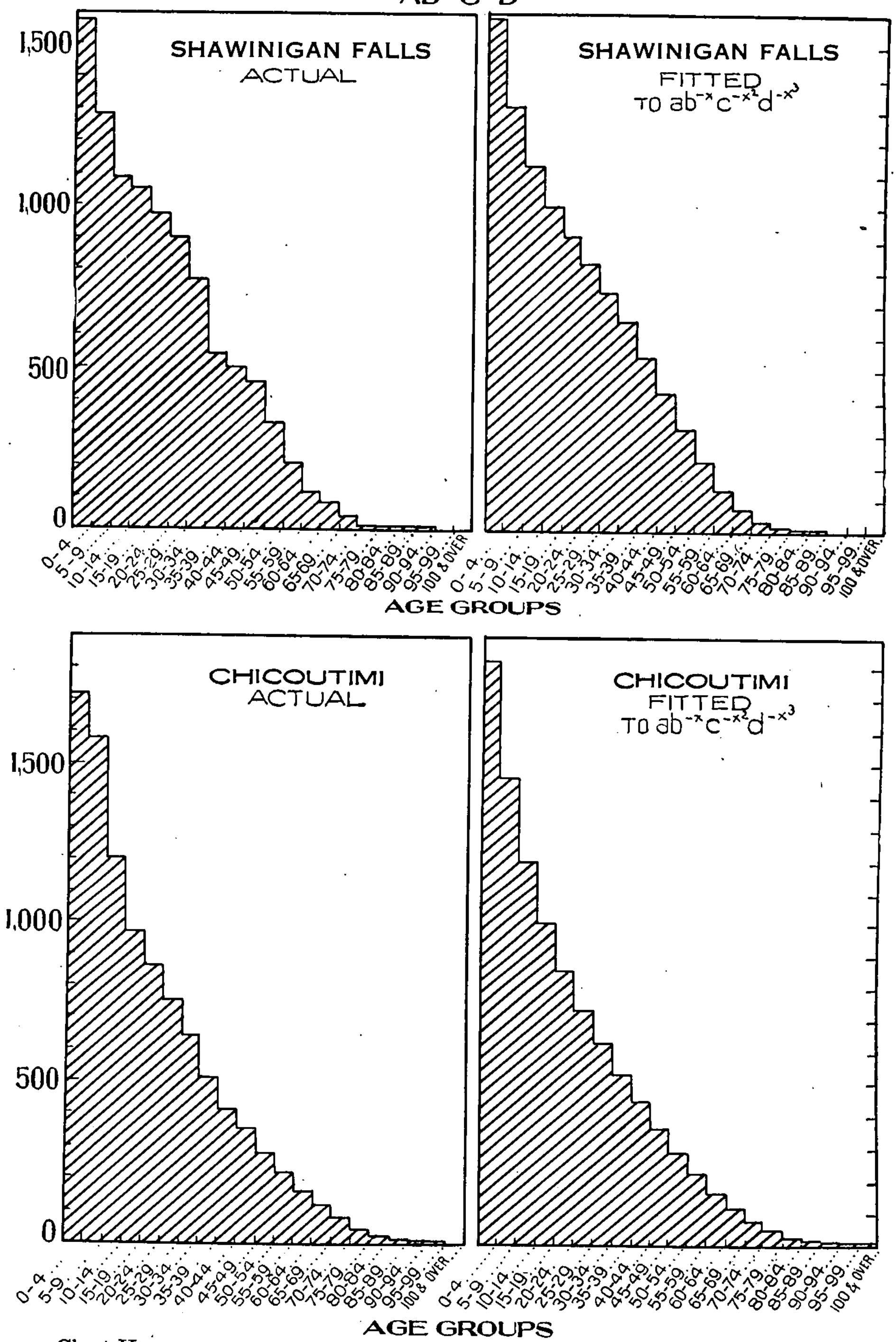


Chart II

It is rather startling to find that these two places show a more advanced stage of development than Canada in 1881 and 1891. At first this is difficult to believe for it would seem that a constant large increase would keep a population permanently young. The fact that Shawinigan Falls and Chicoutimi are not young populations suggests that a large increase is not the sole determinant.

Age of settlement exerts a great influence on the shape of age distribution. Chicoutimi's advanced development can be attributed to this factor. When a place has been settled for a hundred years or more there is an appreciable number at the older ages, especially if there has been a large and steady natural increase. This explains the difference between Canada, 1881, and Chicoutimi, 1931. Canada in 1881 was over 100 years old in some places and so had aged, but the early population and the increase in that population up to 1830 were so small that the survivors exerted little influence on the age distribution of Canada, 1881.

There is another important factor determining the age distribution of Chicoutimi, 1931, and Shawinigan Falls, 1921, a factor that does not appear in a study of 1881 populations. We are apt to be misled by the fact that these two places show a very small proportion of immigrants. The rapid growth was not brought about by immigration but by something that would hasten the age distribution even more—a movement from other parts of the province. These people, moving only a short distance, are transplanted populations and tend to approximate the age distributions of the province. In this case, Shawinigan Falls and Chicoutimi approximate the distributions of Quebec in 1921 and 1931, respectively, and these were more advanced than that of Canada in 1881. On the other hand, Canada before 1881 grew to a considerable extent by an inward and outward movement. The inward movement consisted of persons for the most part between the ages of 20 and 30 and although they were largely taking the place of an outward movement at the same ages it is clear that as long as the movement continued it prevented ageing. Of course, a big inward movement followed by a long period of no movement would hasten the ageing process but as long as it continued and the incomers went out again later it would tend to keep the population young. This factor will be mentioned again in the study of the distribution of 1901.

Since Chicoutimi or Shawinigan Falls did not provide examples of early development, it was decided to take the case of Quebec males, 1881. This furnishes a very good example of early development. While the province had been settled since 1608, the real increase had taken place over a fairly short period before 1881 so that the proportions at the older ages were not important. The country had grown until this time mainly by natural increase and a very large one at that. Chart III shows that Quebec, 1881, is as good an example of the simple geometric progression curve as can be obtained. The d never becomes important, while the c does not become as important as the b until the age of 100. The b curve is the predominant curve throughout, *i.e.*, the reduction from group to group is mainly effected by simple geometric progression.

Canada, 1881 (Chart III) is very clearly a later stage of development than Quebec, but it also is decidedly b; likewise 1891, although the development had gone on still further. Up to 1901, the b-c curve fits as well as, or better than, the b-d curve but later on it shows a very poor fit. This is taken to mean that up till then the older ages were of minor importance, the process of development being shown by the relationship of the younger to the middle ages.

In 1901 we have a decidedly interesting age distribution. The simple c curve fits as well as one with a great number of constants (see p. 88); in other words, we have a case of a normal curve without much skew. If we take age zero as a sort of centre and measure a standard deviation from this age (instead of from the mean as in normal distribution) and use a table of normals we get a good fit to 1901. Further, if we take the two equations, ab^{-x^2} and $y_o\, e^{-\frac{x^2}{k}}$, equate $a = y_o$, $b^{-x^2} = e^{-\frac{x^2}{k}}$ and from this deduce the value of k, we find it is almost exactly the same as $2\sigma^2$ when σ is measured from age zero giving an indication that the result is independent of the method of fitting.

It is important to examine the causes which gave it this normal age distribution. In the first place, the age of settlement was not great enough to make the population elderly; in the second place, while 1901 followed a period of stagnation in population growth in Canada, this stagnation was not caused by the slowing up of natural increase but by emigration which means

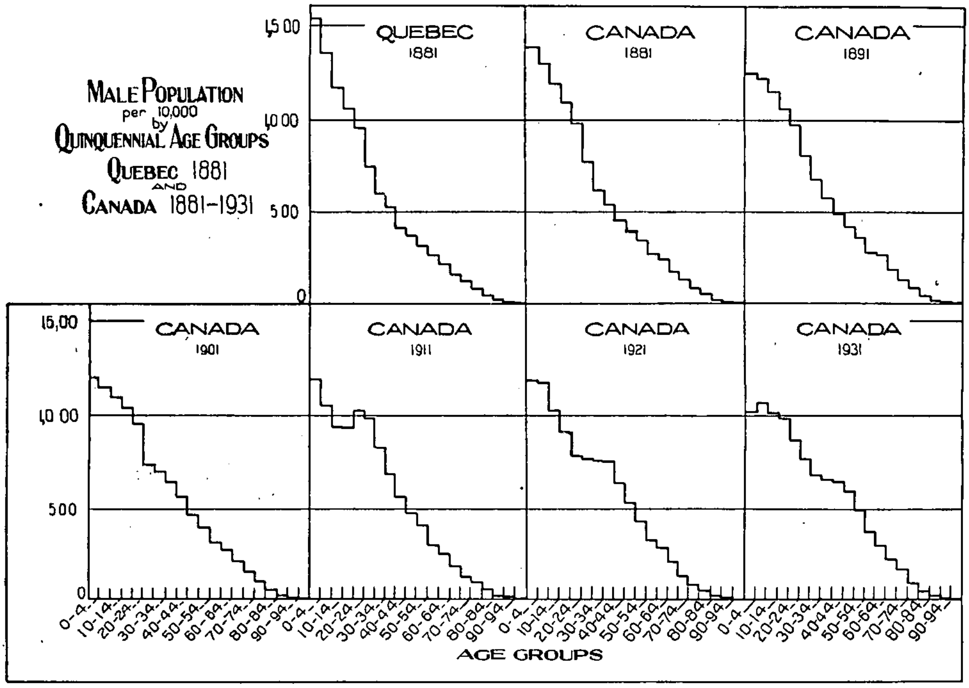


Chart III

emigration of young people, say, from 18 to 30. But just about four years prior to 1901 heavy immigration had set in and this immigration was also of young persons, mainly between 18 and 30. These had time by 1901 just to fill the hollows left by emigration, but no more than fill them. Had the census been taken in 1903 or 1904 the spaces would have been more than filled and, further, those that came in by 1897 would have been in later quinquennial age groups and the regularity would have been destroyed. The Census of 1901 so happened to have been taken at a date on which the age distribution was at a definite stage. It is interesting to dwell upon the large number of causes that brought about the distribution of 1901. Immigration helped but it would not have helped without the previous emigration, nor if it had been any greater or any less, nor if it had proceeded longer than it did. If the rate of natural increase had been less; if the country had been longer-settled, giving it a large proportion of elderly persons; if natural increase had been greater or the country a shorter time settled, the conditions would not have been fulfilled. The year 1901, therefore, has a most interesting age distribution. It suggests many of the causes influencing the development of this distribution and acts as a sort of control for earlier and later developments.

The year 1911 is also interesting. Although immigration had increased enormously in the preceding ten years making the appearance of the age distribution very irregular, this did not seriously interfere with the fitting. The immigrants came in mainly in one or two quinquennial age groups. As the years went on, each year bringing in new arrivals, the "immigrant age distribution" spread over more age groups, the earlier arrivals becoming older and new ones keeping up the supply at ages, say, 20–24. At first, however, the hump caused by immigrant arrivals was only local to ages 20–30. This was the case in 1911. By 1921, and still more by 1931, this hump had spread at its base and had gone on to a later age. Fitting 1911 distribution with a *b-d* curve almost ignored this hump. Consequently, the equation $y = ab^{-x}d^{-x^3}$ gave a fairly good fit, particularly at the ages where this irregularity did not occur. With b and d in 1911, misfits occur only at the ages where they are expected to occur—defects at 10–19 and excesses at 20–29, nearly 60 p.c. of the misfits occurring at these ages. These excesses and defects almost cancel each other and this is considered here an indication of good fitting, *i.e.*, the equation is true to the fundamental shape.

By 1921 and 1931 the hump of immigration had spread and moved onward. The fit to the *b-c-d* curve is better than ever, but with only three constants it is bad. There is no doubt that the distributions of 1921 and 1931 are not so simple as the distributions in previous years. The effects of immigration tell on the later ages and of emigration on the ages from 20 to 30. These effects are mixed up with the ageing process so that the real development of the latter is difficult to trace. The result of this mixed process is that it becomes doubtful whether the shape is exponential at all. An arithmetic curve $y = a + bx + cx^2 + dx^3$ fits the distribution of 1931 just as well as $y = ab^{-x}c^{-x^2}d^{-x^3}$, but it is safe to conclude that this arithmetic shape is not a stage in the development. Had it not been for immigration and emigration the exponential simple curve would no doubt develop through degree after degree. The b and c would disappear and we would pass through a stage where $y = ad^{-x^3}$ would fit as well as ac^{-x^2} fitted in 1901. The distributions of 1921 and 1931 must be considered classes, not stages, although the stages are indicated vaguely. Reasoning from this point of view, a development in these classes themselves would be interesting to trace. Accordingly, the age distribution of males, 1931, was separated into the following classes: (1) counties showing a maximum population in 1851 and decreasing or stationary since; (2) counties with a maximum population in 1861 and so on, down to counties which are still growing. The percentage distribution of the male population in these groups is shown by quinquennial age groups in Statement G. Chart IV shows the counties still growing and a total of the counties reaching maximum population before 1931.

The fundamental consideration in this classification is that these counties have become stationary, not because of stoppage of natural increase, but because of emigration. In other words, the stoppage of increase has occurred in the middle ages and the deaths (emigration being equivalent to death) in ages 20–30. All these distributions have the same general shape, *viz.*, a steep descent from the 15–19 group to the 20–24 group and then an elliptical shape. The shape is a double one. Each of these shapes passes through its stages of development as described by two simple curves, but the stages of development of the distribution as a whole cannot be described by simple curves.

G.—PERCENTAGE DISTRIBUTION OF MALE POPULATION OF COUNTIES GROUPED ACCORDING TO YEAR IN WHICH THEY REACHED THEIR MAXIMUM POPULATION, BY QUINQUENNIAL AGE GROUPS, AND SHOWING NATURAL INCREASE PER 1,000, 1931

Age Group	Counties Reaching Maximum Population in							Counties Still Growing 1931
	1851	1861	1881	1891	1901	1911	1921	
All ages[1]	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
0– 4	11·60	10·27	9·07	9·49	10·57	10·53	9·57	10·22
5– 9	11·54	10·70	9·83	10·22	11·22	11·40	10·53	10·71
10–14	10·99	10·42	9·65	9·96	10·76	10·89	10·86	10·07
15–19	11·58	10·38	9·96	9·99	10·39	10·63	10·10	9·68
20–24	8·98	8·54	8·43	8·49	8·48	8·75	8·49	8·66
25–29	6·98	6·70	6·59	6·65	6·60	6·62	6·87	7·87
30–34	5·97	5·89	6·04	6·13	5·99	5·75	6·10	7·06
35–39	5·31	5·64	5·91	5·99	5·75	5·56	6·12	6·89
40–44	5·05	5·37	5·54	5·53	5·18	5·22	6·30	6·70
45–49	4·38	4·91	5·36	5·32	4·98	5·03	6·03	6·14
50–54	4·19	4·66	5·11	5·01	4·56	4·66	5·04	4·99
55–59	3·51	4·05	4·53	4·30	4·07	3·97	3·99	3·58
60–64	2·84	3·65	4·23	3·89	3·42	3·44	3·34	2·71
65–69	2·43	3·29	3·65	3·40	2·95	2·94	2·74	2·00
70–74	2·25	2·65	2·95	2·73	2·42	2·22	1·96	1·42
75–79	1·34	1·60	1·76	1·66	1·51	1·38	1·14	0·78
80–84	0·73	0·85	0·94	0·81	0·73	0·67	0·57	0·36
85–89	0·24	0·35	0·34	0·32	0·31	0·26	0·21	0·13
90–94	0·07	0·07	0·08	0·09	0·08	0·07	0·05	0·03
95–99	0·01	0·01	0·02	0·01	0·01	0·01	0·01	0·01
100 and over	–	–	–	–	–	–	–	–
Natural increase per 1,000, 1931	14·2	11·1	7·9	9·3	13·2	12·5	11·6	13·9

[1] Not stated age omitted.

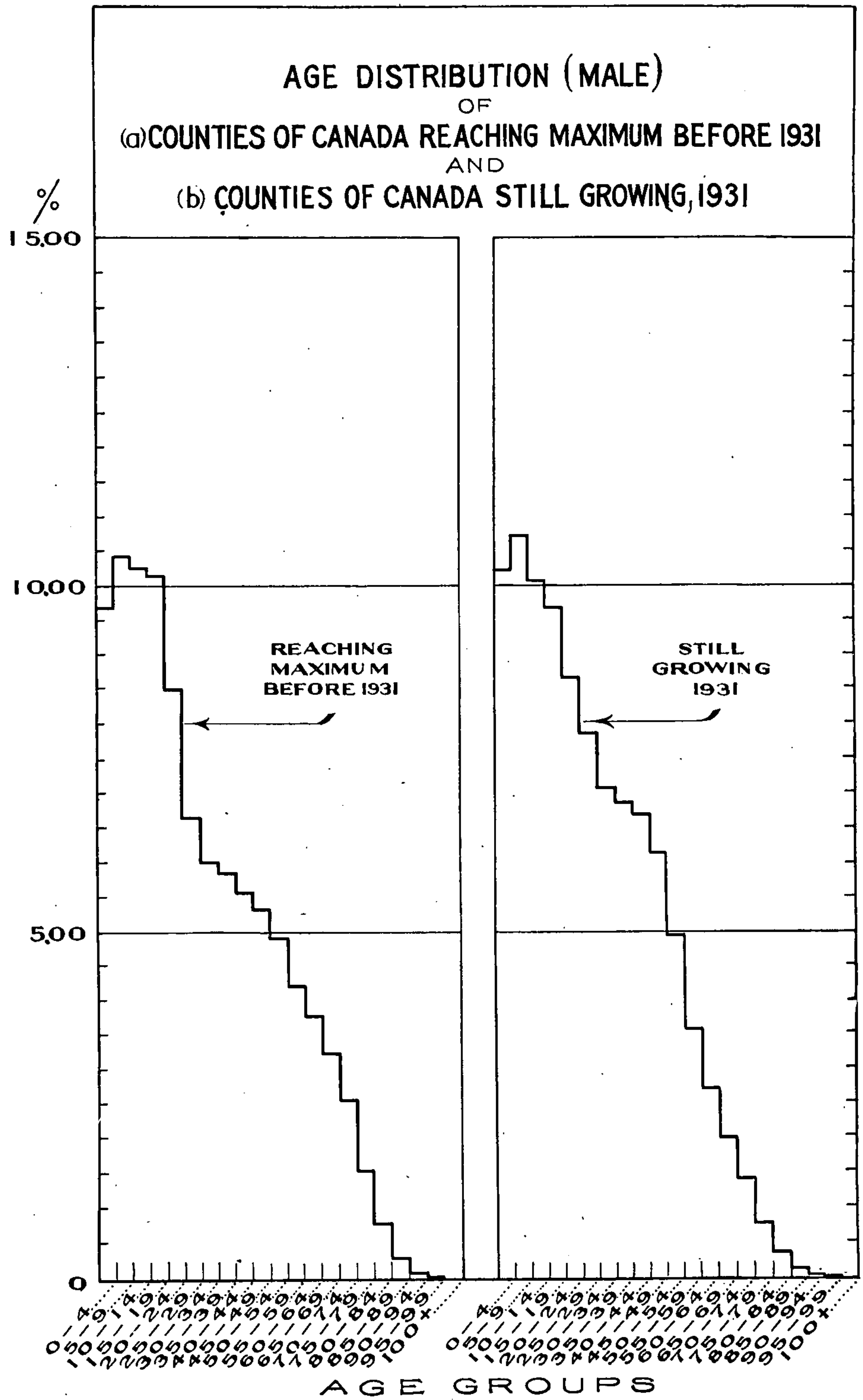

AGE DISTRIBUTION (MALE)
OF
(a) COUNTIES OF CANADA REACHING MAXIMUM BEFORE 1931
AND
(b) COUNTIES OF CANADA STILL GROWING, 1931
%
15.00
10.00
5.00
0
REACHING MAXIMUM BEFORE 1931
STILL GROWING 1931
AGE GROUPS

Chart IV

Some indication of the difference between the counties reaching their maximum in different years is given by the following statement:—

H.—MEAN AGE, STANDARD AGE AND PERCENTAGES UNDER 25 YEARS OF AGE AND 65 YEARS OF AGE AND OVER, CANADA, MALES, BY GROUPS OF COUNTIES, 1931

Group of Counties[2]	Mean Age	Standard Age[1]	P.C. under 25	P.C. 65 and over
Chicoutimi, 1931	22·29	20·2	63·41	2·92
All counties, 1931	28·95	22·3	49·29	5·48
Counties still growing, 1931	28·55	22·0	49·33	4·72
All counties reaching maximum before 1931	30·49	23·4	49·09	8·50
Counties reaching maximum, 1851	27·84	22·5	54·70	7·07
" " " 1861	30·11	23·3	50·31	8·83
" " " 1881	31·77	23·8	46·93	9·76
" " " 1891	30·99	23·5	48·15	9·02
" " " 1901	29·41	23·2	51·43	8·01
" " " 1911	29·09	23·3	52·19	7·55
" " " 1921	29·64	23·0	49·54	6·68
Elgin, Ontario (included above), 1931	33·65	24·1	42·54	10·40

[1] For explanation of this term, see page 24.
[2] Male population.

The last two columns are particularly important since the first of them reflects the degree of flatness and the last the age of settlement. Elgin, Ontario, is shown because it might be expected to resemble a life table and was expected to show a late stage of development corresponding to Chicoutimi, 1931, at the other extreme but it did not come up to expectations in any way.

Throughout the whole series of steps of development the value of the second degree is paramount. It is decidedly the degree of the middle age groups from about 20 to about 65. The curve $y = ac^{-x^2}$ fits practically every year except at the extreme ages and, also, the very early stages. Since it is not possible to fit the age distribution of every area in Canada with a curve, it is well to make use of this in arriving at a more practicable basis of classification of the age distribution of these areas. Another point that can be made use of is that the curve $ab^{-x}d^{-x^3}$ gives a good fit to almost every stage, the four-constant curve merely improving the fit at the middle ages.

Since the c element in a four-constant curve seems to describe an historical feature in our population, it is important to establish certain limits to its range, and ages 25 to 64 would seem to be those limits. Between these ages a c curve was found to describe the shape of the age distribution throughout. The proportion of the age distribution that is included between these two limits determines whether the shape is convex or not and the percentages of the population before and after these limits determines whether the concavity leans towards youth or old age. As the proportion before 25 decreases, the value of b becomes smaller and the concavity before 25 becomes less marked; as the proportion after 64 increases, the value of d increases and the concavity after 64 becomes more marked. The classification of age distributions by means of three criteria (1) the standard age, (2) the percentage under 25 and (3) the percentage over 64, (where standard age is the root mean square deviation from age 24 of the population 25–64) would seem, then, to be an adequate classification which is at the same time simple enough to be practical. It is a classification used in preference to classifications by median age, mean age, quartiles, etc. If we know the standard age and the percentages below and above the ages 25 and 64, we have the general shape of the age distribution very adequately described. All three advance with the flattening and if any one of them is retarded it means some difference in the shape, *e.g.*, if the percentage under 25 is retarded while the others are advancing, it means an age distribution something like that of Canada in 1921 and 1931. If all three advance together, the process of development is smooth. If we classify the ages of certain areas in this way and arrange in order of the three-point index, we have a fairly simple method of classification of the stages of age development of these areas. Attributes due to age development can then be examined.

It is probably necessary to make some comments upon the reasoning underlying the assumptions that are made in Chapter III as to the causes of age development. These are: (1) the age or length of settlement; (2) the past rates of natural increase; (3) the total population increase; (4) trend changes in 2 and 3. Cause 1 is reflected by the proportion of elderly persons; cause 2 by the proportion of very young persons; cause 3 by the proportion of middle-aged persons. Although the natural increase may be very large, there will be a very irregular distribution unless this natural increase has remained in the area or if the death rate has been very great and the large natural increase was entirely due to a very high birth rate. Such matters as longevity, differential death rate, etc., are important but the measurement is not fine enough to reflect them. They will be dealt with further on. It was assumed that over the period of observation the chief cause of irregularity at the middle ages was emigration. By irregularity here is meant a distortion of the general shape, not want of smoothness or local irregularities. The year 1911 had many local irregularities but showed an excellent fit just the same and had a very definite position in the stages of age development. Immigration seems to be a matter of filling in and for some time does not interfere with the course of development even though it overdoes this filling in. The hump of immigration has a definite shape and seems to travel along the age distribution like a superimposed population. As the hump spreads and travels to later ages it interferes more and more, but in 1931 it happens to be capable of separation from the rest of the age distribution. Chart V shows this separation. Canada, males, 1931, are divided into two classes, (1) Canadian born with Canadian-born parents and (2) the remainder of the population, *i.e.*, Canadian born with their children and immigrants with their children. A separation of Canadian born and immigrant alone does not mean much in this connection since a considerable number of the Canadian born are the children of immigrants. The distribution of the Canadian born with their children shows the stage of development reached by 1931. It has reached a stage later than 1891 but not as far advanced as 1901. The *b-d* curve gives the best fit and the *d* is as important as the *b* at about 65 years of age (see p. 100).

It seems striking that the Canadian population of 1931 less those directly or indirectly due to immigration should have an age development equivalent to that of Canada between 1891 and 1901. It must be remembered that Canada's 1931 total age distribution shows a natural stage of development when we take 1881 as a standard or base. Does this mean that in some way immigration caused a rejuvenation of the Canadian born? It may be advanced as a tentative explanation that the rejuvenation was not caused by immigration but by the enormous emigration from 1881 to about 1895. The emigrants at the time of emigration would range from 18 to 30 years of age. Their emigration would, by 1931, cause a shortage in persons (Canadian born) 54 to 80 years of age.

H.—PERCENTAGE DISTRIBUTION OF CANADIAN-BORN MALES OF CANADIAN-BORN PARENTS AND OF IMMIGRANT MALES AND THEIR CHILDREN, BY QUINQUENNIAL AGE GROUPS, CANADA, 1931

Age Group	Canadian-Born Males of Canadian-Born Parents, 1931	Immigrant Males and Their Children, 1931	Age Group	Canadian-Born Males of Canadian-Born Parents, 1931	Immigrant Males and Their Children, 1931
	p.c.	p.c.		p.c.	p.c.
0- 4	12·30	7·15	55–59	3·19	4·41
5- 9	12·34	8·37	60–64	2·49	3·50
10–14	11·31	8·47	65–69	1·91	2·70
15–19	10·57	8·70	70–74	1·39	1·99
20–24	9·06	8·05	75–79	0·79	1·12
25–29	7·32	8·06	80–84	0·38	0·53
30–34	6·37	7·50	85–89	0·14	0·19
35–39	6·01	7·60	90–94	0·03	0·04
40–44	5·42	7·90	95–99	0·01	0·01
45–49	4·83	7·55	100 and over	-	-
50–54	4·12	6·14			

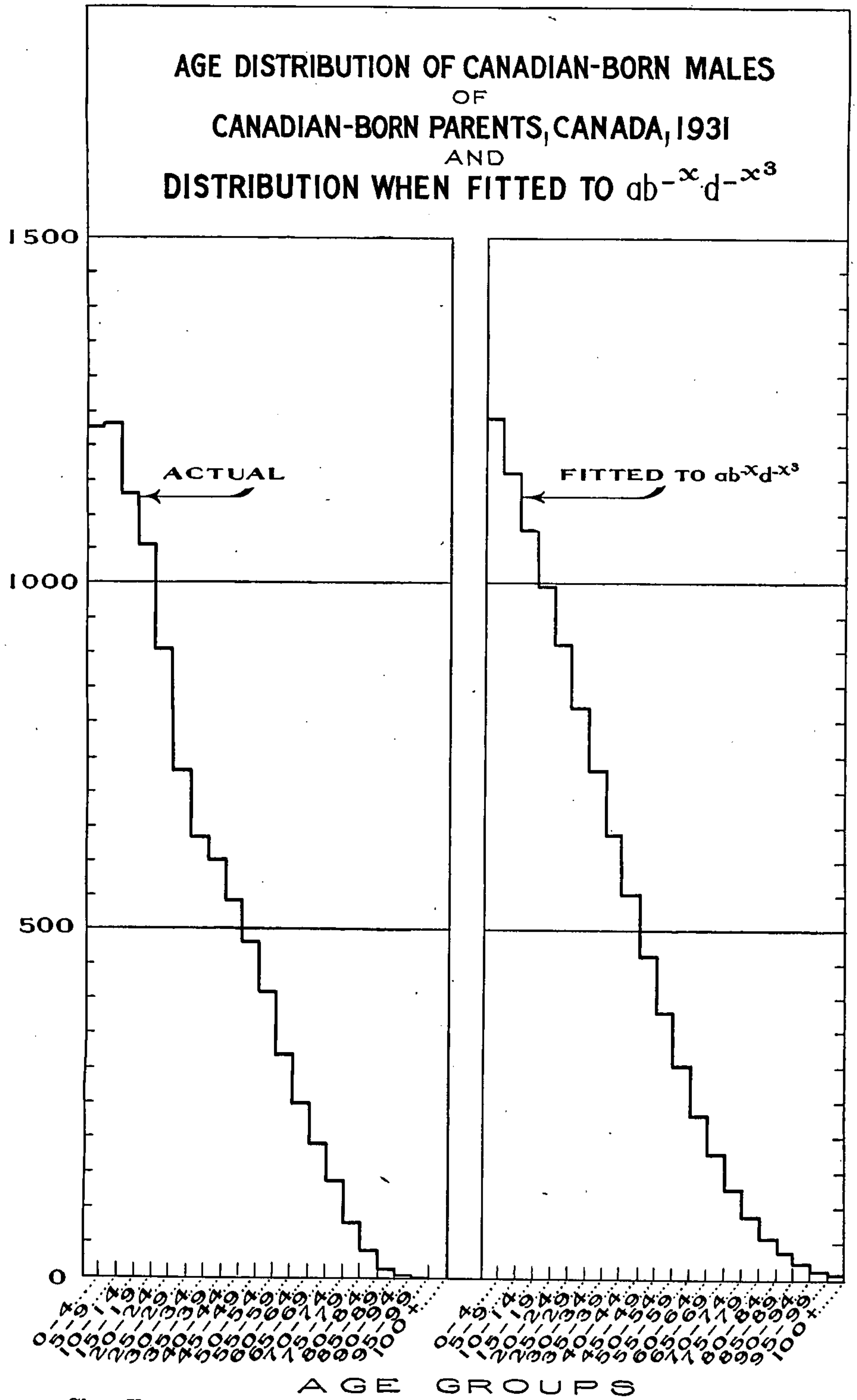

AGE DISTRIBUTION OF CANADIAN-BORN MALES
OF
CANADIAN-BORN PARENTS, CANADA, 1931
AND
DISTRIBUTION WHEN FITTED TO $ab^{-x}d^{-x^3}$
1500
1000
500
0
ACTUAL
FITTED TO $ab^{-x}d^{-x^3}$
AGE GROUPS

Chart V

J.—DISTRIBUTION OF CANADIAN-BORN MALES OF CANADIAN-BORN PARENTS WHEN FITTED TO *B-C-D*, *B-D*, *B-C* AND *C* CURVES, BY QUINQUENNIAL AGE GROUPS, 1931

Canadian-Born Males of Canadian-Born Parents

Age Group	x	Actual	Distribution When Fitted to			
			(1) $ab^{-x}c^{-x^2}d^{-x^3}$	(2) $ab^{-x}d^{-x^3}$	(3) $ab^{-x}c^{-x^2}$	(4) ac^{-x^2}
0- 4	1	1,230	1,354	1,243	1,191	1,191
5- 9	2	1,234	1,187	1,161	1,157	1,157
10-14	3	1,131	1,058	1,079	1,102	1,101
15-19	4	1,057	954	996	1,029	1,028
20-24	5	906	865	911	942	942
25-29	6	732	784	823	846	845
30-34	7	637	708	733	745	744
35-39	8	601	631	642	643	643
40-44	9	542	554	552	544	544
45-49	10	483	475	464	452	452
50-54	11	412	396	381	368	368
55-59	12	319	319	305	294	293
60-64	13	249	248	235	230	230
65-69	14	191	184	179	176	176
70-74	15	139	129	130	133	133
75-79	16	79	86	92	98	98
80-84	17	38	54	62	71	71
85-89	18	14	32	40	50	50
90-94	19	3	17	25	35	35
95-99	20	1	9	15	24	24
100 and over	21	-	4	8	16	16
Error	......	....	662	648	774	775

(1) $\text{Log } y = 3{\cdot}1989106 - 0{\cdot}0729929x + 0{\cdot}0061630x^2 - 0{\cdot}0004086x^3$
(2) $\text{Log } y = 3{\cdot}1228094 - 0{\cdot}0283292x - 0{\cdot}0001727x^3$
(3) $\text{Log } y = 3{\cdot}0803044 + 0{\cdot}0000137x - 0{\cdot}0042557x^2$
(4) $\text{Log } y = 3{\cdot}0802032 - 0{\cdot}0042549x^2$

Now, age of settlement, rate of natural increase, rate of total increase and trend changes in these two rates are regarded as the fundamental principles governing the development of age distribution, *i.e.*, the smooth trend of development. Fluctuations in the death rate, birth rate, etc., cause irregularities, but they do not interfere with the development, if the trend is resumed. A great deal is being said about such phenomena as a defect in the first quinquennial age group, *i.e.*, as being smaller than the next. This happened to the Canadian age distribution in 1931 for the first time. While this may be symptomatic its significance can easily be overrated. If 1941 shows a continuation of this it will become significant, but it could easily be accounted for in 1931 without concluding that it is a stage in development. The very large immigrant population came into Canada in a very short period and as adult single males. For a few years they did not materially affect the birth rate, but after six or seven years in Canada they married or brought in their wives—and, it is important to remember, they did this in such a short time that the movement was almost instantaneous. The result was a sudden huge increase in the birth rate. Again there was a secondary movement of this kind around 1921 after the War. The birth rates owing to these movements were abnormal—not perhaps in relation to some other countries, but in relation to the regular trend of Canada. It was "out of trend." A resumption of normality alone, to say nothing of the influences of the depression, would bring about a smaller number at ages 0–5 than 5–9. Further, it is familiar experience that violent fluctuations in one direction are followed by a swing which goes too far in the other direction. It is this that makes a smooth fitting significant since it ignores these fluctuations and considers only a trend. It may happen that the downward move in the earlier ages will continue—we cannot tell—but that it will be as rapid as the 1931 phenomenon indicates is very improbable. It is clear that five years free from child epidemics, (which is possible), followed by five bad years, would bring about a larger 5–9 group even in a stationary population with a complete reversal of this in the next five years.

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