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Fertility Projections of Registered Indians, 1982 to 1996

Canada

FERTILITY PROJECTIONS OF REGISTERED INDIANS, 1982 TO 1996

by

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This publication is one of four reports that provide information on the development of population projections of registered Indians, 1982 to 1996. The other three reports are:

- Population Projections of Registered Indians, 1982 to 1996
- Mortality Projections of Registered Indians, 1982 to 1996
- Migration Projections of Registered Indians, 1982 to 1996

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SUMMARY

The registered Indian population has entered the demographic transition, moving from a traditionally high to a moderately low fertility typical of modern society. Within less than two decades, its fertility halved, reaching about 3.2 births per woman in 1981. In recent years, a marked convergence between Indian and overall Canadian fertility has been observed. However, the fertility level of registered Indians is still twice as high as that of the Canadian population at large. The Indian current demographic transition has not yet run its course and there is a potential for a further fertility decrease before the overall Canadian level is reached.

Fertility is an important component in population projections and this paper presents three fertility assumptions for the period 1982-1996: constant, slow decline and rapid decline in fertility. According to the constant assumption, the fertility level would remain at the 1981 level of 3.2 births per woman over the projection period. The other two assumptions imply a declining trend, a modest reduction in one case, with fertility reaching a level of 2.6 births per woman and a speedy reduction in the other, with fertility reaching 2.1 births per woman by the end of the projection period.

Data for developing fertility assumptions came from the Indian Register of Indian and Northern Affairs Canada. These data suffer from two major limitations: late reporting and underreporting. A significant proportion of births were not reported during the year in which they occur and thus data had to be adjusted for late reporting. Problems of underreporting were not as evident. Hence, data were adjusted for underreporting only for Quebec which suffered an excessively high degree of underreporting of births.

Projections of the annual number of births were obtained by the parametric model, requiring three fertility measures - total fertility rate, mean age of fertility and modal age of fertility. The mean and modal ages of fertility which measure the age patterns of childbearing were assumed to remain constant at the current level for the projection period.

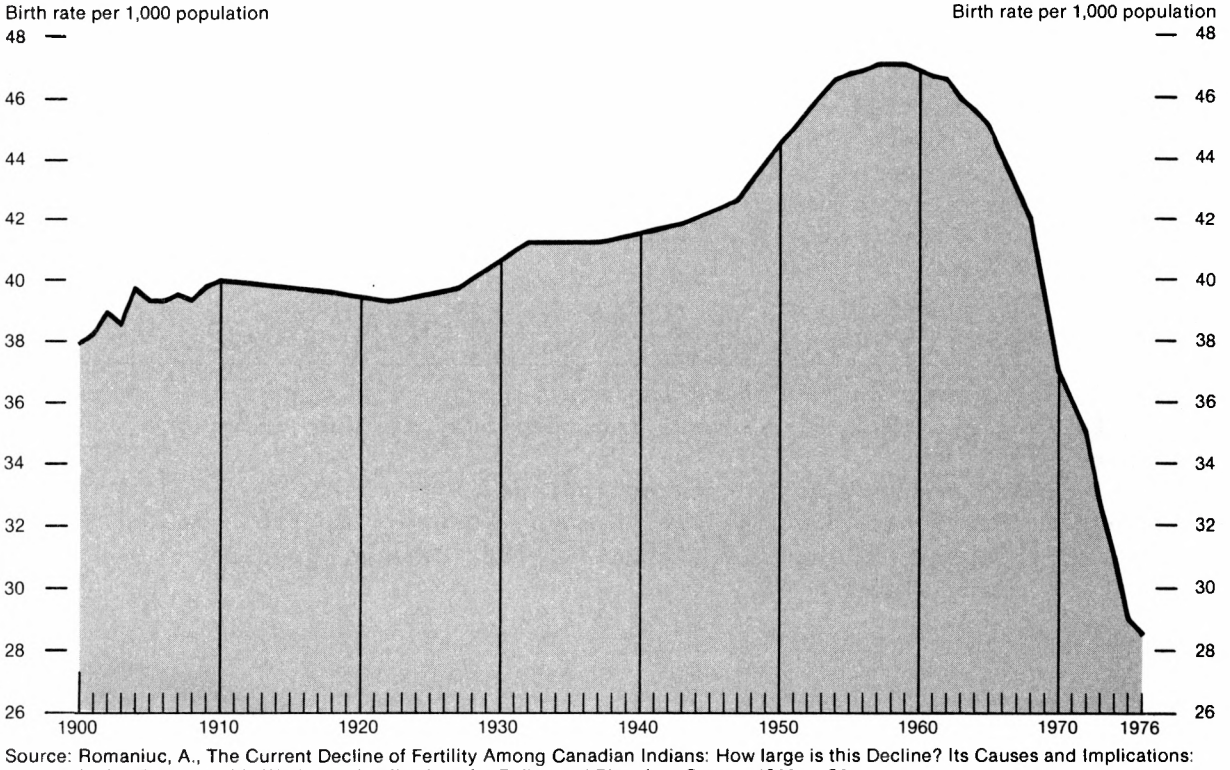
1. INTRODUCTION

The purpose of this report is to discuss the data used in the population projections of registered Indians (hereinafter called Indians) and to present assumptions about the future course of their fertility.

The Native population has entered the demographic transition, moving from a traditionally high to a moderately low fertility typical of modern society. Until about the mid 1940's, the Indian birth rate (status and non-status) remained basically stable, around 40 births per 1,000 population. This period of relative stability gave way to a rather significant increase in birth rate by 1960 (Romaniuk, 1981). The 1960's marked a sharp turning point in the Indian birth rate. As shown in Figure 1, the crude birth rate took a nose dive from about

Figure — 1

Estimates of Crude Birth Rates for Canadian Indians (Status and Non Status), 1900 to 1976



Source: Romaniuc, A., The Current Decline of Fertility Among Canadian Indians: How large is this Decline? Its Causes and Implications: Indian Demographic Workshop Implications for Policy and Planning. Ottawa, 1980, p. 30.

47 per 1,000 to 29 per 1,000 in the late 1970's. The downward trend is corroborated by data for all Native people (status and non-status Indians, Métis and Inuit) from censuses shown in Table 1. For example, the ratio of chidren under five years of age to the total Indian population (status and non-status) fell from about 19 per cent in 1961 to 16 per cent in 1971 and 13 per cent in 1981, a reduction of 32 per cent in 20 years. Since, during the same period, there was a substantial reduction in child mortality, these ratios understate the actual decline in birth rate. The average number of children born to

Table 1. Variations in Fertility of Native Population as Measured by Selected Indices, Based on the 1961, 1971 and 1981 Censuses

Selected Indices	Censuses		
	1961[1]	1971[1]	1981[2]
Average number of children born to ever-married women 15-19 years old.....	1.26	1.06	0.77
Average number of children born to ever-married women 20-24 years old.....	2.27	1.88	1.49
Average number of children born to ever-married women 25-29 years old.....	3.79	3.17	2.28
Percentage of childless ever-married women 15-19 years old.....	24.09	30.62	42.56
Percentage of childless ever-married women 20-24 years old.....	11.04	17.66	24.65
Children 0-4 years old as percentage of total population.....	18.76	15.67	12.79

1. Includes band and non-band Indians.
   In 1961 and 1971, Métis were included only if they lived on reserve.
2. Includes status and non-status Indians.

Sources: Statistics Canada, 1961 Census, Volume 4.1, Table H-4; 1971 Census, Volume 1.5, Table 31; 1981 Census, Special Tabulations.

ever-married women 20 to 24 years of age fell from 2.3 in 1961 to 1.9 in 1971 and 1.5 in 1981. In contrast, the percentage of childless ever-married women in the same age category increased from 11 per cent in 1961 to 18 per cent in 1971 and 25 per cent in 1981. Similar observations are made in subsequent sections based on data for registered Indians only. Between 1971 and 1981, for example, the registered Indian crude birth rate declined from 35.5 per 1,000 to 29.2 per 1,000 and the total fertility rate declined from 5.3 to 3.2 births per woman.

A brief presentation of an historical perspective of Indian fertility in this Introduction is followed by a discussion of data sources, errors in the data and their adjustment in Section two. Late reporting of births, deemed to be the major source of biases affecting birth data, has received particular attention. Section three examines the recent trends and patterns of fertility, with an emphasis on provincial variations in total fertility rates and age patterns of fertility. The fertility assumptions and their underlying rationales are given in the fourth Section. The projection methodology is discussed in Section five. Finally, Section six presents concluding remarks on the three assumptions of the future course of fertility.

2. DATA USED AND THEIR ADJUSTMENT

2.1 Data Sources and Evaluation

There are three major sources of fertility data for Indians in Canada: Census of Canada, Health and Welfare Medical Services Branch data and the Indian Register of INAC.

Although statistics on native population were collected in the decennial censuses of Canada, separate data on registered (status) Indians were collected and tabulated for the first time in the 1981 Census. The lack of comparable data from the previous censuses precludes the possibility of any trend evaluation and analysis of the data, needed for the development of assumptions. Moreover, census fertility data refer to ever-married women only. In light of the fact that a large proportion (about three-fifths in 1981) of Indian children are born out-of-wedlock, census data do not provide a complete picture.

Indirect procedures to calculate fertility measures using census data include "stable population model", "reverse-survival method" and "own-children method". The "quasi-stable population model" has been used to estimate fertility measures for Canadian Indians in the past (Romaniuk and Piché, 1972). Due to the changing age structure of the Indian population brought about by the rapid decline in fertility, the "stable population model" does not seem to be an appropriate procedure for deriving fertility measures for the more recent years. "Reverse-survival" and "own-children" procedures require reliable and complete population data by age (or age group). Available evidence indicates that there was some underenumeration of Indians in the 1981 Census.

The data from Health and Welfare Canada are subject to two limitations. First, they are not always complete for every province. The Atlantic provinces, Quebec and Ontario, for example, deal with births of the population on reserve only. Second, there is a lack of consistency between provinces in data collection procedures. For example, Manitoba and Saskatchewan have an identification code attached to their Provincial Health Insurance number which indicates Registered Indian status; any births occurring among Indians are kept track of through the Provincial Health Insurance Department. Lists of births are sent to the Medical Services Branch to obtain a medicare number and parents must register new births in order for the child to be covered by medicare. In the Northwest Territories, data are collected by Health and Welfare by nurses in the field.

The INAC Indian Register, which is used in this study, is the most comprehensive source of fertility data pertaining to registered Indians. These data are based on the computerized registration system implemented in 1965 and therefore provide a reasonable time series for the population under question. However, INAC births registration suffers from two major limitations: (i) late reporting; and (ii) underreporting.

2.2 Late Reporting and Its Adjustment

It is well known that a significant proportion of births are not reported during the year in which they occur, but are reported several years later (Piché and George, 1973). The problem is complicated further by the fact that the proportion of late reporting varies markedly from one year to another (Table 2). In fact, late reporting has been increasing over time. As Table 3 shows, 81.0 per cent of children born in 1965 were reported in the same year, 11.8 per cent

Table 2. Births of Registered Indians for Canada, 1965-1982, by Year of Birth and Year of Reporting

Year Reported	Before 1965	Year of birth																		Total births as reported by INAC
		1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	
1982								(260)	32	36	63	71	81	129	150	296	715	2547	5430	9,810
1981							(238)	29	43	40	57	71	105	148	193	426	2085	5024		8,459
1980						(214)	31	29	36	48	71	122	176	229	414	2034	5217			8,621
1979					(179)	33	32	39	51	76	90	189	255	477	2059	5222				8,702
1978				(193)	20	30	43	48	85	89	143	260	415	1876	5354					8,556
1977			(192)	34	28	35	51	63	81	140	207	460	2410	5323						9,024
1976		(174)	23	26	31	31	59	78	116	189	362	2332	4706							8,127
1975	(133)	18	21	37	30	48	91	90	141	312	2332	4860								8,113
1974	194	33	33	40	41	104	110	191	328	2014	5160									8,248
1973	166	39	42	47	72	92	167	297	1764	5556										8,242
1972	140	38	46	53	56	98	238	1727	6208											8,604
1971	192	48	55	73	113	256	1642	6379												8,758
1970	174	55	55	98	182	1379	6762													8,705
1969	210	66	83	140	1307	6929														8,735
1968	256	78	170	1240	7288															9,032
1967	300	148	1208	7300																8,956
1966	319	1135	7488																	8,942
1965	1175	7798																		8,973
Total births for each year	3259	9630	9416	9281	9347	9249	9464	9230	8885	8500	8485	8365	8148	8182	8170	7978	8017	7571	5430	

Note: Figures in parentheses refer to births that have been reported 11 years or more after their year of occurrence.
Source: Data from the Indian Register (INAC).

were reported one year later, 1.5 per cent, 2 years later, and the remaining 5.7 per cent, 3 or more years later. The phenomenon became more pronounced as years passed. Only 69.1 per cent of Indian births in 1971 were reported in the same year, 18.7 per cent were reported one year later, 3.2 per cent 2 years later and the remaining 9.0 per cent, 3 or more years later. For the years beyond 1971, complete data are not yet available. For 1981, for example, births reported in 1981 and 1982 are available; a significant proportion of births are yet to be registered.

The reallocation of late reported births to their actual year of occurrence was straightforward as the required distribution of births by year of occurrence and year of reporting was readily available. The estimates of "not yet reported" births was somewhat more complex. For 1972 onward, a significant proportion of births are not yet reported and therefore had to be estimated. For example, slightly more than one-half of all estimated births for 1981 were reported in 1981 and the remaining would be reported with delays of as long as 11 years or more.

Table 3. Estimated Annual Births[a] for Registered Indians by Year of Occurrence and Year of Reporting, Canada, 1965 to 1971

Year of Occurrence	Year of Reporting						
	Number of Births	Same Year	1 Year Later	2 Years Later	3 Years Later	4 Years Later	5 Years or More Later
		%	%	%	%	%	%
1965	9,630	81.0	11.8	1.5	0.8	0.7	4.2
1966	9,416	79.5	12.8	1.8	0.9	0.6	4.4
1967	9,281	78.6	13.4	1.5	1.1	0.8	4.6
1968	9,347	78.0	14.0	1.9	1.2	0.6	4.3
1969	9,249	74.9	14.9	2.8	1.1	1.0	5.3
1970	9,464	71.4	17.3	2.5	1.8	1.2	5.8
1971[b]	9,230	69.1	18.7	3.2	2.1	1.0	5.9

a) It is assumed that the total number of births for a year will be reported within 12 years from the year of occurrence.
b) Complete data for 1972 onward are not yet available.
Source: Same as Table 2.

The approach for the adjustment of late reporting is essentially that of extrapolation of past trends. Based on a correlation analysis, past trends in the pattern of late reporting were extrapolated into the future. In choosing the final estimation procedure, extrapolation experiments were done using several fertility indices calculated at the national and provincial level. The trend analysis was initially carried on at the national level for each "lag" (interval between the year of occurrence and the year of reporting of the births). At the national level, the pattern of variation in the ratio of reported to expected births was relatively stable over time, given the fairly large cohort size. However, at the provincial level, small numbers of births yielded sharp fluctuations. The approach found most suitable at the provincial level was that of extrapolation based on actual numbers of births for each lag, using the trend of the five preceding years. When the correlation coefficient was not statistically significant, the average number of births observed over the preceding 3 years was used instead. This method was preferred because of the following reasons. Firstly, the method allowed one to account for the most current changes in the pattern of late reporting. Secondly, as expected, it yielded an adjusted number of births greater than that reported for each year. Thirdly, when compared with results obtained by adjusting the number of births for late reporting directly at the national level only, the results obtained by the two methods were very close. And finally, the method yielded a fairly consistent trend over time for each lag.

Extrapolated numbers of births for Canada and the provinces, for 1972-1981, are shown in Table 4 and the numbers of births reported and estimated for Canada, 1965-1982, are shown in Table 5.

Table 4. Estimated Annual Births for Registered Indians, Canada, Provinces and Territories, 1972-1981

Province/Territory	Year									
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Prince Edward Island	19	16	6	16	11	18	18	14	18	17
Nova Scotia	149	142	138	126	137	151	167	142	158	152
New Brunswick	179	164	144	167	165	150	158	157	175	199
Quebec	864	851	821	777	741	724	708	770	693	690
Ontario	1,779	1,703	1,737	1,785	1,743	1,780	1,818	1,858	1,949	1,962
Manitoba	1,554	1,460	1,458	1,441	1,396	1,449	1,436	1,480	1,577	1,523
Saskatchewan	1,682	1,572	1,644	1,537	1,557	1,620	1,641	1,503	1,543	1,840
Alberta	1,141	1,198	1,168	1,196	1,227	1,217	1,329	1,321	1,379	1,399
British Columbia	1,499	1,472	1,503	1,511	1,498	1,492	1,491	1,503	1,585	1,538
Yukon	72	70	59	72	64	75	71	87	70	93
Northwest Territories	228	189	213	225	202	216	206	229	247	253
CANADA	9,166	8,837	8,891	8,853	8,741	8,892	9,043	9,064	9,394	9,666

Source: Data from the Indian Register (INAC), adjusted for late reporting of births and deaths.

No adjustments were made for the late reporting of births by age of the mother. A similarity was assumed between the age distribution of mothers who reported a birth in the year of occurrence and of those who delayed the reporting. Hence, the age distribution of reported births was applied to the imputed births.

Table 5. Reported and Estimated Number of Births, Canada, Registered Indians, 1965-1981

Year	Reported	Estimated
1965	8,973	9,630
1966	8,942	9,416
1967	8,956	9,281
1968	9,032	9,347
1969	8,735	9,249
1970	8,705	9,464
1971	8,758[1]	9,230
1972	8,604	9,166
1973	8,242	8,837
1974	8,248	8,891
1975	8,113	8,853
1976	8,127	8,741
1977	9,024	8,892
1978	8,556	9,043
1979	8,702	9,064
1980	8,621	9,394
1981	8,459	9,666

(1) According to the Registered Indian Membership data available from INAC, the total number of births reported in 1971 is 8,756.
Source: Same as table 4.

2.3 Underreporting and Its Adjustment

The problem of underreporting of births is not as obvious as that of late reporting. It is highly likely, however, that quite a few children, whose births were not registered in the year of occurrence and who died in subsequent years, were never registered. Thus, as discussed in the previous section, in order to evaluate the completeness of the adjusted number of births, they were compared to independently derived figures.

The "reverse-survival method" is commonly used to evaluate the extent of underreporting of the registered number of births in populations where registration is suspected to be incomplete. On the assumption that children currently at age x are survivors of the children born x years ago, this method reverse-survives children at age x enumerated in the census and compares them with the number of births that occurred x years ago. Thus the estimated number of births (B) is:

$$B = {}_5N_0 \ / \ {}_5L_0 \qquad (1)$$

where ${}_5N_0$ is the population in age group 0-4 and ${}_5L_0$ is the number of person-years lived between birth and exact age 5, obtained from an appropriate life table. In the case of registered Indians, both sets of information are problematic. The only census which provided the age-sex distribution of status Indians was the 1981 Census, but the data were affected by undercount. Also, the life tables available for Indians were prepared from unadjusted Register data. The estimates produced by the "reverse-survival method", as discussed below, should therefore be regarded as approximations.

The age and sex data for status Indians, as obtained from the 1981 Census, were adjusted for possible undercoverage (using the over-all undercoverage rate for the age groups 0-4 and 5-9), possible

refusals and the institutionalized population, and other non-Indians who were enumerated as Indians. This was done for both sexes and for every province. Then by using the life tables for the total Canadian population 1940-42, which are considered to approximate the current mortality patterns of Indians[1], the population 0-4 in 1981 was reverse-survived using equation (1). The resulting figures provided estimates of the average number of births (B) for 1976-81. Similarly, births were estimated for 1971-76 using:

$$B = {}_5N_5 \; / \; {}_5L_5 \qquad (2)$$

where ${}_5N_5$ is the 1981 population in the age group 5-9 and ${}_5L_5$ is the number of person-years lived between age 5 and exact age 10.

A comparison between the average number of births from the Indian Register, and the estimated average number of births, as derived by the reverse-survival method using census data for periods 1971-76 and 1976-81 is presented in Table 6. If the possibility of overreporting in INAC data can be ruled out, the results show that birth data for most of the provinces in 1971-76 and those for Quebec and Ontario only in 1976-81, are affected by underreporting. In the latter period, it was found that the underreporting of births was about 19 per cent in Quebec.

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1. Life expectancy at birth for registered Indian males and females in 1981 are estimated to be 62.4 and 68.9 years, respectively. Life expectancy at birth for the total population of Canada in 1940-42 was 63.0 for males and 66.3 years for females.

Table 6. Extent of Underreporting of Average Annual Number of Births, Registered Indians, Canada, Provinces and Territories, 1971-1976 and 1976-1981

Province/ Territory	1971-76			1976-81		
	Estimated* 1	Observed 2	Ratio 3=2/1	Estimated* 4	Observed 5	Ratio 6=5/4
Atlantic	321	316	.98	324	339	1.05
Quebec	947	811	.86	886	717	.81
Ontario	1,998	1,749	.88	1,899	1,873	.99
Manitoba	1,389	1,462	1.05	1,381	1,493	1.08
Saskatchewan	1,374	1,598	1.16	1,430	1,629	1.14
Alberta	1,258	1,186	.94	1,328	1,329	1.00
British Columbia	1,548	1,497	.97	1,511	1,522	1.01
Territories	284	279	.98	285	309	1.08
Canada	9,119	8,898	.98	9,044	9,211	1.02

* Calculated by reverse-survival method using Canadian life tables for 1940-42.
Source: Statistics Canada, Demography Division, unpublished data.

In light of the above fact, Quebec's observed level of fertility needs a closer look. Table 7 compares the 1981 total fertility rates obtained from the Indian Register, own-children ratio, calculated from 1981 Census households and family data and children ever-born for ever-married women obtained from 1981 Census fertility data. When measured in terms of a ratio of children 0-4 to possible mothers age 15-49, the fertility of Quebec's Indians was about 2 per cent lower than that of total Canadian Indians. In terms of children ever-born, Quebec's fertility was 8 per cent lower than the total. However, INAC data show Quebec's fertility level was 31 per cent lower than the national level. Although INAC data may be underestimated for many other provinces, they are definitely underestimated for Quebec.

Therefore, for the purpose of the projection, Quebec's fertility level for 1981 (the base year) was slightly inflated to 2.5 from the observed level of 2.2[2]. With this upward adjustment of Quebec's total fertility rate, the overall total fertility rate for Indians of Canada becomes 3.2 in 1981.

Table 7. Total Fertility Rate, Own-Children Ratio and Children Ever-Born, Indian Population, Canada, Provinces and Territories, 1981

Province/ Territory	Total Fertility Rate per Woman		Own-children Ratio Children 0-4/ Women 15-49		Children Ever-born per Ever-married Woman, 15-44	
	Registered Indians		Status Indians			
	Rate	Index	Rate	Index	Rate	Index
Atlantic	2.91	93	4.21	100	2.97	98
Quebec	2.16	69	4.11	98	2.78	92
Ontario	2.86	92	3.71	89	2.75	91
Manitoba	3.53	113	4.74	113	3.67	122
Saskatchewan	4.13	132	5.24	125	3.60	119
Alberta	3.78	121	4.46	106	2.98	99
British Columbia	2.49	80	3.63	87	2.75	91
Territories	3.59	115	4.29	102	3.18	105
Canada	3.12	100	4.19	100	3.02	100

Source: Data from INAC's Indian Register, adjusted for late reporting of births and deaths and 1981 Census of Canada, unpublished tabulations.

2. If the estimates from the reverse-survival procedure could be relied upon, the total fertility rate should have been inflated to 2.7. But because the estimates are approximations, the increase was kept to a modest level.

3. TRENDS IN THE FERTILITY

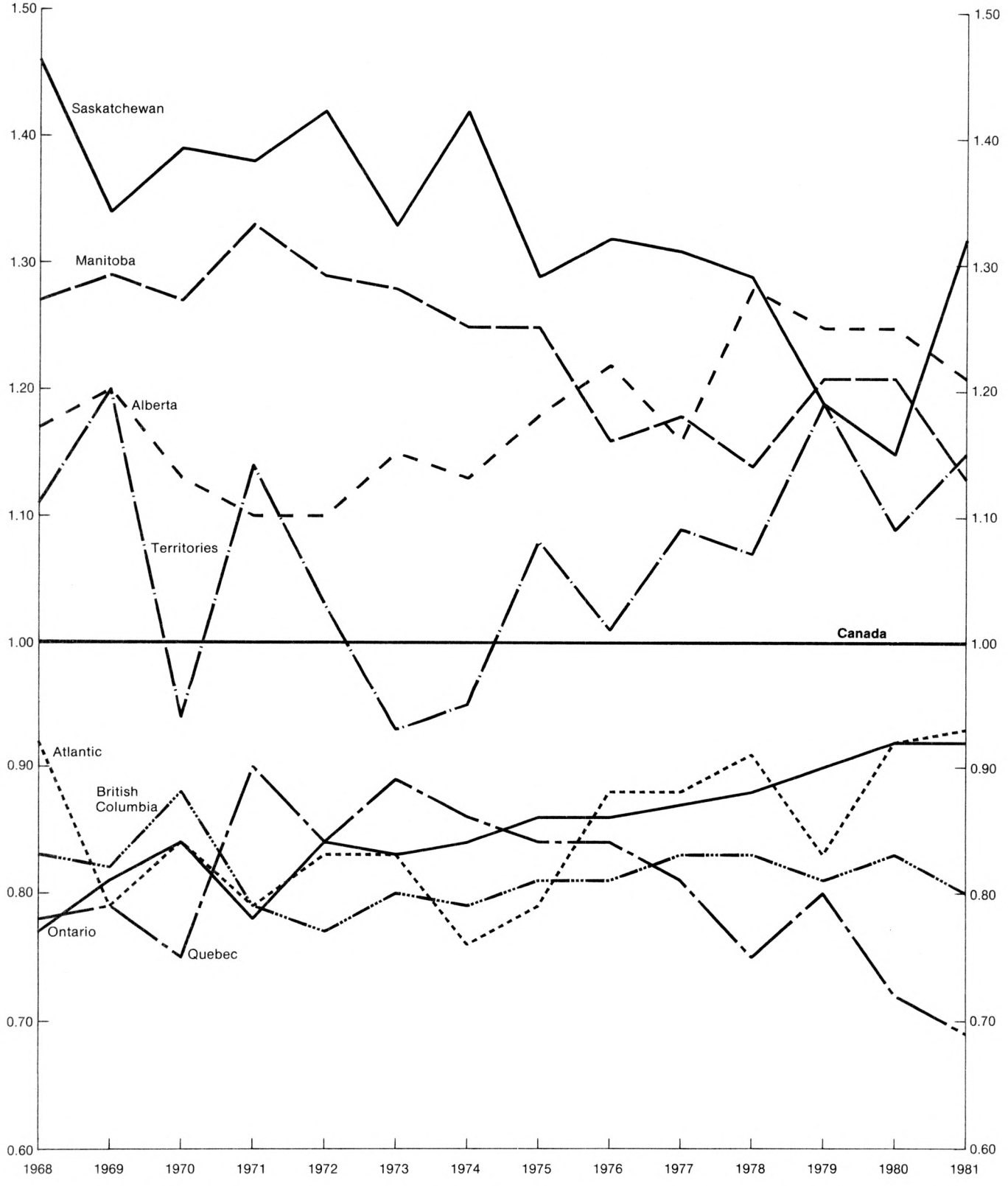
3.1 Total Fertility Rates for Canada, Provinces and Territories

An examination of the overall fertility trends in Canada reveals that fertility levels of all provinces are converging to the overall Canadian fertility level. In the case of Indians, the data do not show such a convergency pattern (Figure 2). If there is some convergence toward narrowing the gap between provinces, it is hardly perceptible. Over the last 10 years the Indian provincial rates have more or less maintained their respective positions relative to the Indian national level. The total fertility rates of Indians in the Atlantic provinces, Quebec, Ontario and British Columbia have remained consistently lower and those of Manitoba, Saskatchewan, Alberta and the Territories have remained higher than the Indian national level. Except for Manitoba, the fertility rates of all provinces have tended to decline at more or less a similar pace.

However, a major feature of Indian fertility trends is its convergence towards the overall Canadian fertility level. Between 1968 and 1981, when the total fertility rate of Canada declined by 32 per cent, from 2.5 to 1.7, that of registered Indians declined by 48 per cent, from 6.1 to 3.2. In spite of this rapid reduction, however, Indians still have a fertility rate almost twice as high as Canada as a whole. As can be seen from Table 8 and Figure 3, the provinces could be divided into four broad groups according to the rate of convergence: (i) Manitoba, Saskatchewan and Alberta, where Indian fertility rates have historically been highest and have declined at a very rapid pace but still remain almost twice as high as the overall Canadian rate in those provinces; (ii) the Atlantic provinces and the Territories, where the fertility has historically been high, though

Figure — 2

Ratios of Total Fertility Rates for Provinces and Territories, to Those for Canada, Registered Indians, 1968 to 1981



Source: Data from the Indian Register (INAC), adjusted for late reporting of births and deaths.

slightly lower than the previous group, but has converged little or not at all to the overall provincial fertility rates; (iii) Ontario where the degree of convergence between Indian and overall fertility has been modest and has stabilized in the past five years; and (iv) Quebec and British Columbia, where fertility rates declined at a fast rate and came close to that of the overall provincial level.

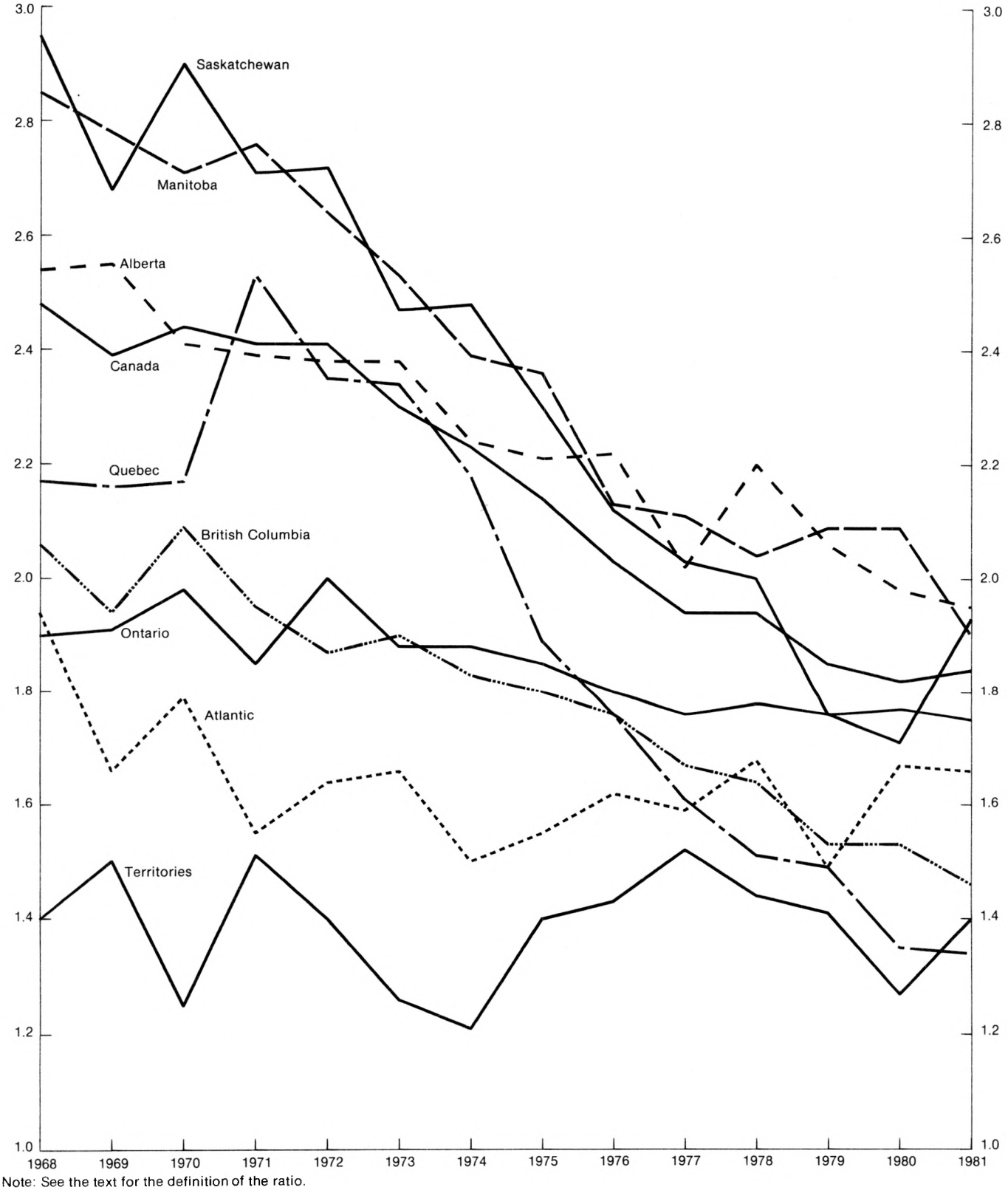
Table 8. Total Fertility Rates for Registered Indians and Total Population, Canada, Provinces and Territories, 1968-1981

Province and Territory	Year													
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Atlantic														
Total	2.89	2.75	2.67	2.69	2.46	2.22	2.12	2.02	2.03	1.94	1.86	1.81	1.76	1.75
Indian	5.60	4.57	4.79	4.16	4.04	3.69	3.19	3.14	3.28	3.09	3.12	2.69	2.94	2.91
Quebec														
Total	2.18	2.10	1.97	1.88	1.73	1.68	1.66	1.75	1.77	1.76	1.69	1.75	1.70	1.61
Indian	4.73	4.53	4.28	4.75	4.07	3.93	3.62	3.31	3.11	2.84	2.56	2.61	2.30	2.16
Ontario														
Total	2.46	2.45	2.40	2.22	2.05	1.96	1.88	1.84	1.77	1.73	1.68	1.67	1.66	1.63
Indian	4.67	4.68	4.75	4.11	4.10	3.68	3.54	3.40	3.18	3.04	2.99	2.94	2.94	2.86
Manitoba														
Total	2.71	2.68	2.65	2.54	2.38	2.24	2.18	2.09	2.02	1.97	1.91	1.88	1.84	1.86
Indian	7.72	7.44	7.19	7.01	6.28	5.67	5.22	4.94	4.31	4.15	3.89	3.93	3.84	3.53
Saskatchewan														
Total	3.01	2.89	2.73	2.69	2.55	2.39	2.39	2.22	2.30	2.27	2.20	2.19	2.14	2.14
Indian	8.87	7.74	7.91	7.29	6.93	5.91	5.93	5.11	4.88	4.61	4.39	3.86	3.67	4.13
Alberta														
Total	2.79	2.72	2.67	2.43	2.24	2.15	2.11	2.11	2.04	2.01	1.98	1.97	2.01	1.94
Indian	7.08	6.94	6.43	5.80	5.34	5.12	4.72	4.67	4.53	4.07	4.35	4.06	3.98	3.78
British Columbia														
Total	2.44	2.43	2.38	2.14	2.00	1.87	1.82	1.78	1.72	1.74	1.72	1.72	1.73	1.71
Indian	5.02	4.72	4.97	4.18	3.73	3.56	3.33	3.20	3.02	2.90	2.82	2.64	2.65	2.49
Territories														
Total	4.82	4.61	4.28	4.00	3.57	3.26	3.29	3.05	2.60	2.51	2.54	2.75	2.73	2.57
Indian	6.75	6.92	5.36	6.02	5.00	4.11	3.98	4.27	3.73	3.82	3.65	3.87	3.48	3.59
Canada														
Total	2.45	2.41	2.33	2.19	2.02	1.93	1.88	1.85	1.83	1.81	1.76	1.76	1.75	1.70
Indian	6.07	5.76	5.68	5.27	4.87	4.44	4.19	3.95	3.71	3.51	3.41	3.25	3.18	3.15

Source: Statistics Canada, Vital Statistics, Catalogue 84-204, Annual; data from INAC's Indian Register adjusted for late reporting of births and deaths.

Figure — 3

Ratios of Total Fertility Rates for Registered Indians to Those for All Canadians, Canada, Provinces and Territories, 1968 to 1981



Note: See the text for the definition of the ratio.

Source: Data from the Indian Register (INAC), adjusted for late reporting of births and deaths; Statistics Canada, Vital Statistics, Births, Catalogue No. 84-204, Annual.

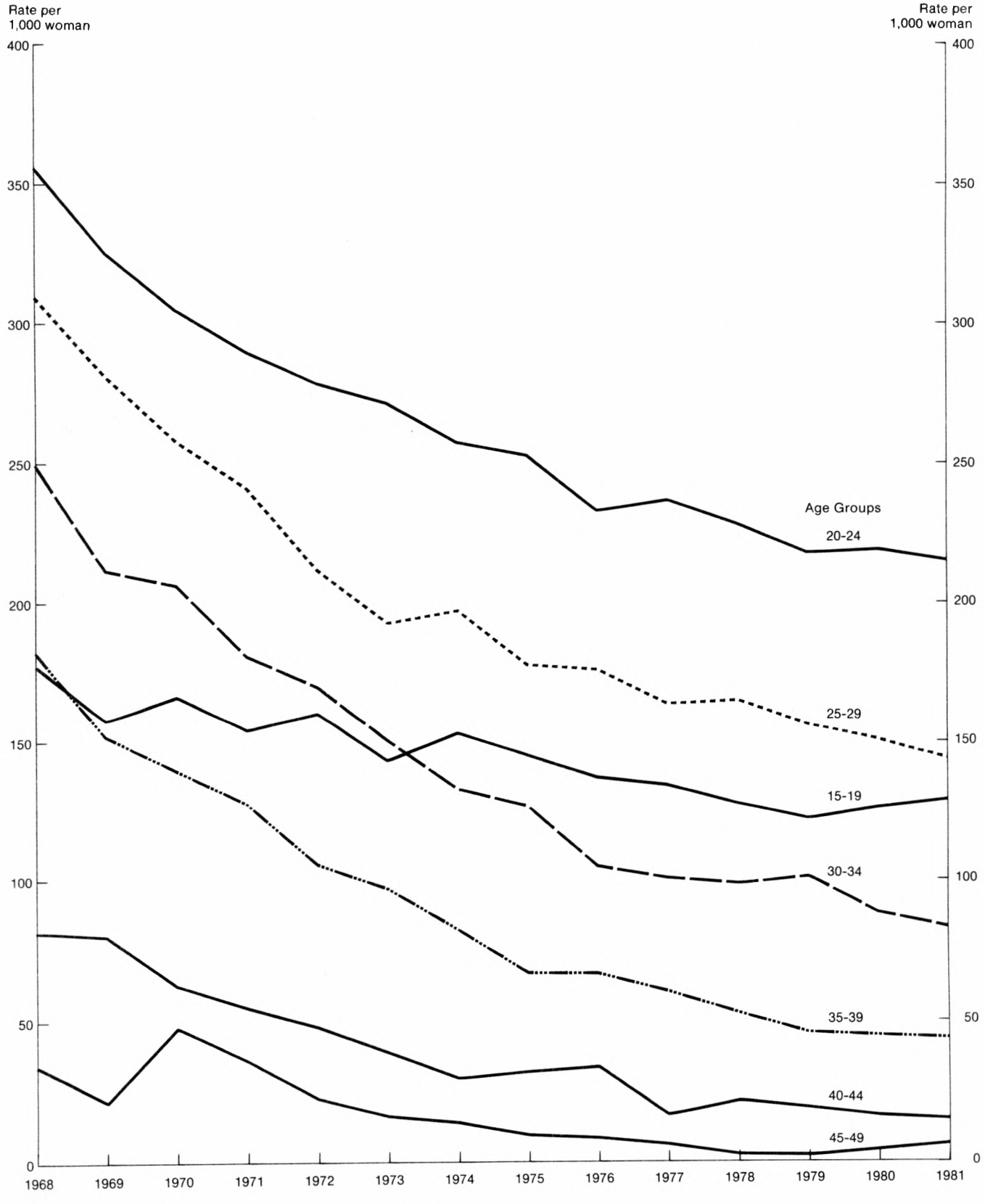
3.2 Age Patterns of Fertility

Consistent with the general pattern of populations experiencing rapid fertility decline, the fertility of Indians declined at a much faster rate at older ages than younger ages (Figure 4). Between 1968 and 1981, for example, fertility in the age groups 40-44 and 45-49 declined by more than 80 per cent, that in the age groups 30-34 and 35-39 by about 70 per cent, and in the younger age groups by less than 50 per cent. Thus, following the overall Canadian pattern, Indian women have seen their fertility at older ages drastically reduced. In 1968, the fertility of Indian women over 30 accounted for 39 per cent of the overall fertility; by 1981, this contribution was reduced to only 23 per cent. Conversely, the contribution of women below 25 years of age increased from 38 per cent to 54 per cent. This phenomenon was particularly marked for the age group 20-24. Thus, not only has fertility shifted to younger ages, but over time it has become more concentrated in the ages of peak fertility, i.e., the age group 20-24 (Figure 5).

The shifting age patterns of fertility are clearly reflected in the mean, median and modal ages of childbearing. The mean age of childbearing declined from 28.5 years in 1968 to 25.7 years in 1981. During the same period, the median age of childbearing fell from 27.6 years to 24.4 years and the modal age fell from 25.8 years to 21.8 years (Figure 6). The downward trend in these indices reflects the shifts in the age pattern of childbearing towards the early years of women's reproductive life. However, the last half decade has witnessed a slowdown in the downward shift of the mean, median and modal age of fertility.

Figure — 4

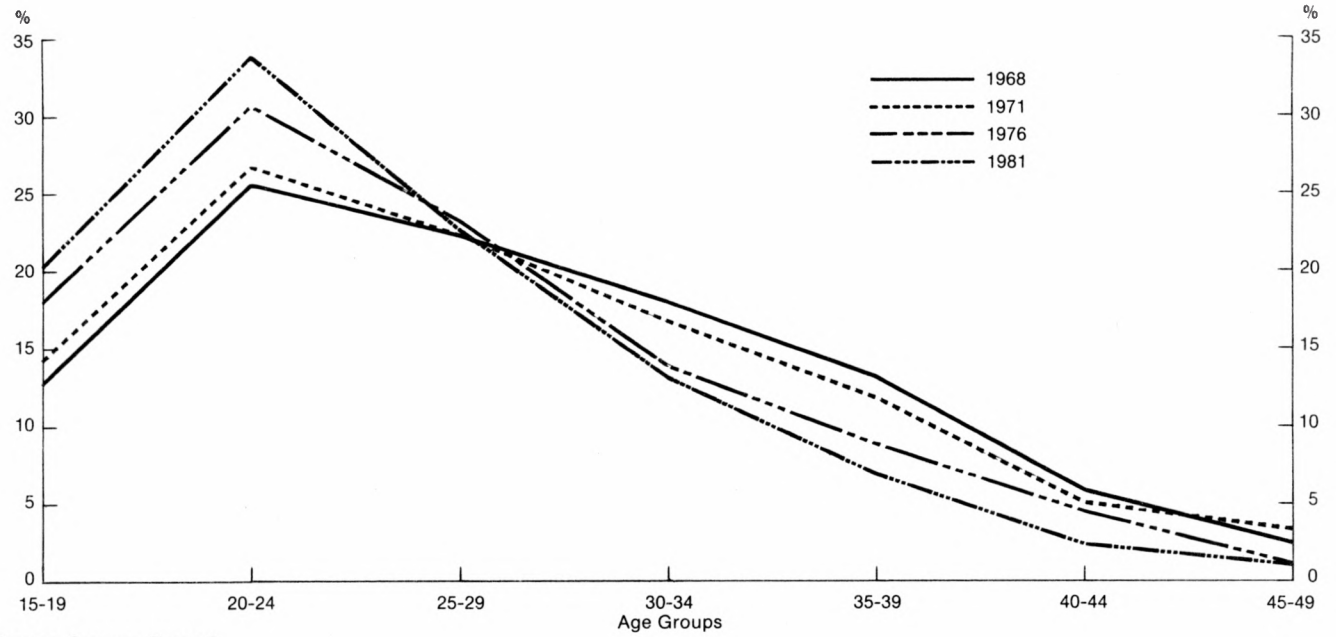
Age-Specific Fertility Rates, Registered Indians, Canada, 1968 to 1981



Source: Same as Figure 2.

Figure — 5

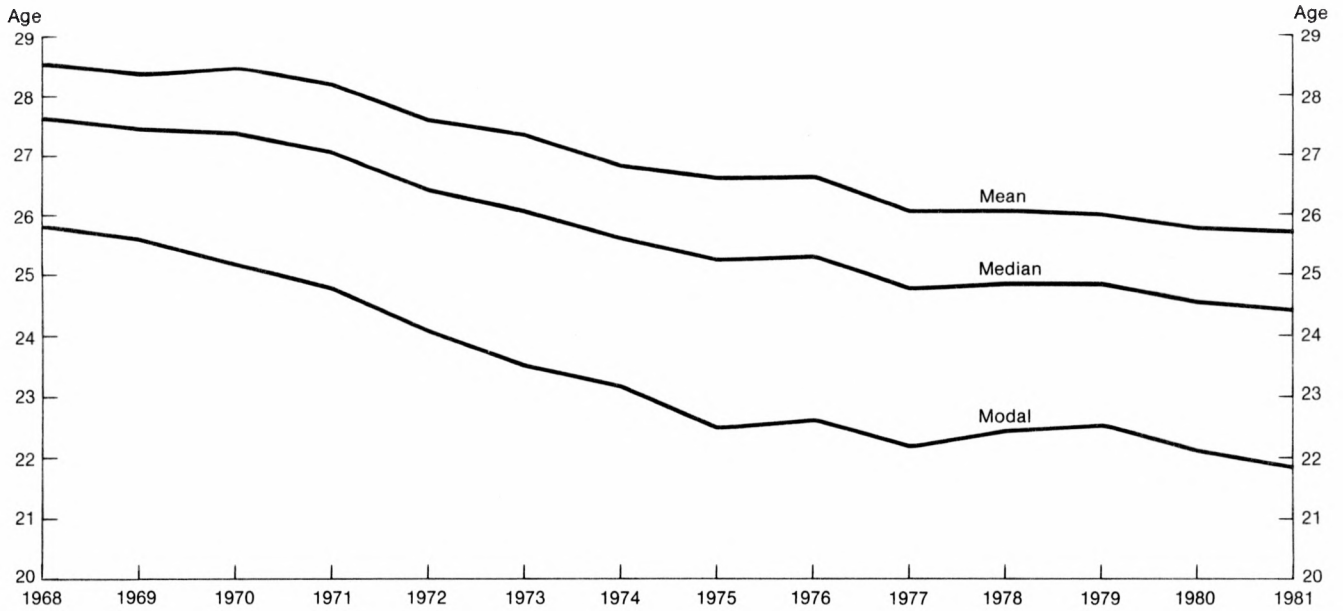
Relative Contribution of Women in Each Age Group to Total Fertility Rates, Registered Indians, Canada, 1968, 1971, 1976 and 1981



Source: Same as Figure 2.

Figure — 6

Mean, Median and Modal Ages of Childbearing, Registered Indians, Canada, 1968 to 1981



Source: Same as Figure 2.

Because the role played by the age patterns of fertility in the derivation of the total annual births is minimal, it was assumed that the current age pattern will remain constant for the projection period.[3] In the present projections, the averages of mean and modal ages of fertility for the five most recent years (1977-1981) were used (Table 9). The five-year average rather than a one year value was used to eliminate the year-to-year fluctuations in these indices.

Table 9. Mean and Modal Age of Mother at Childbirth for Registered Indians, Canada, Provinces and Territories, Five Year Average, 1977-1981

Province/Territory	Mean Age	Modal Age
Atlantic	26.6	22.7
Quebec	26.0	22.7
Ontario	25.9	22.3
Manitoba	25.8	22.4
Saskatchewan	26.2	22.1
Alberta	25.9	22.4
British Columbia	25.5	22.1
Territories	26.3	23.1
Canada	25.8	22.1

Source: Same as Table 5.

3. The parametric model used for birth projections requires assumptions about mean and modal ages of fertility (see Section 5).

4. ASSUMPTIONS ABOUT FUTURE FERTILITY

What are the directions fertility trend may take in the years to come? Is it going to decline further to reach new lows and close the still large gap with the overall Canadian fertility level, stabilize at the current level or could it even reverse its trend?

The latter possibility has been discarded as there is no basis for assuming fertility would go up in the immediate future, given the dynamics of societal changes experienced by the Indian population. Three fertility assumptions for the registered Indian population have been developed (Table 10 and Figure 7) as follows:

(1) A **slow decline in fertility** : a moderately declining fertility reaching a level of 2.57 births per women by 1996.

(2) A **rapid decline in fertility** : fertility would decline rapidly and reach 2.12 births per woman by 1996.

(3) A **constant fertility** : this assumes that the 1981 fertility level of 3.15 births per woman would remain constant for the projection period.

Throughout this report these three assumptions will be labelled, respectively, **slow decline** , **rapid decline** and **constant fertility** assumptions.

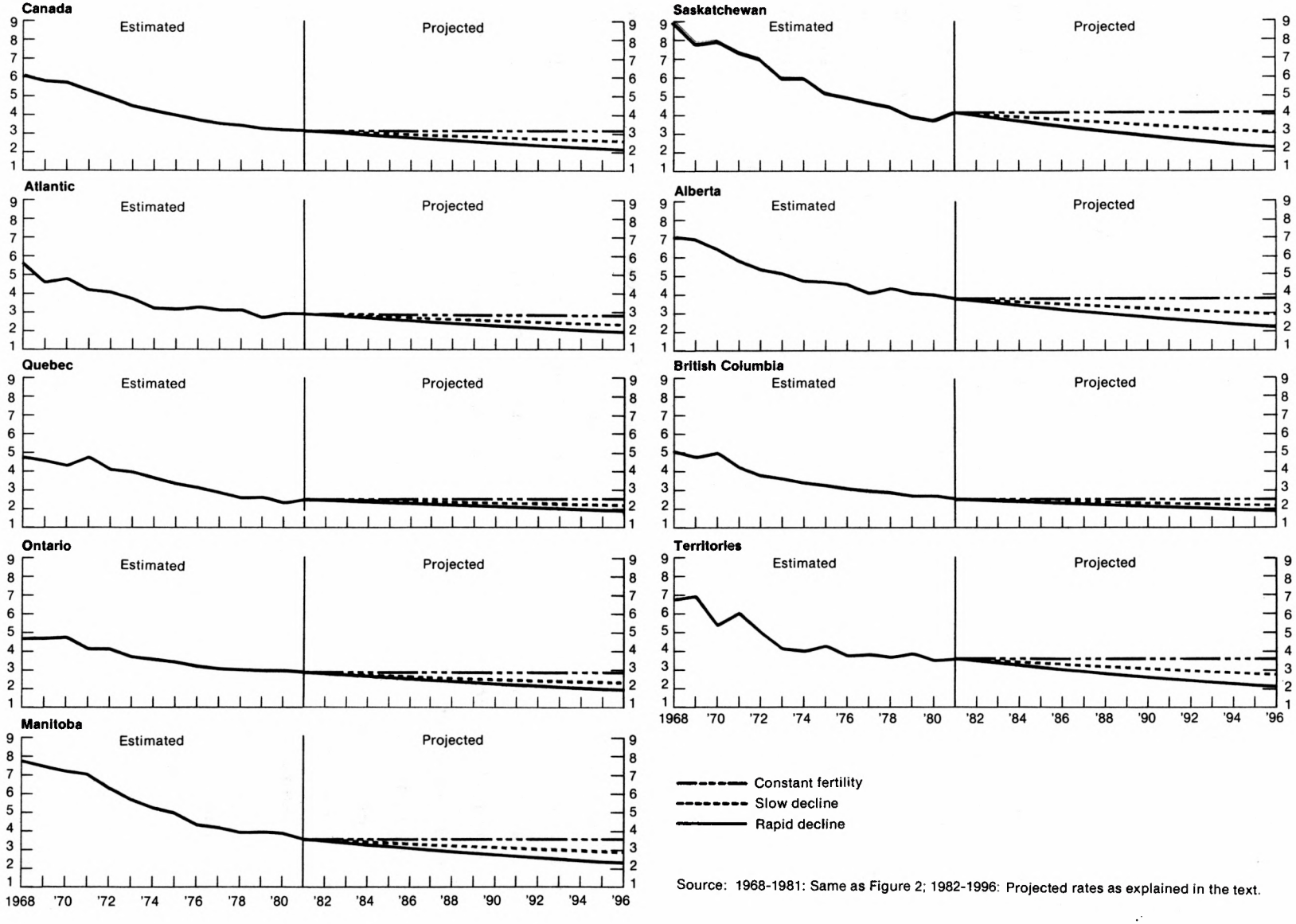
Table 10. Projected Total Fertility Rates for Registered Indians, Canada and INAC Regions, 1981-1996

Region	1981*	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
								SLOW DECLINE								
Atlantic	2.91	2.87	2.83	2.79	2.75	2.71	2.68	2.64	2.60	2.57	2.53	2.50	2.46	2.43	2.39	2.36
Quebec	2.50	2.47	2.44	2.42	2.39	2.37	2.35	2.33	2.30	2.28	2.26	2.24	2.21	2.19	2.17	2.15
Ontario	2.86	2.82	2.78	2.75	2.71	2.68	2.64	2.60	2.57	2.54	2.50	2.47	2.44	2.40	2.37	2.34
Manitoba	3.53	3.48	3.43	3.37	3.32	3.28	3.23	3.18	3.13	3.09	3.04	2.99	2.95	2.91	2.86	2.82
Saskatchewan	4.13	4.05	3.96	3.88	3.81	3.73	3.65	3.58	3.51	3.44	3.37	3.30	3.23	3.17	3.10	3.04
Alberta	3.78	3.72	3.65	3.59	3.53	3.47	3.41	3.35	3.29	3.24	3.18	3.13	3.07	3.02	2.97	2.92
British Columbia	2.49	2.47	2.44	2.42	2.39	2.37	2.35	2.33	2.30	2.28	2.26	2.24	2.21	2.19	2.17	2.15
Territories	3.59	3.53	3.46	3.40	3.34	3.28	3.22	3.16	3.11	3.05	3.00	2.94	2.89	2.84	2.79	2.74
Canada	**3.15**	**3.11**	**3.07**	**3.03**	**2.99**	**2.95**	**2.91**	**2.87**	**2.83**	**2.79**	**2.75**	**2.71**	**2.67**	**2.63**	**2.60**	**2.57**
								RAPID DECLINE								
Atlantic	2.91	2.83	2.75	2.68	2.60	2.53	2.46	2.39	2.32	2.26	2.20	2.14	2.08	2.02	1.96	1.92
Quebec	2.50	2.44	2.39	2.35	2.30	2.26	2.21	2.17	2.13	2.09	2.05	2.01	1.97	1.93	1.89	1.86
Ontario	2.86	2.78	2.71	2.64	2.57	2.50	2.43	2.37	2.31	2.24	2.18	2.13	2.07	2.02	1.96	1.92
Manitoba	3.53	3.43	3.32	3.22	3.13	3.04	2.95	2.86	2.77	2.69	2.61	2.53	2.46	2.38	2.31	2.26
Saskatchewan	4.13	3.96	3.80	3.65	3.50	3.36	3.22	3.09	2.97	2.85	2.73	2.62	2.52	2.41	2.32	2.25
Alberta	3.78	3.65	3.53	3.40	3.29	3.17	3.07	2.96	2.86	2.76	2.67	2.58	2.49	2.40	2.32	2.26
British Columbia	2.49	2.44	2.39	2.35	2.30	2.26	2.21	2.17	2.13	2.09	2.05	2.01	1.97	1.93	1.89	1.86
Territories	3.59	3.46	3.34	3.22	3.10	2.99	2.89	2.78	2.68	2.59	2.49	2.41	2.32	2.24	2.16	2.10
Canada	**3.15**	**3.07**	**2.99**	**2.91**	**2.83**	**2.76**	**2.69**	**2.62**	**2.55**	**2.48**	**2.41**	**2.35**	**2.29**	**2.23**	**2.17**	**2.12**
								CONSTANT FERTILITY								
Atlantic	2.91															
Quebec	2.50															
Ontario	2.86															
Manitoba	3.53															
Saskatchewan	4.13							Constant								
Alberta	3.78															
British Columbia	2.49															
Territories	3.59															
Canada	3.15															

* Estimated.
Source: Projected as explained in the text.

Figure — 7

Estimated and Projected Total Fertility Rates, Registered Indians, Canada, Provinces and Territories, 1968 to 1996



Source: 1968-1981: Same as Figure 2; 1982-1996: Projected rates as explained in the text.

What are the rationales underlying these assumptions? The possibility of a continuation of the decline can be conjectured for a number of reasons. The current demographic transition has not yet run its course and there is room for a further fertility decline before overall Canadian levels are reached. One of the determinants of fertility decline, according to the demographic transition theory, is reduction in mortality, particularly infant mortality. Although the Indian mortality level has declined, it still remains much higher than the Canadian level. In 1981, the life expectancy at birth for the registered Indians was estimated to be 62.4 years for males and 68.9 years for females, a level comparable to that observed for all-Canadians in 1941 (Rowe and Norris, 1985). The estimated infant mortality rate (27.8 deaths and 24.4 deaths per 1,000 births in 1981, for males and females, respectively) is still high and its further reduction is likely to engender motivation for fewer births.

Another possible variable inducing fertility decline among registered Indians may be their movement from reserves to off reserve urban areas, thus adopting family norms prevailing in today's Canadian society. Between 1966 and 1981, according to the register data those living off reserve increased from 19 to 30 per cent. The 1981 Census revealed that ever-married women living off reserve had 20 to 40 per cent lower fertility than those living on reserve (Table 11). The average number of children ever-born per ever-married woman in the 20-24 age group was 1.25 for the off-reserve population and 1.91 for the on-reserve population. The corresponding figures were 2.03 and 2.86, respectively, for the age group 25-29. Similar patterns can be found when comparing the fertility of rural and urban populations. If more Indians move from reserves to non-reserve areas and from rural to urban areas[4], their fertility may decline further.

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4. According to the Census definition.

In the area of the educational attainment of Indians, much progress has been made. However, the educational level of Indian women still remains behind that of total Canadian women. In 1981, for example, while one-third of all ever-married Canadian women had a secondary certificate or higher level of schooling, only one-fifth of Indian ever-married women had attained corresponding level of schooling. University educated married women are fewer among Indians: compared to 8 per cent in the total population, only 2 per cent of Indian married women had a university degree or equivalent certificate. With increasing modernization, there is much scope for further increase in higher education among Indian women.

Table 11. Mean Number of Children Ever-Born per Ever-Married Woman by Age and Residence, Status Indians, Canada, 1981

Age of Women	On/Off Reserve			Rural/Urban		
	On Reserve 1	Off Reserve 2	Ratio 3 = 2/1	Rural 4	Urban 5	Ratio 6 = 5/4
15-19	1.03	.58	.56	1.03	.52	.50
20-24	1.91	1.25	.65	1.84	1.24	.67
25-29	2.86	2.03	.71	2.80	1.98	.71
30-34	3.77	2.67	.71	3.69	2.64	.72
35-39	4.92	3.39	.69	4.79	3.35	.70
40-44	5.96	4.19	.70	5.83	4.13	.71
45-49	6.84	5.31	.78	7.06	5.13	.73

Note: These data are not adjusted for under or over coverage of women and births and therefore are not comparable with INAC data.
Source: 1981 Census of Canada, unpublished tabulations.

As expected, education is a factor highly correlated with the fertility of Indians. As revealed in Table 12, status Indian women, aged 45-49, with less than grade 9 schooling, have 44 per cent higher fertility than those with a secondary certificate or higher level of schooling. For younger generations, this differential is much more pronounced. For example, in the age group 25-29, the mean number of children ever-born per ever-married Indian women with less than grade 9 (3.43) was 80 per cent higher than that of a woman with a secondary certificate or higher level of schooling (1.90). The corresponding difference was much larger for the age group 20-24 (2.33 versus 1.15).

Table 12. Mean Number of Children Born per Ever-Married Woman by Age and Level of Schooling, Status Indians, Canada, 1981

Age of Women	Children per woman			Index		
	Less than Grade 9 (1)	Grades 9-13 (2)	Secondary Certificate or Higher (3)	Less than Grade 9 (4)	Grades 9-13 (5) = (2)/(1)	Secondary Certificate or Higher (6)=(3)/(1)
15-19	1.13	.76	-	100	67	-
20-24	2.33	1.54	1.15	100	66	49
25-29	3.43	2.37	1.90	100	69	55
30-34	4.14	3.06	2.56	100	74	62
35-39	5.14	3.68	3.29	100	72	64
40-44	6.07	4.38	3.75	100	72	62
45-49	6.93	4.82	4.80	100	70	69

Note: These data are not adjusted for undercoverage of women and births and therefore are not comparable with INAC data.
Source: 1981 Census of Canada, unpublished tabulations.

Although there has been a rapid reduction in fertility in recent years, the fertility of registered Indians is still twice as high as that of the Canadian population at large. Hence, there is a potential for further decreases and an eventual catch up with the all-Canadian level. However, according to the Indian Register between 1968 and 1976, the total fertility rate for Indians declined by an average rate of 4 per cent per annum and by 3 per cent between 1976 and 1981. If the rate of decline slows down as observed in recent years, the Indian fertility may take much longer to converge with the total Canadian fertility. Such a reasoning is the basis for the assumption of the slow fertility decline assumption.

The constant and rapid decline assumptions provide the likely range of the future course of Indian fertility. The constant assumption is a useful one in the short run and the rapid decline assumption may be considered adequate in the long run. With increased modernization, Indian fertility will probably converge towards the overall Canadian pattern and could approach the replacement level within a period of 15 years.

5. PROJECTION METHODOLOGY

The general approach to developing fertility projections for Indians is basically the same as the one used for the most recent Statistics Canada projections for Canada and the provinces (Statistics Canada, 1985, Catalogue 91-520). For every INAC region/province, three sets of age-specific fertility rates were developed and applied to the projected female populations of childbearing age in order to produce the birth components of the population projections. The births for Canada were obtained by aggregation.

In projecting population, the annual number of births is usually obtained by projecting age-specific fertility rates and applying them to the number of women of reproductive age. Thus one is required to project about thirty-five age-specific fertility rates, which is highly cumbersome, particularly at the sub-national level. For example, in the present case, one would have to project 280 fertility rates for eight regions. However, this complexity is reduced by means of a parametric model which requires only three relatively simple fertility measures - total fertility rate, mean age of fertility and modal age of fertility - to derive the total number of births (Romaniuk, 1975). The total fertility rate measures the level of fertility and the mean and modal ages of fertility measure the timing of childbearing.

The model fits very well with the fertility data for registered Indians. The model parameters and test results for 1981 are presented in Table 13. The total number of births derived by the model is 9,762 - barely 1.0 per cent higher than the estimated number of births (i.e., after adjusting for late reporting). The fit is not as good for the Atlantic provinces and the Territories where the observed numbers of births are too small to test the validity of the model.

Table 13. Estimated Number of Births and Number of Births Derived from the Parametric Model, Registered Indians, Canada, Provinces and Territories, 1981

Province/ Territory	Total Fert- ility Rates	Mean Age	Modal Age	Derived Number of Births	Estimated Number of Births	Ratio Derived/ Estimated
Atlantic	2.91	26.6	22.7	353	368	0.96
Quebec	2.50*	26.0	22.7	695	690	1.01
Ontario	2.86	25.9	22.3	1,995	1,962	1.02
Manitoba	3.53	25.8	22.4	1,539	1,523	1.01
Saskatchewan	4.13	26.2	22.1	1,849	1,840	1.00
Alberta	3.78	25.9	22.4	1,408	1,399	1.01
British Columbia	2.49	25.5	22.1	1,566	1,538	1.02
Territories	3.59	26.3	23.1	357	346	1.03
Canada	3.15	25.8	22.1	9,762**	9,666	1.01

* Unadjusted for undereporting.

** This is the sum of values for all provinces and territories; independently derived number of births is 9,789.

Source: Same as Tables 9 and 10.

6. CONCLUSION

Given the extent of late reporting and underreporting and the limitations of the estimation technique for correcting the data, it is likely that the Indian fertility, particularly for recent years, is underestimated. The fertility projections based on the extrapolation of recent trends, therefore, are probably lower than what might be expected. The constant assumption, that the fertility level will remain at the 1981 level (i.e., 3.2 births per woman) for the projection period may approach the reality if the "actual" fertility level (which is not underestimated) declines at a slow pace. In the short term, it should provide a reasonable assumption, but in the long term it may be taken as an upper bound. The rapid decline assumption which projects a total fertility rate of 2.1 by 1996, is plausible in the long run, if the future fertility follows the path of the past; in the short term, it may be taken as a lower bound. The slow decline assumption, which falls between the constant and rapid decline assumptions, and which projects a total fertility of 2.6 by 1996, is probably the most plausible in the short as well as the long term. With increased modernization, Indian fertility, however, may follow the overall Canadian pattern and may approach the replacement level within 15 years as assumed under the rapid decline assumption.

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