



BRITISH
COLUMBIA

BC STATS

Ministry of Finance and
Corporate Relations

**Population Extrapolation for Organizational
Planning with Less Error
(P.E.O.P.L.E.)**

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**Population Extrapolation for Organizational Planning
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SUMMARY

British Columbia small area population projections result from the application of a “Component/Cohort-Survival” population model to assumptions dealing with fertility, mortality and migration.

The Component/Cohort-Survival method requires separate projections of each of the components of population change, namely fertility, mortality and migration. With this information, and with a base year age-specific estimate of population, a projection for any subsequent year is made by promoting each age group in the preceding year to the next highest age group, while at the same time taking into account the effects of net migration, deaths and births.

In general, all assumptions relating to migration, births and deaths by small area are based on past conditions, modified wherever possible to take into consideration possible future changes. Consequently, the resulting population projections are not necessarily what will be, but rather what could be given the realization of these conditions. It is certainly possible that unforeseen changes in factors such as government policy, economic development, land use and zoning will affect future populations. Consequently, the projections should be regarded as only one possible scenario of the future size and age-sex structure of the population.

Age and gender-specific population projections are prepared for eighty-eight sub-provincial areas referred to as local health areas (Figure 1). Population projections for larger geographic regions such as regional districts and development regions are prepared by aggregating the local health area projections. Where health areas cross over regional district boundaries, the most recent (1996) Census population is used to determine the proportion of the health area to be allocated to the different regional districts.

In order to approximate the error associated with the population projections, a comparison was made between the 1996 Census population adjusted for incompletely enumerated Indian Reserves and net census undercount, and a projected population for 1996 that was produced with the first projection incorporating the 1991 Census results (PEOPLE 18). Since PEOPLE 18 did not include any estimate of net census undercount in its base population, the projection was re-run with updated base year population data to reduce the error associated solely with the revisions to historical data and unrelated to the performance of the model. The accuracy of this adjusted 1991 Census-based population projection was assessed through a number of summary measures, with the primary measure being the average absolute percent error (AAPE).

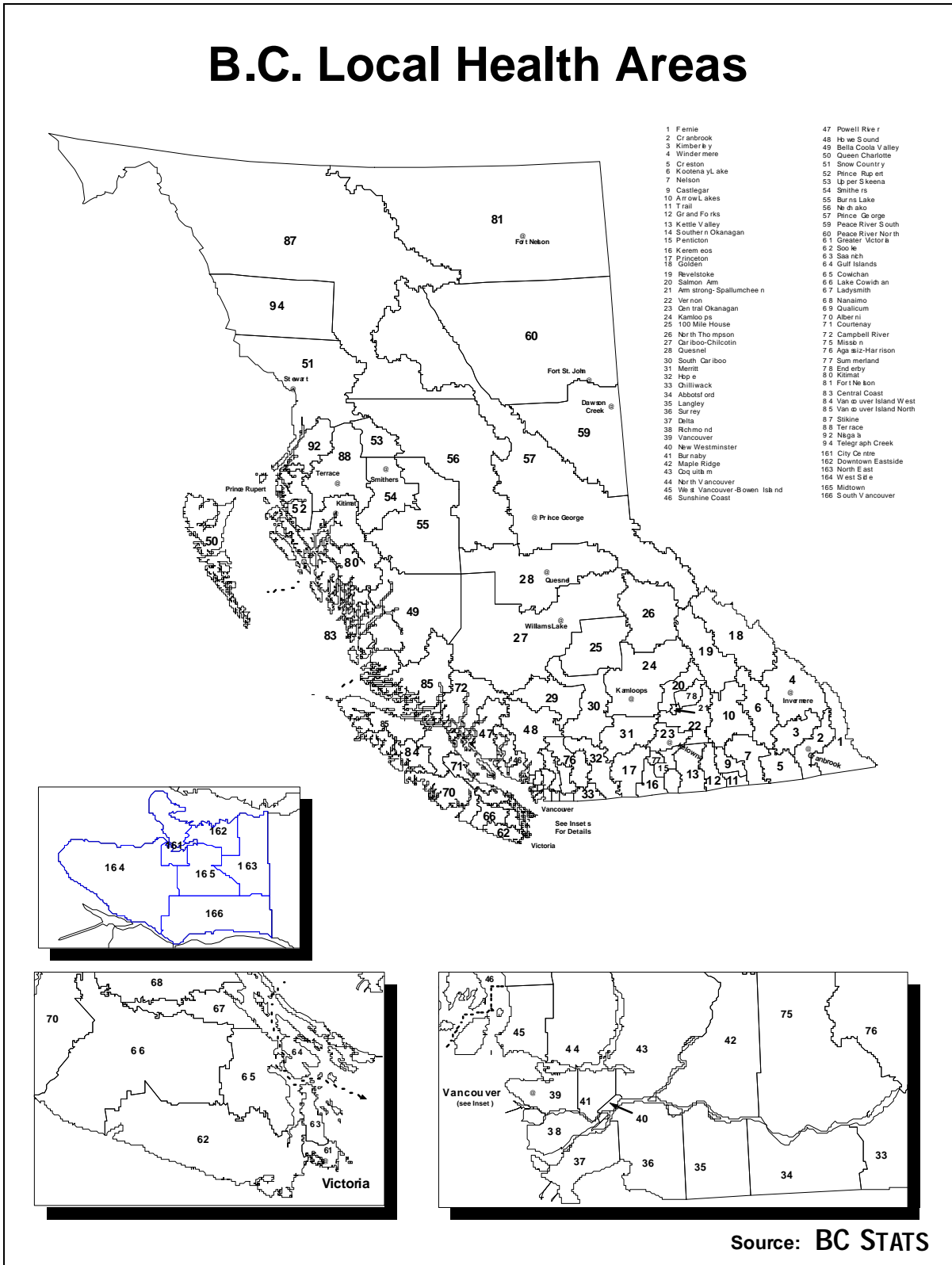
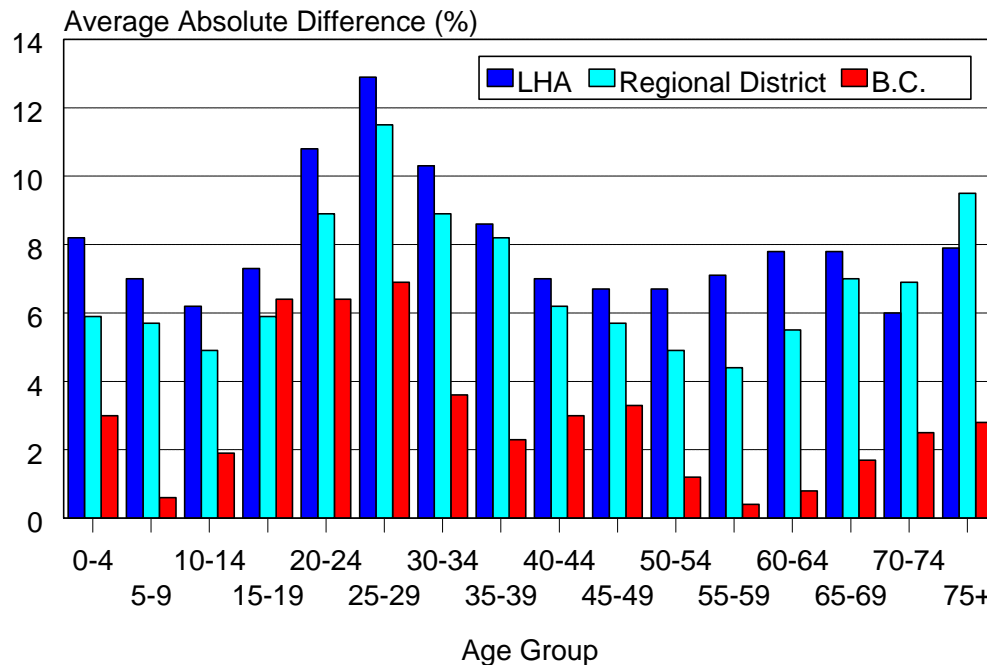


Figure 1

The AAPE for local health areas for the PEOPLE 18 (adjusted) projection is 5.3 per cent, while the AAPE for regional districts is 4.7 per cent. The projection average absolute error relative to the 1996 Census varies by population size with the error diminishing as the population gets larger. As seen in Figure 2, there is also a wide variation in the projection error across age groups. Higher projection error is associated with the 20 to 34 age groups.



BC Stats

Figure 2

Finally, it should be noted that the error associated with this, or any other projection, is dependent upon the time period on which it is evaluated. At the provincial level, the PEOPLE 18 projection underestimated the population by about 2.1 per cent after four years. However, it would be incorrect to assume that both the magnitude and sign of this error are stable over time. For example, the projection error on a yearly basis associated with a provincial level projection prepared in 1980 is displayed in Figure 3.¹ As can be seen, both the sign and magnitude of the error varies with time. The population projections developed by BC Stats are intended to capture only the average migration, fertility and mortality levels expected over the next thirty years, and will not fully reflect any fluctuations that may occur on a year to year basis.

¹ This was the first projection prepared and published by the Central Statistics Bureau (the forerunner to BC Stats) and was called Proj 10/80. Note that this projection was also adjusted for net census undercount to make it consistent with current estimates.

1980 Based Projection* vs Actual - British Columbia -

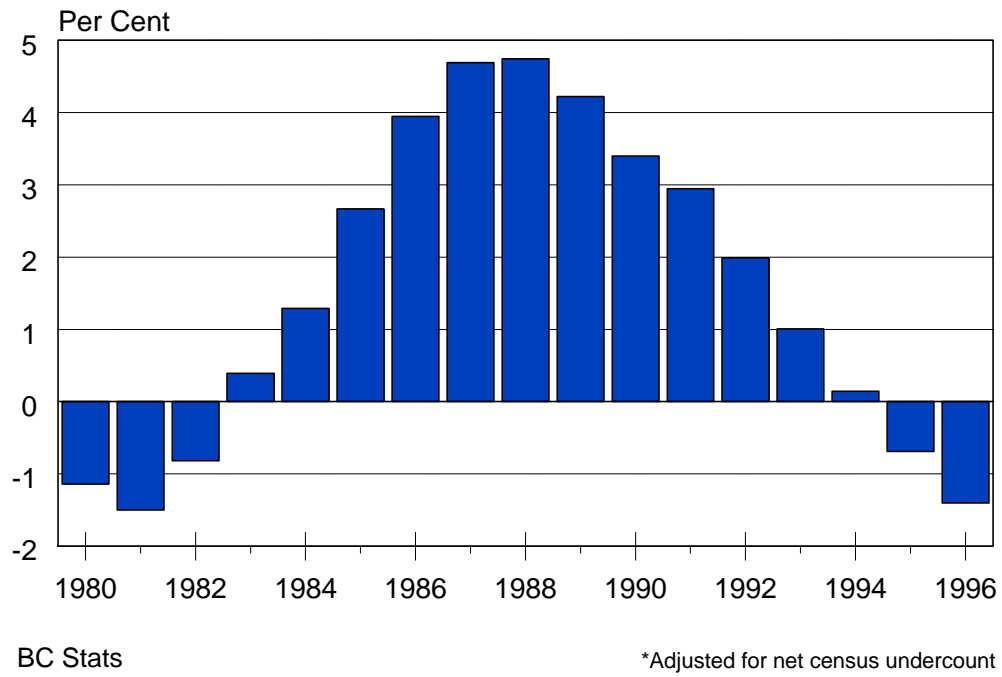


Figure 3

1 INTRODUCTION

(I) NATURE AND USE OF POPULATION PROJECTIONS

Population counts can be divided into three broad categories: census, estimates, and projections. Currently within Canada, the most complete and reliable source of information on the population is the census, which is based on a house-to-house enumeration. Due to the high cost and time commitments associated with conducting a census, this method of counting people is currently only carried out once every five years. However, population is constantly changing, and in some cases quite rapidly, hence population statistics for every fifth year are not adequate for many purposes. As a result, researchers prepare population estimates and projections in order to supplement the information provided by a census.

There are some important distinctions between population estimates and population projections that are often misunderstood. Population estimates make use of current information in order to produce a current estimate of the population (e.g., immigration records, birth and death records, or statistics such as residential electrical connections that are correlated with population change). On the other hand, when there is no such data, a current estimate reduces methodologically to a projection.

As a result of the different approaches used to generate a census population count, an estimate, or a projection, one can expect to observe a considerable variation in accuracy between the three approaches. The census is generally considered the most accurate approach, followed by an estimate, then a projection. This paper will concentrate on the methodology used to prepare population projections for regions within the Province of British Columbia as well as an evaluation of that approach.²

² For information on the methodology and accuracy of regional population estimates prepared by BC Stats see: *Generalized Estimation System (GES) - Small Area Population Estimation Methodology*, Population Section, BC Stats, Ministry of Finance and Corporate Relations, Government of British Columbia, December 1998. Also see *Estimating the Age/Gender Distribution of Small Area Populations in British Columbia*, Population Section, Central Statistics Branch, Ministry of Government Services, Government of British Columbia, April 1994. For details of the methodology underlying the estimate of the total British Columbia population see: *Population Estimation Methods, Canada*, Catalogue 91-528E, Demography Division, Statistics Canada, March 1987, p 9-16.

(II) LIMITATIONS OF POPULATION PROJECTIONS

In general, all assumptions relating to the components of population change (i.e., migration, births and deaths) by small area are based on past conditions, modified wherever possible to take into consideration possible future changes. Consequently, the resulting population projections are not necessarily what will be, but rather what could be given the realization of these conditions. It is certainly possible that unforeseen changes in factors such as government policy, economic development, land use and zoning will affect future populations. Consequently, the projections should be regarded as only one possible scenario of the future size and age-gender structure of the population.

Age and gender-specific population projections are prepared for eighty-eight sub-provincial areas referred to as local health areas. Population projections for larger geographic regions such as regional districts and development regions are prepared by aggregating the local health area projections.³

(III) COMPONENT/COHORT-SURVIVAL METHOD

British Columbia small area population projections result from the application of a "Component/Cohort-Survival" population model to assumptions dealing with fertility, mortality and migration.

The Component/Cohort-Survival method requires separate projections of each of the components of population change, namely fertility, mortality and net migration. With this information, and with a base year age-specific estimate of population, a projection for any subsequent year is made by promoting each age group in the preceding year to the next highest age group, while at the same time taking into account the effects of net migration, deaths and births.

Specifically, beginning from a base year estimate of population by single year of age and sex, each age group i in the base year t is promoted to the next higher age group $i+1$ in time $t+1$, while at the same time taking into account the effects of net migration, births and/or deaths in that age cohort. This process is then repeated for the number of years required.

A diagrammatic representation of the process is given in Figure 4.

The source and/or derivation of each of the components of Figure 4 will be outlined over the remainder of this paper.

³ Since the new local health area boundaries cross over regional district boundaries in several cases, portions of some areas are allocated to regional districts based on percentage splits at the time of the 1996 Census.

**Provincial Population Forecast
Model Flow Chart**

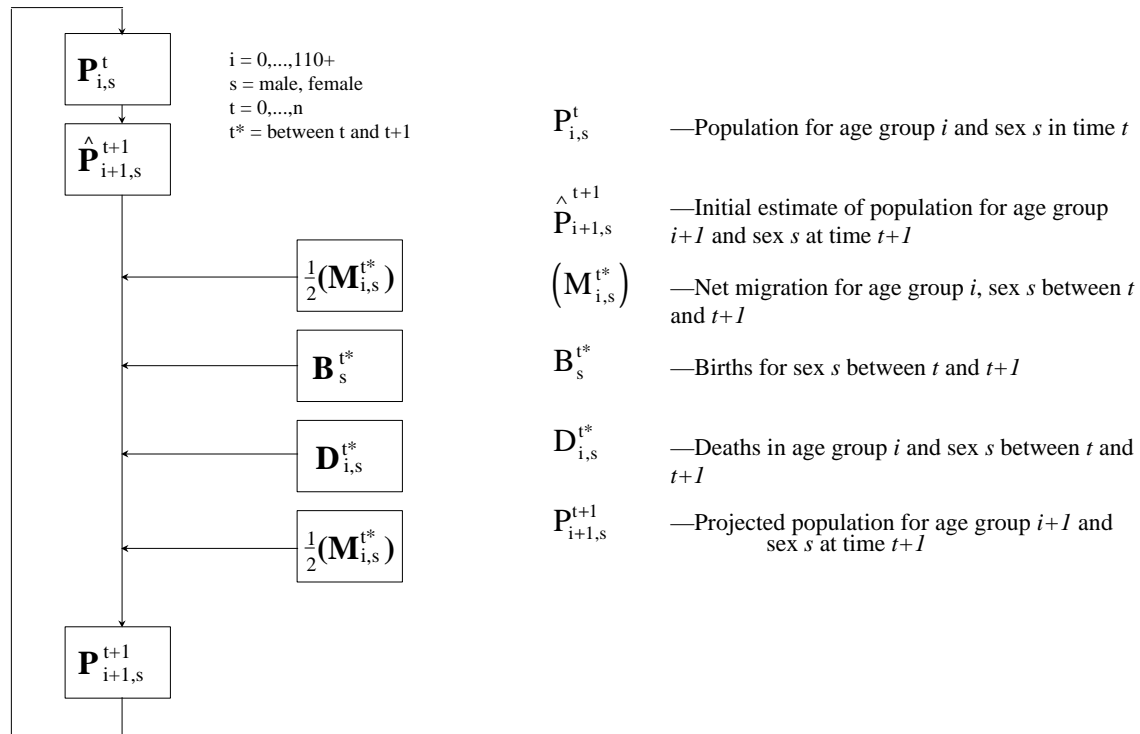


Figure 4

2 BASE POPULATION

The base-year population used in the projection is an estimate based on the latest (1996) Census population adjusted for net census undercount and incompletely enumerated Indian Reserves.⁴ In 1993 a decision was made by Statistics Canada to incorporate an estimate of those who were missed in the census less those who were counted more than once (i.e., the undercount minus the over-count, which yields the net census undercount) into the official population estimates for the provinces. This methodology was applied back to 1971. The net census undercount in 1991 was estimated by Statistics Canada to be 2.36 percent and the comparable figure for 1996 is 3.68 percent.⁵ In essence, the census year populations are estimates, but these estimates are considered to be more accurate than the raw census figures.

⁴ According to Statistics Canada, a net of 142,443 persons in British Columbia were missed in the 1996 Census. In addition, there were 3,136 persons on 19 Indian Reserves who were incompletely enumerated during the 1996 Census.

⁵ Note that these figures do not include incompletely enumerated Indian Reserves. The net undercount figures with incompletely enumerated Indian Reserves included are 2.47 percent for 1991 and 3.76 percent for 1996.

3 FERTILITY FORECASTS

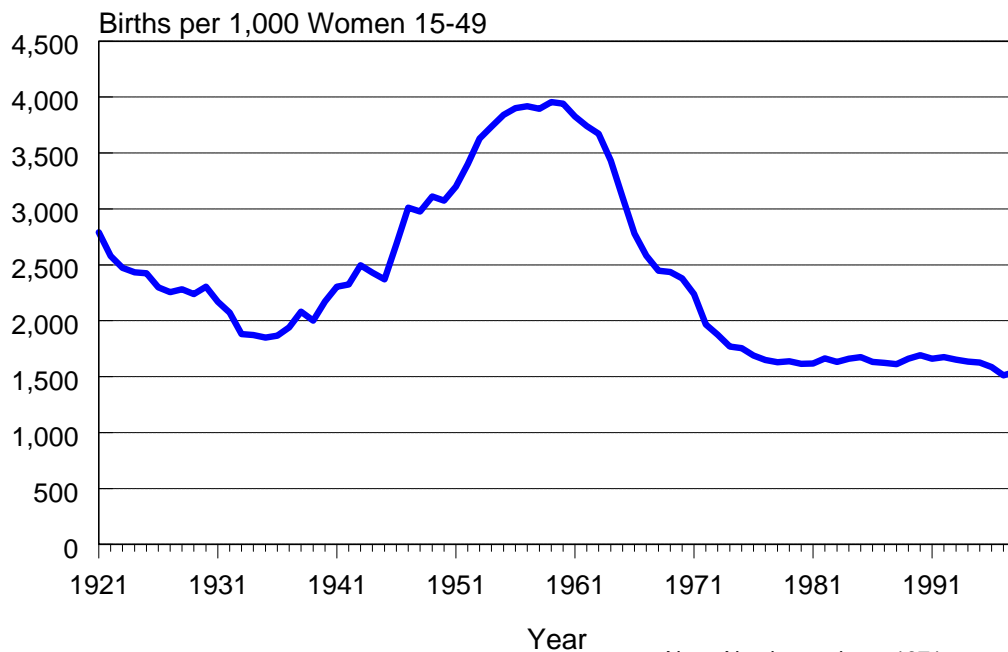
Birth forecasts for each year are a function of two variables:

- the number of females of child bearing ages (defined as 15-49), and
- the expected fertility of these women.

The fertility rate of women in a specific age group can be summarized by the number of births in a year occurring to women in that age group divided by the number of women in that age group. This “propensity to give birth” is termed the Age Specific Fertility Rate (ASFR) and is expressed as the number of births per 1,000 women in each age group.

The Total Fertility Rate (TFR) is the summation of the age specific fertility rates, and represents an age standardized summary measure of the population's fertility structure. In the calculation of the TFR, each ASFR is given an equal weight. The result is a measure of fertility that represents the total number of children 1,000 women would bear if the fertility structure of that year applied to them over their child-bearing years (i.e., completed family size). The estimated and projected TFR for each region on an annual basis can be found in the Summary Statistics table contained in the regional projection booklet.

British Columbia Total Fertility Rate



BC Stats

Note: Numbers prior to 1971 are based on populations which are not adjusted for net census undercount.

Figure 5

Projections of ASFR's are prepared for each of 88 sub-provincial areas. In general, the TFR's and ASFR's for each small area are projected with some consideration of their values relative to the provincial level projections. First, age specific fertility and total fertility rates are calculated by small area for the historical years available through the current year. Over this period, the relationships between the provincial and small area ASFR's and TFR's are analyzed. Small area projections of TFR's are then produced to the year 2026. The small area ASFR's are projected such that they approach the BC level ASFR structure at different points well beyond the end of the projection period and at various rates depending upon trends and expectations of regional changes.

As seen in Figure 6, the provincial ASFR's vary significantly with age and time. The most fertile age groups are presently the 25-29 and 30-34 ages, followed by 20-24. Over time, one can observe a dramatic general increase in most ASFR's from the mid-1930s up to 1960, and then a drop through the 1960s and early 1970s. This variation in fertility has been termed the "baby-boom" (followed by the "baby-bust"), and was evident to different extents in all but the 45-49 year old age groups.

Age Specific Fertility Rates

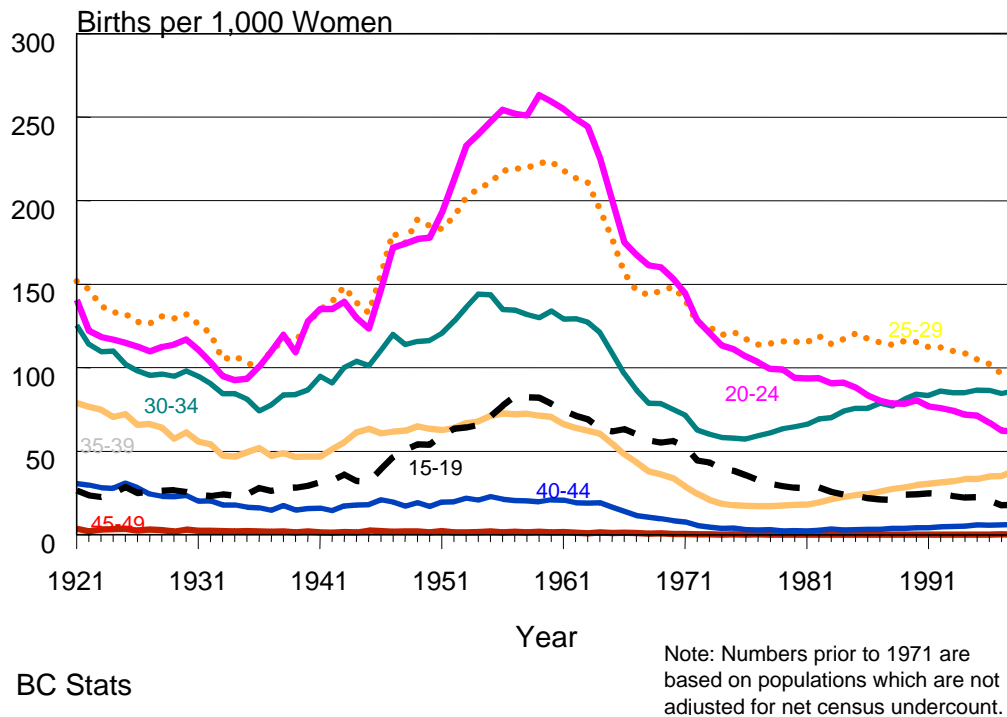


Figure 6

During the baby-boom period, the 20-24 year old age group recorded the greatest fertility rate increases and subsequent decreases. Since 1973, the fertility rate of this age group has fallen below that of the 25-29 age group, and since 1989, below that of the 30-34 year old age group. Current data indicate that the fertility rate for this age group is still decreasing unlike increases in other, older, age groups.

One of the more significant developments since the mid-seventies has been the increase in the fertility rates among the 30-34 and 35-39 year old age groups. This trend in the increase of the fertility rates of older women (30-39), coupled with the decreasing fertility rates among the younger age groups (less than 24), may be interpreted as a desire to postpone child bearing until later in life. This change in preference for births at older ages is thought to be a factor in the increases in female labour force participation during this period.

4 MORTALITY PROJECTION

Small area mortality projections are prepared by first compiling age-sex specific death rates for available historical periods through the current year. These death rates are then converted into "lifetable survival rates" and extrapolated to converge towards the projected provincial survival rates at a period well beyond the end of the projection period. The area-specific survival rates are then applied to the population to produce the surviving population by age and sex.

Life expectancy at age 0 is commonly used as a summary measure of the age-specific death rates. By and large, life expectancy has been increasing over time, though more slowly in recent years. In general, the most significant factor contributing to the increased life expectancy over the past 60 years has been the reduction in infant and early childhood mortality, which in turn, has been caused by the effective control of diseases such as polio, tuberculosis, diphtheria, and others. The trend of increasing life expectancy is expected to continue, though at a lower rate than in the past.

5 MIGRATION PROJECTIONS

(I) REGIONAL DISTRIBUTION OF NET MIGRATION

Projections of net migration by small area are prepared by extrapolating past trends, modifying these trends wherever possible to take into consideration available information on planned changes to the industrial base and the regional economic outlook. Historical net migration values are compiled for available periods through the current year, then analyzed first at the provincial level, then at each of the eight development regions within the province, then at each of twenty-eight census divisions within the development regions, and finally down to the 88 local health areas within the census divisions. The distribution of the provincial-level net migration forecast down to each of these sub-levels is based on historical trends modified by the expected relative strengths of the sub-regional economies. The control total net migration to which all sub-provincial regions must sum is the latest British Columbia net interprovincial and net international migration forecast.⁶

British Columbia Net Migration

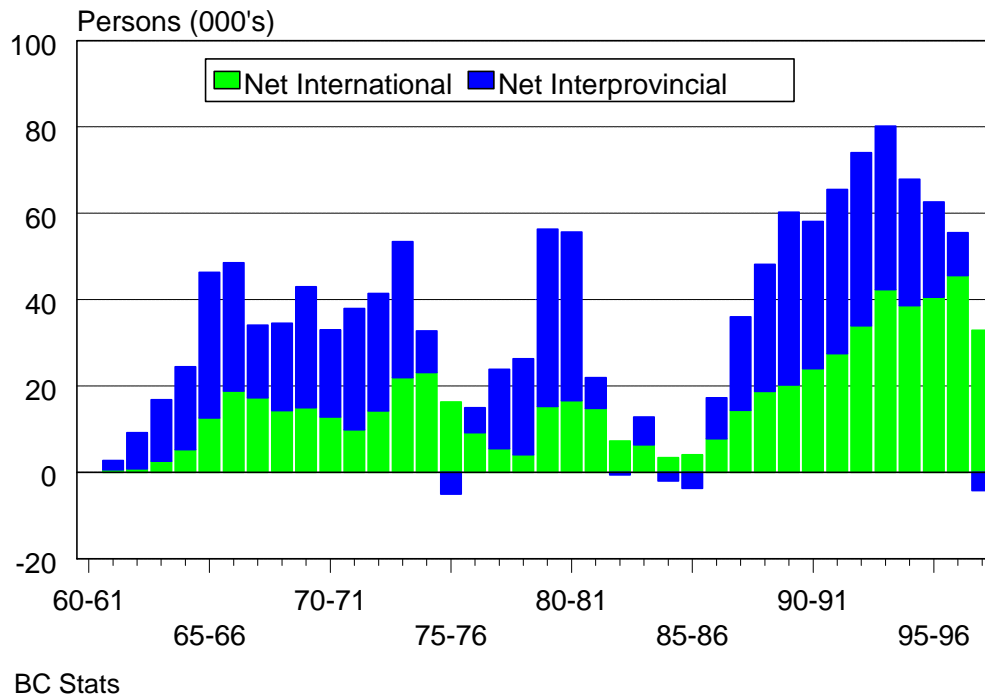


Figure 7

⁶ See: *British Columbia Population Forecast Update, March 1999*, BC Stats, Ministry of Finance and Corporate Relations, Province of British Columbia.

Historically, the bulk of the net migration gain has gone to the Mainland-Southwest region. In general, the Mainland-Southwest can be expected to account for 55 to 65 per cent of provincial net migration and 80 to 90 per cent of the international migration. It is likely that these trends will continue to persist for the foreseeable future. The second major migrant destination is the Vancouver Island-Coast region, which can be expected to account for 15 to 20 per cent of the total provincial net migration gain. This area generally receives about 6 to 7 per cent of the provincial net international migration and 20 to 25 per cent of interprovincial migration. The Thompson-Okanagan region is also a major recipient of migrants, attracting between 3 and 5 per cent of provincial net international migration and 15 to 20 per cent of net interprovincial migration.

For a detailed summary of the migration levels projected for each area, see the Summary Statistics table printed with each regional projection.

(II) AGE/GENDER DISTRIBUTION OF NET MIGRATION

In general, the distribution of the projected total net migration for each area by age and gender are based on the historical distribution. Small area age/gender estimates of net migration have been compiled for the census periods 1971/76, 1976/81, 1981/86, 1986/91 and 1991/96, and are referred to as the Historical Small Area Distributions. Examination of these net migration distributions by small area show many to be unstable over time. This is likely the result of two factors: First, many of the areas possess small resource-based economies subject to wide fluctuations, with consequent swings in migration levels. Second, a certain amount of instability is introduced when calculating a percentile distribution for net migration, which may have either positive, negative, or zero values.

The projection of these potentially unstable distributions into the future could produce misleading results. As a result, procedures were developed to minimize the effects of this instability. First, it was found that residual net migration age distributions for many areas differed depending on whether the net migration was positive or negative. Consequently, historical migration distributions by small area are separated according to whether they occurred during a time of positive or negative total net migration. If a net outflow of population is projected for a region, a negative historical distribution is selected.

A further step taken to reduce the effects of instability in the migration distributions is to group the 88 net migration distributions into clusters of similar migration distributions, then calculate the positive and negative net migration distributions for each group of areas. These are referred to as the Historical Grouped Distributions. Cluster analysis across selected age groups was used to group the historical small area migration distributions. Examination of the cluster memberships from different periods resulted in the placing of the majority of the areas into three clusters, while eight areas were maintained as independent clusters.

In order to guard against adopting a historical net migration distribution that may not be representative of the projected year, five different historical sex-specific distributions are calculated for each year, then distributed by single year of age. These five different net migration distributions are:

1. The Historical Small Area Distribution from the most recent time period having the same sign as the projected net migration.
2. The Historical Group Distribution from the most recent time period having the same sign as the net projected migration.
3. The migration distribution from the most recent period for all small areas with a positive and negative net migration.
4. The population distribution derived from ageing the population one year, adding births and subtracting deaths (i.e., the natural base population).
5. The age distribution of migrants to British Columbia as a whole. For all the years under consideration, migration to British Columbia has been positive, hence this is a positive distribution. Nevertheless, it is used as the fifth distribution regardless of whether the migration to a small area is positive or negative.

In some cases, it is not possible to calculate all five distributions. This occurs if a small area has never had a negative net migration in the past, but one is indicated for the projected year under consideration. In situations such as this, only distributions that can be calculated are used to distribute the small area net migration.

Empirical testing based on the 1981, 1986 and 1991 Censuses indicated that of the five net migration distributions described above, number 1 (the Historical Small Area Distribution) produced the lowest error, followed by number 2 (Historical Grouped Distribution), then number 3, and so on. However, despite the fact that distribution number 1 produced the lowest error on average, it did not produce the lowest error for each small area. Hence, a selection procedure was designed to substitute the net migration distribution produced by number 1, with either 2, 3, 4, or 5 in only those cases where the population distribution produced by number 1 was considered unlikely.

Empirical testing based on the 1981, 1986 and 1991 Censuses resulted in the following selection procedure being adopted. First, all migration distributions possible are calculated and added to the natural base population, resulting in up to five possibilities for the small area projected population. These age/sex specific population projections are then examined to determine which one produces the least change in the small area age structure from the previous year. This is done by first calculating the average percent difference between the age structures for each of the five possible populations in time $t+1$ to the population in time t . Next, the standard deviations about these averages are calculated, and the distribution with the lowest standard deviation is flagged. If the standard deviation produced by using the Historical Small Area Distribution is significantly greater than the smallest standard deviation (i.e., of the flagged distribution), then the Historical Small Area Distribution is rejected. This procedure is repeated with the Historical Grouped Distribution, and so on until one of the five possible populations is selected.

6 SUB-PROVINCIAL/PROVINCIAL CONSISTENCY

In order to ensure internal consistency between the sum of the small areas and provincial level population projections, a final prorating step was introduced. This procedure involves adjusting the sum of the small area age/sex specific population, death and birth projections to conform to the provincial level forecast.

7 EVALUATION OF THE LHA AND REGIONAL DISTRICT POPULATION PROJECTIONS FOR BRITISH COLUMBIA

(I) EVALUATION MEASURES

In the past, in order to approximate the error associated with the population projections, a comparison was made between the latest available census population and the projection for that census year produced approximately five years earlier. For the 1996 Census population, the projection to be used is PEOPLE 18, which was the first to incorporate the 1991 Census results, even though it had a 1992 base year (since the 1991 Census results were not available until 1992).⁷ Unfortunately, there is a problem with consistency between the base year population used in the projection and the current estimate for that year that could result in a significant overestimation of the error associated with the projection. In 1993 Statistics Canada decided to estimate the net census undercount (i.e., the net difference of the number of persons missed in the census and the number of persons counted more than once) and incorporate these numbers into the official population estimates for the provinces, such that the 1996 “true” population figure is actually an estimate based on the census that incorporates adjustments for net census undercount. Since the base year for the PEOPLE 18 projection did not include any such estimates for net census undercount and was based on raw census numbers (with the exception of the inclusion of estimates of incompletely enumerated Indian Reserves), any error evaluation based on these numbers will include errors in the base year data in addition to the pure projection errors. In a sense, this has always been the case, since census data is not immediately available and usually the base year for the first projection incorporating census data is the year after the census. This means that the evaluation has always overestimated the error because it included errors due to intercensal revisions to the base year data. The difference this time around is that the base year revisions are far more significant and could greatly distort the evaluation results.

In order to account for these differences, the BC-level projection was re-run using the most current estimates for 1992 (the base year for PEOPLE 18), leaving the other input assumptions unchanged. The associated evaluation using the adjusted projection should be a more accurate reflection of the projection error than one done using the original projection; however, there are still some points to be noted when assessing the results of the evaluation. One consideration is that foreknowledge of base year population revisions could have changed the input assumptions, particularly with regard to birth and death data, so that the projection error may be overstated. Also, counts of returning Canadians and non-permanent residents were not included in the population until 1993, and even though these people are included in the revised population estimate that forms the base-

⁷ Note that the projection model is constantly being refined and new procedures have been incorporated into the model since the PEOPLE 18 projection. For this reason, this evaluation may not be completely reflective of the current model; however, the error structure should not be substantially different and this evaluation should give a reasonable representation of the error that can be expected in more current PEOPLE projections.

year population for the revisited PEOPLE 18 projection, the population of these components was never considered in the migration projections. For the non-permanent residents (NPRs) this is of little consequence, since the erratic nature of the net flows of NPRs makes forecasting this component very difficult and generally the forecast is for zero net NPRs annually (in other words, the forecast is for the inflow of NPRs to equal the outflow). However, for the returning Canadians, the failure to project this component means that the overall projected population should be understated. As detailed below, at the provincial level the PEOPLE 18 projection did indeed underestimate the population for 1996 (by approximately 2.1 per cent). Some of this error is related to the exclusion of returning Canadians from the projection assumptions.

The accuracy of this adjusted 1991 Census-based population projection after five years was assessed through a number of summary measures:

- average absolute percent error or difference (AAPE)
- median absolute percent error (MAPE)
- standard deviation about the average of the absolute percent errors
- frequency distributions of percent errors

(II) EVALUATION RESULTS

The various summary measures for the evaluation of the 1991-based local health area and regional district population projections are given in Tables 3, 4 and 5. Table 2 gives a breakdown of the error by population size.

Table 1

**Preliminary 1996 Population Projection Accuracy for
British Columbia LHA's and Regional Districts
(1991 Census Base)**

	Local Health Areas	Regional Districts
AAPE*	5.3%	4.7%
MAPE!	4.4%	4.8%
Error at the BC Level	-2.1%	-2.1%
% Overestimated	20.3%	25.0%
No. of Observations:		
less than 5%	44	15
5%-10%	26	13
10%-15%	8	0
greater than 15%	1	0

* Average Absolute Percent Error
! Median Absolute Percent Error

Table 2

**Preliminary 1996 Population Projection Accuracy for
British Columbia LHA's by Population Size
(1991 Census Base)**

Population Size	AAPE*	MAPE!	Number of Observations
0 - 5,000	7.8%	8.9%	9
5,000 - 8,000	7.7%	7.6%	9
8,000 - 18,000	6.8%	6.5%	19
18,000 - 30,000	4.3%	3.8%	11
30,000 - 70,000	3.8%	3.5%	16
70,000 and over	2.8%	2.7%	15

* Average Absolute Percent Error
! Median Absolute Percent Error

Table 3

**Preliminary 1996 Population Projection Accuracy
by Age (1991 Census Base)**

Age Group	B.C.		Reg. Dist.		LHA	
	Diff	% Diff	Diff	% Diff	Diff	% Diff
0 - 4	7,373	3.0%	424	5.9%	186	8.2%
5 - 9	-1,568	-0.6%	326	5.7%	172	7.0%
10 - 14	-4,765	-1.9%	281	4.9%	131	6.2%
15 - 19	-16,199	-6.4%	579	5.9%	217	7.3%
20 - 24	-16,551	-6.4%	792	8.9%	347	10.8%
25 - 29	-20,496	-6.9%	786	11.5%	338	12.9%
30 - 34	-12,064	-3.6%	501	8.9%	284	10.3%
35 - 39	-7,848	-2.3%	354	8.2%	207	8.6%
40 - 44	-9,419	-3.0%	382	6.2%	177	7.0%
45 - 49	-9,707	-3.3%	371	5.7%	155	6.7%
50 - 54	-2,552	-1.2%	149	4.9%	92	6.7%
55 - 59	-748	-0.4%	145	4.4%	77	7.1%
60 - 64	1,295	0.8%	167	5.5%	111	7.8%
65 - 69	2,511	1.7%	150	7.0%	92	7.8%
70 - 74	3,300	2.5%	168	6.9%	83	6.0%
75+	5,857	2.8%	228	9.5%	101	7.9%
All Ages	-81,581	-2.1%				

Table 4

**Preliminary 1996 Population Projection Accuracy for
British Columbia LHA's by Age and Gender
(1991 Census Base)**

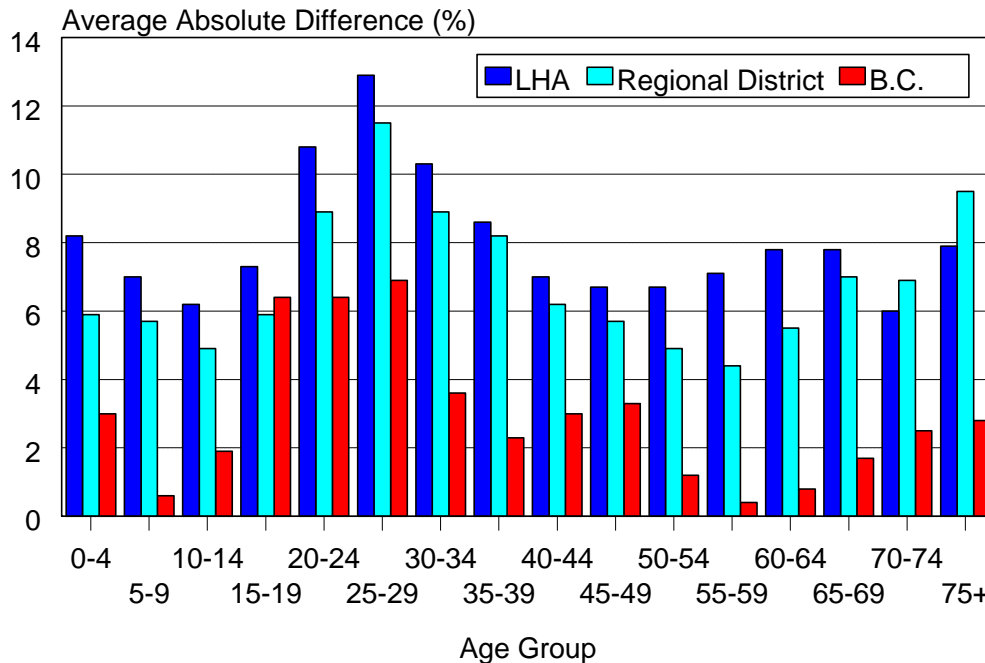
Age Group	Male		Female		Total	
	Diff	% Diff	Diff	% Diff	Diff	% Diff
0 - 4	96	7.9%	95	9.3%	186	8.2%
5 - 9	92	7.9%	87	7.1%	172	7.0%
10 - 14	71	6.3%	62	6.8%	131	6.2%
15 - 19	122	8.2%	101	7.4%	217	7.3%
20 - 24	174	11.4%	178	11.3%	347	10.8%
25 - 29	180	12.4%	164	14.2%	338	12.9%
30 - 34	157	11.0%	131	10.0%	284	10.3%
35 - 39	109	9.4%	100	7.9%	207	8.6%
40 - 44	87	7.5%	93	7.0%	177	7.0%
45 - 49	76	6.9%	80	6.9%	155	6.7%
50 - 54	44	6.6%	54	7.2%	92	6.7%
55 - 59	42	7.6%	48	8.1%	77	7.1%
60 - 64	56	8.3%	57	7.9%	111	7.8%
65 - 69	51	9.4%	47	8.8%	92	7.8%
70 - 74	42	8.0%	44	6.1%	83	6.0%
75+	50	12.3%	62	9.7%	101	7.9%

Table 5

**Preliminary 1996 Population Projection Accuracy for
British Columbia Regional Districts by Age and Gender
(1991 Census Base)**

Age Group	Male		Female		Total	
	Diff	% Diff	Diff	% Diff	Diff	% Diff
0 - 4	210	6.0%	225	6.4%	424	5.9%
5 - 9	170	6.4%	163	5.8%	326	5.7%
10 - 14	155	5.1%	130	5.1%	281	4.9%
15 - 19	314	6.4%	269	5.6%	579	5.9%
20 - 24	405	9.3%	389	8.6%	792	8.9%
25 - 29	430	11.1%	356	13.0%	786	11.5%
30 - 34	270	9.3%	238	8.8%	501	8.9%
35 - 39	166	9.9%	189	6.8%	354	8.2%
40 - 44	176	6.2%	208	6.4%	382	6.2%
45 - 49	186	5.8%	187	5.7%	371	5.7%
50 - 54	83	4.4%	108	6.5%	149	4.9%
55 - 59	92	4.4%	104	6.0%	145	4.4%
60 - 64	92	5.2%	94	6.6%	167	5.5%
65 - 69	94	8.6%	87	8.0%	150	7.0%
70 - 74	91	9.5%	80	6.9%	168	6.9%
75+	90	13.7%	146	7.1%	228	9.5%

As seen in Table 2, the projection average absolute error relative to the 1996 Census varies by population size with the error diminishing as the population gets larger. There is also a wide variation in the projection error across age groups (Table 3). Higher projection error is associated with the 20 to 34 age groups.



BC Stats

Figure 8

The main reason for the higher error in the 20 to 34 year old age groups is that persons in these age groups are more mobile than the general population, hence the higher error for these age groups is a reflection of the relatively weaker methodology of projecting migration.

Finally, it should be noted that the error associated with this, or any other projection, is dependent upon the time period upon which it is evaluated. At the provincial level, the PEOPLE 18 projection underestimated the population by about 2.1 per cent after four years. However, it would be incorrect to assume that both the magnitude and sign of this error are stable over time. For example, the projection error on a yearly basis associated with a provincial level projection prepared in 1980 is displayed in Figure 12.⁸ As can be seen, both the sign and magnitude of the error varies with time. The population projections developed by BC Stats are intended to capture only the average migration,

⁸ This was the first projection prepared and published by the Central Statistics Bureau (the forerunner to BC Stats) and was called Proj 10/80. Note that this projection was also adjusted for net census undercount to make it consistent with current estimates.

fertility and mortality levels expected over the next thirty years, and will not fully reflect any fluctuations that may occur on a year to year basis.

1980 Based Projection* vs Actual - British Columbia -

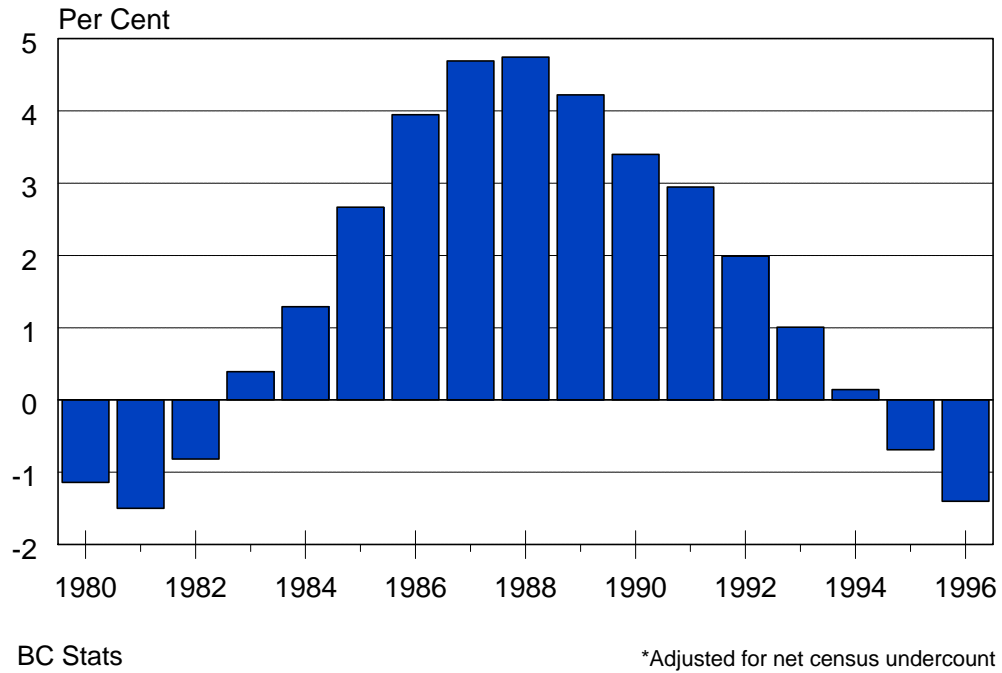


Figure 9