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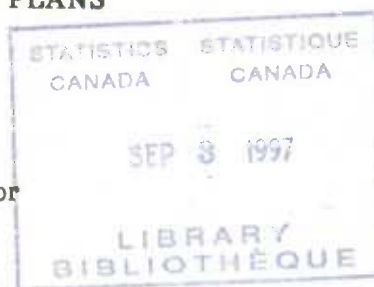
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METHODOLOGY BRANCH

**CANADA's CENSUS of POPULATION:  
1986 EXPERIENCE and 1991 PLANS**

*SSMD-87-021 E*

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### Abstract

The most recent Canadian Census of Population took place on June 3rd, 1986. Despite its cancellation and subsequent re-instatement less than two years before it took place, the Census was completed on time, within budget and with relatively few problems. This paper reviews the 1986 Census in terms of those characteristics which made it unique, reports on the current state of progress, and describes some of the problem areas that have surfaced. The paper also describes the current state of development for the 1991 Census, with special emphasis on how this process has been affected by emerging experience with the 1986 Census. The two major areas where work is actively underway, content consultation and research and testing, are briefly described. The paper concludes with some basic lessons learned from the 1986 Canadian Census which are applicable to census-taking in general.

### Résumé

Le plus récent recensement de la population du Canada a eu lieu le 3 juin 1986. Bien qu'il ait été annulé puis rétabli moins de deux ans avant sa réalisation, le recensement, qui a posé relativement peu de problèmes, a été mené à terme dans les délais impartis et suivant le budget fixé. Les auteurs du présent document examinent les caractéristiques qui ont conféré un caractère unique au recensement de 1986, font état de l'évolution actuelle de la situation et énoncent certains des problèmes qui se sont présentés. Ils décrivent l'état d'avancement actuel du recensement de 1991 et mettent l'accent sur la manière dont l'expérience du recensement de 1986 influe sur celui-ci. De plus, ils décrivent brièvement les deux principaux domaines où les travaux sont en cours, à savoir les consultations concernant le contenu ainsi que la recherche et la mise à l'essai. En guise de conclusion, ils présentent certaines leçons fondamentales tirées du recensement de la population canadienne de 1986, leçons qui s'appliquent au dénombrement en général.

## 1. Introduction

The most recent Canadian Census of Population took place on June 3rd, 1986. This paper describes the 1986 experience and how it has shaped the planning for the next census in 1991.

Section 2 of the paper describes the major events and decisions leading up to the 1986 Census. Section 3 describes the current status of the census and gives a brief evaluation of how the collection and processing phases have gone. The fourth section of the paper describes in more detail some of the areas where problems have occurred in 1986, and the measures taken to deal with them. The current state of development for the 1991 Census is described in Section 5, with special emphasis on the content consultation activities and the research and testing program being conducted in preparation for 1991. Finally, Section 6 concludes with a summary of some lessons that have been drawn from the 1986 Census which apply to census-taking in general.

## 2. Key Features of the 1986 Census

Canada has conducted its Census of Population every five years since 1956. The mid-decade census, however, has usually been a "smaller" census, in the sense that it asks fewer questions than the decennial census. The 1986 Census marked a departure from this pattern. The 1970s had brought a heavy westward migration of the population with the 1981 Census showing that the provinces of British Columbia and Alberta especially were the fastest growing areas in the country. However, economic conditions changed rapidly immediately after the 1981 Census, with a severe recession, changes in employment and evidence of return migration to eastern Canada. These and other indications of rapid change argued for a comprehensive 1986 Census, comparable to 1981, covering basic social and economic data (migration, labour force, income) to meet the requirements of both the public and private sectors.

The 1981 Census was judged to have been extremely successful. The data were collected, processed and published faster than ever before, all at lower costs. To keep costs to a minimum, and to enable a "large" mid-decade census to be carried out, a major strategic assumption for the 1986 Census was that 1986 would repeat the procedures and use the same systems as the 1981 Census to the maximum extent possible.

Consultations were carried out with data users in 1982 and 1983, and in early 1984 the questions to be asked were approved by the federal government. However in November 1984, a new government decided to cancel the 1986 Census as a cost-saving measure. In the weeks that followed, the government received representations from a large number of users stressing the need for a mid-decade

census. In December 1984, the Census was re-instated, but with the provision that Statistics Canada commit itself to absorb a large portion of the costs (some \$100 million) over a five-year period.

Of the \$100 million, \$30 million was paid for by a government job creation program for students and youth, who were to be employed in the data gathering and processing operations. It was clearly recognized that this posed some risk, since it meant a substantial change in the workforce used. As an illustration, Table 1 compares the enumerator profiles in 1981 and 1986.

Table 1: Enumerator Profile, 1981 and 1986 Censuses

	<u>1981</u>	<u>1986</u>
	(percent)	
Homemaker	59.4	21.5
Student	12.6	55.6
Retired	4.8	1.7
Unemployed	6.9	9.7
Employed	16.3	11.5

As well as using students, the budget of the Census itself was reduced. This was accomplished to a minor extent by reducing the content of the Census, but the major costs savings came from measures such as the elimination of paid advertising and dropping the "Postal Check", one of the traditional coverage improvement programs. Again, these changes were clearly seen as increasing the risk to the Census.

There was also a greatly increased emphasis on recovering costs through a substantial jump in the prices of output products. The objective for 1986 was to recover \$10 million dollars, compared to only \$2.5 million in 1981, through the sale of Census output.

During the consultations on content, it became clear that there was a strong demand for data on Canada's native population. Statistics Canada responded by putting a question on the 100% questionnaire asking respondents if they considered themselves an aboriginal person, and by developing special collection procedures aimed at improving the quality of enumeration on reserves. In addition, the federal government funded a special Aboriginal Peoples Program, administered by Statistics Canada. This program had three objectives: increasing native participation in the Census through a special communications effort targetted at

natives, funding the accelerated processing of the results from the new question, and subsidizing the provision of data to the native population.

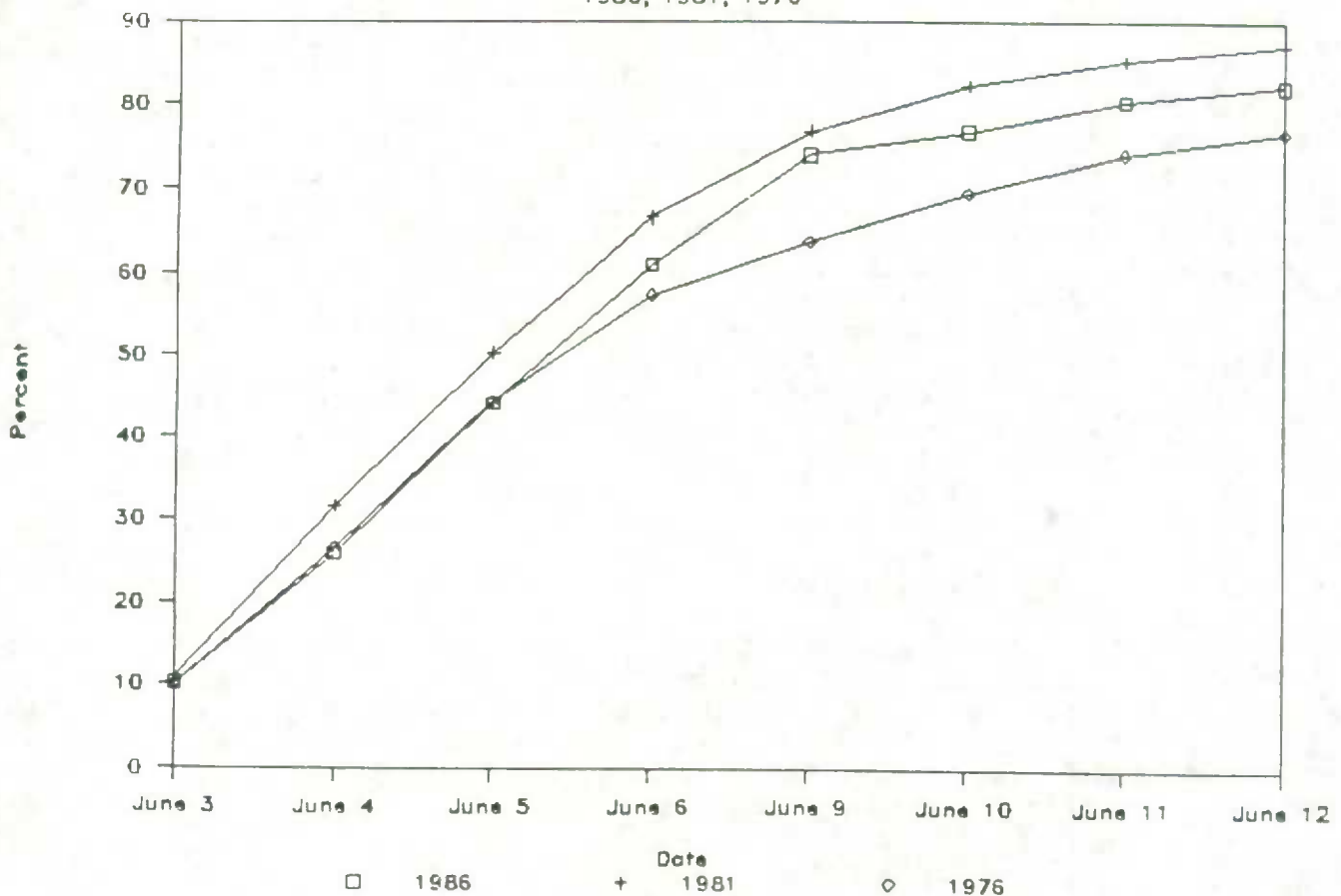
Another sub-group of the population for which there was a high demand for better data was disabled persons. In this case, however, it was decided that the data needs would best be met through a post-censal survey, using the Census as a screening vehicle. The Census thus included a question on disability on the sample questionnaire received by 20% of households.

### 3. Current Status of the 1986 Census

#### 3.1 Collection

The collection operation started in earnest about one week before Census Day with enumerators dropping off a questionnaire at every household in Canada. One of the first indications of how the Census was going came with the rate of mail returns in the first ten days following Census Day (Figure 1). Although the rate was below that achieved in 1981, it was higher than the last mid-decade census and well within the range expected.

Figure 1: Census Mail Receipts  
1986, 1981, 1976



By the end of June 1986, the collection phase was over 98% complete, with only the more difficult follow-up cases left to be resolved. The first indication of the quality of enumeration came with the percentage of enumerator assignments rejected at the Field Quality Control stage. Table 2 shows that the rejection rates for the various checks were generally comparable with 1981. The notable exception was that the percentage of assignments rejected because the rate of non-response exceeded two percent was considerably higher than 1981.

Table 2: Percentage of Assignments Rejected at Quality Control by Reason, 1981 and 1986

<u>Quality Check</u>	<u>1981</u>	<u>1986</u>
Questionnaire not accounted for by Enumerator	6.09	6.97
More than 25% of questionnaires fail field edits	6.04	5.69
More than 2% non-response	12.17	19.30

### 3.2 Coding and Data Capture

Once the collection phase was complete, the coding of write-in questions and the key-entry of the questionnaires were carried out using the facilities of Revenue Canada Taxation. The operations began in mid-July and were completed by the end of November 1986. This phase of the Census was very successful, being completed on schedule, under budget and with levels of outgoing quality for both operations well above the levels specified. Among the reasons for the success of the keying operation in particular were a much higher productivity than planned (10,000 keystrokes per hour compared to a planned 7,500) and fewer questionnaires than expected. The operation was so successful in fact, that the use of Revenue Canada facilities has already been recommended again for the 1991 Census. While the quality of the coding operation remains to be evaluated in detail, no significant problems were evident.

### 3.3 Edit and Imputation

Following data capture, the next major operation in the Census is the loading of the data tapes onto a database and the edit and imputation of the data to remove inconsistencies and replace missing data. The database loading operation began in September 1986 and was completed about one month ahead of schedule in mid-January 1987. The subsequent processing has maintained the one

month lead compared to the planned schedule, and at the present time the processing of the 100% data is progressing with no major problems being encountered.

### 3.4 Output

The first public product from the 1986 Census was the "interim population counts" released in January 1987. These counts are interim in that they are incomplete by generally 1-2% (e.g., Canadian residents overseas are not included). The counts are available down to the municipality level. The major purpose of the interim counts is to serve as an early warning system to uncover errors in geographic boundaries or other major discrepancies. Provincial and territorial governments are especially interested in early access since the census counts carry important financial implications for their governments. For 1986, these interim counts did identify some fifteen relatively minor geographic boundary errors. More significant perhaps, these numbers have raised concerns among certain data users about the dimension of undercoverage.

The final population and dwelling counts were released as planned on April 13, 1987. These counts were provided for every Census Sub-division (municipality, Indian Reserve, etc.) and Federal Electoral District (each represented by a member of Parliament). These counts by themselves provided strong evidence to confirm the utility of the 1986 Census. Although this is not the place for a detailed presentation of results, a brief resume will confirm that five-year census benchmarks assist in definitively pin-pointing changes. Compared to the 1976-81 period, the 1986 Census (covering 1981-86) pointed to the slowing of Canada's growth rate (from 5.9% to 4.2%). Western growth slowed dramatically (e.g., Alberta's growth rate fell from 21.7% to 6.1%) but still remained the fastest growing sector of the country. The slide in Quebec continued with an even lower growth rate in 1981-86 (1.6%) versus 3.3% for 1976-81. Another significant indicator is the reversal in 1986 of the established decline in the core cities of Canada's major metropolitan areas (Vancouver, Montreal, Toronto). The core city proper of Toronto underwent a 11% population decline from 1971-76, but in the 1981-86 period, the gain was 2%.

The 100% data were released on July 9th, 1987. This release covered family and household data, gender, marital status, mother tongue and dwelling information. Among the highlights of this most recent release were:

- more than one million Canadians are now aged 75 years or over
- more than half the population is now over age 30
- families have increased in number but declined in size

- lone parent families continue to grow at a faster rate than husband-wife families
- one in 12 couples now live common-law
- one in four elderly persons lives alone
- the proportion of francophones in Canada and of anglophones in Quebec continue to fall
- there is a greater diversity of languages other than English or French

In summary, the early 1986 Census results demonstrate that this census is not merely replicating a continuation of earlier trends but is providing leading indicators of important social and economic changes.

### 3.5 Data Quality Measurement

An important component of the Census, of course, is a program of data quality measurement studies. In the Canadian Census, two of these studies, the Temporary Residents Study and the Vacancy Check, are used to adjust the final population counts. The Temporary Residents Study estimates how many persons were missed because they were absent from their usual place of residence on Census Day. The Vacancy Check estimates the number of private households and individuals missed because the enumerator incorrectly classified a dwelling as unoccupied as of Census Day. Table 3 compares the results for these two studies in 1981 and 1986.

Table 3: Persons Added to Census Counts From Vacancy Check and Temporary Residents Study, 1981 and 1986

	<u>1981</u>	<u>1986</u>
Vacancy Check	82,356	93,934
Temporary Residents	117,584	76,431

The major vehicle for measurement of gross undercoverage in the Canadian Census is the Reverse Record Check. In this study, a sample of persons who should be enumerated is drawn from several sources, the Census Day address of the person is traced, and the questionnaire for that address is checked to see if the person was enumerated. The results from this study are not used to adjust the final population figures.

Final results from this study will not be available until the

fall of 1987. In 1986, there was an attempt to improve the tracing of the sample and thus speed up the availability of results. For the first time, addresses of the sampled individuals were updated prior to the Census by linking to various administrative files. It appears that this approach has been only partially successful, however, and considerable work will be required to make the work of record linkage worthwhile in terms of better tracing in the future.

Finally, the 1986 Census was the first time a study was conducted to measure the degree of overcoverage. Until the results are known and the study is evaluated, however, the study is considered to be strictly experimental.

#### 4. Problem Areas

In most respects, the 1986 Census has been very successful so far. However there have been a number of problem areas which have posed challenges.

##### 4.1 Indian Reserve Refusals

A major problem was the failure of a significant percentage of Indian Reserves to co-operate with the Census-taking operation. The reasons go beyond the Census, and reflect a position towards government in general and not Statistics Canada in particular. Unfortunately, the Census was caught in the middle.

Approximately 45,000 persons, representing some 20% of the on-reserve population, could not be enumerated. Although repeated efforts were made, and are still being made, to conduct the Census, it was clear by the fall of 1986 that some method of estimating the population on these refusal reserves was required.

A number of different approaches were examined, including using administrative data from the department of Indian and Northern Affairs. However on analysing the possible approaches, the best one turned out to be simply using the growth rate between the 1981 and 1986 Censuses for the reserves which did respond and applying that growth rate to the 1981 populations for the refusal reserves. However, the error of this model-based approach was sufficiently high that reliable estimates could only be made at the provincial level. It was therefore decided that only the official province and Canada level population counts would be adjusted to account for Indian Reserve refusals. All other tabulations showing sub-provincial detail or data on characteristics of the population will not be adjusted. While this will undoubtedly lead to some confusion among users of the data, it was felt to be preferable to adjusting or imputing for such a large percentage of the reserve population.

#### 4.2 Response Errors to the Aboriginal Question

As previously mentioned, the 100% questionnaire included a new question (Question 7) asking respondents whether they considered themselves an aboriginal person or native Indian of North America, that is, Inuit, status or non-status Indian, or Metis.

The first indication of possible problems with the question came from tabulations of the raw data which were obtained when loading of the Edit and Imputation database was nearing completion. An examination of these tabulations showed that the Inuit population had recorded a remarkable growth in five years, going from 25,390 in 1981 to almost 64,000 in 1986. This was surprising, since the 1981 count of Inuit had generally been accepted as accurate. Furthermore, most of this growth was not in the traditional Inuit areas of Canada.

A check of some of the questionnaires showed that the problem was not a keying error. As well, in many cases the answers to Question 7 were inconsistent with those from the ethnic origin and mother tongue questions. This led to the conclusion that the problem was most likely due to response errors.

To investigate the problem further, a telephone follow-up survey was mounted which included cases where any aboriginal response was given in Question 7 but there was no indication of an aboriginal ethnic origin or mother tongue. Table 4 shows the results of this survey for these so-called conflict cases. (Indian Reserves, the north of Canada, and collective dwellings were excluded). The original Census response and the re-interview show a high degree of inconsistency, with more than 50 percent of responses going from aboriginal in the Census to non-aboriginal in the follow-up survey (for Inuit the percentage was over 96 percent).

Table 4: Percentage Distribution of Re-interview Responses by Census Response, 1986 Census Aboriginal Question

<u>CENSUS</u>	<u>RE-INTERVIEW</u>				
	INUIT	STATUS	NON-STATUS	METIS	NON-ABORIG
INUIT	2.1	0.6	0.5	0.5	96.4
STATUS	2.9	36.8	6.3	0.3	53.8
NON-STATUS	0.3	3.1	10.2	2.4	84.1
METIS	0.0	6.2	19.9	24.2	49.7

Based on these results, the decision was made to cancel completely the dissemination of data from Question 7. Any estimates of the aboriginal population will be derived instead from the 20% question on ethnic origin. The raw data will be available on request to researchers, and there is still the possibility that results may be published for areas where the response error may not have been a problem (e.g., areas where the Census is conducted by face-to-face interview). However, investigation of this will take at least a year.

#### 4.3 Coverage

The 1986 collection environment, despite the original intention to repeat the 1981 approach, varied significantly from 1981. The use of paid advertising was eliminated, there was a greatly increased use of student enumerators, the Postal Check was dropped, and collection support activities were reduced or eliminated. Although final results are not yet available from the Reverse Record Check, there are now indications that this may have led to an increase in undercoverage compared to the 1981 and 1976 Censuses.

Table 5 shows a comparison of the demographic estimates of the population compared to the final Census counts for the past three Censuses. The size of the gap has widened considerably in 1986.

Table 5: Demographic Estimates and Census Final Population Counts, 1976, 1981 and 1986

	<u>1976</u>	<u>1981</u>	<u>1986</u>
Demographic Estimate	23,125,813	24,280,618	25,588,306
Census Final Count	22,992,604	24,341,701	25,352,960
Percent Difference (using Census as base)	0.58	-0.25	0.93

Note: Census Final Counts have been adjusted to June 1

A second indication of a possible increase in undercoverage is the number of temporary residents enumerated in the Census. In 1986, despite Expo 86, fewer people were enumerated away from home on Census night than in 1981.

Early indications such as these have already led to the Census figures being challenged by some provinces. In some cases, provinces requested that Statistics Canada delay the final population counts until the results of the Reverse Record Check were known, and even to consider adjustment of the final counts

using Reverse Record Check results. While no adjustment of 1986 Census counts will take place, it is clear that the issue of adjustment will have to be addressed in greater depth for the 1991 Census. As well, careful consideration will have to be given to how the 1986 data should be used in the revision of 1981-86 intercensal population estimates and in the production of post-censal estimates from 1986 onwards.

## 5. Current Status of 1991 Development

Planning for the 1991 Census was officially launched with an International 1991 Census Planning Conference held in October 1985. Shortly thereafter, a senior-level planning group was established to identify the major issues for 1991, put together a strategic plan, and initiate work on a number of research and developmental projects which required long lead times. The planning group completed its work at the end of 1986 and a project team for 1991 was formed.

### 5.1 Major Planning Assumptions for 1991

Although the assumptions needed to plan a large undertaking such as a Census run into the hundreds, the major ones are as follows:

1. Census Day will be Tuesday, June 4, 1991.
2. The Census of Agriculture will again be conducted together with the Census of Population.
3. There will be significant changes in the content of the Census relative to recent Censuses. As a result, a much more extensive consultation program, including consultation with the general public, will be carried out.
4. A formal program of research and testing, which did not exist for the 1986 Census, will be carried out for the 1991 Census.
5. Certain questions will be asked for 100% of the population and additional questions will be asked of a sample.
6. All new questions or significant modifications to existing questions must be successfully field tested.
7. Regional data processing and key entry of questionnaires will be done using Revenue Canada Taxation facilities, similar to 1981 and 1986.
8. Timeliness of the output will be at least equivalent to the 1986 Census timeframes.
9. There will be a continuing need for Statistics Canada to maintain fiscal restraint in the conduct of the 1991 Census.

## 5.2 Content Consultations

Early in the 1991 Census planning process, consultation on content with a wide range of census data users was established as a priority (Pryor, 1986). Both the 1986 Census experience, where data users played an important role in the decision to in fact carry out the Census, and the evident need to examine changing socio-economic conditions were central to this decision. The content consultation program encompasses some 30-40 public meetings across Canada. In addition, various meetings will be held with federal and provincial government departments and agencies, the National Statistics Council and special user groups including business organizations, municipalities, community groups, Native organizations and ethnic associations. Beyond these meetings all interested parties are encouraged to submit written briefs expressing their views.

The consultations commenced in January 1987 and will end in September 1987 in order to meet the input schedule to the field testing activities. Thus far the consultation sessions have been well-received, although attendance in some locations has been disappointing. To compensate, media coverage has been much better than expected with the result being extensive public awareness of the consultation approach. Hopefully, this level of awareness will be expressed in submissions of positions on 1991 priorities.

The basic approach at the meetings is to listen, but also to have a certain structure to the sessions in order to assure that all possible content topics - both old and new - will be addressed. As expected, a wide variety of opinions have been expressed. However, most discussions gravitate to a selected set of issues including consensus for new formulations of traditional enquiries and recommendations for new subjects for questions.

In terms of new formulations, concerns have been raised regarding the definition and derivation of family data, residence rules for joint custody children and the determination of household relationships. As in other countries, legal marital status versus actual living arrangements is a common topic for discussions. In addition to collecting basic fertility information (number of children ever born), there have been recommendations to collect related information on number of marriages, intervals between divorce and re-marriage and/or reason(s) for marriages ending.

Another sector of interest is language, with suggestions for improving census language questions. In 1981 and 1986, there were three questions, i.e., mother tongue, home language and official language (English and French) ability. In the area of labour force, occupation, industry and income inquiries, there has generally been satisfaction with current practice. The concerns that have arisen deal more with additional inquiries as, for example, information regarding unpaid work or volunteer

activities. Other new areas mentioned for questionning include nature of disabilities, modes of transportation to work and even the number of pets (cats and dogs only)!

The most challenging area of discussion focuses on ethnic origin/ancestry/race inquiries. Despite the recognized shortcomings of questions in this socio-cultural area, such data are essential to ongoing government programs related to visible minorities, discrimination measurement and cultural program funding.

Four of the major dimensions of a census are costs, data needs, response burden and quality. It is apparent that the content consultation process, as expected, will bring a long list of demands for 1991 information. Costs, quality and response burden are yet to be added to the equation. With a trend to smaller censuses in many Western countries, the final decision in Canada will involve very difficult choices. The plan is to submit tested options for the specific 1991 Census questions and sampling rates to the federal government in time for a January 1990 decision.

### 5.3 1991 Research and Testing Program

#### 5.3.1 Major Issues

The research and testing program has as its objective the overall improvement of the 1991 Census through the development of new methodologies and the thorough testing of proposed changes to ensure that they will work. The major issues which the project is attempting to address are, in order of priority:

##### (i) Response Quality

The experience with Question 7 in 1986 has clearly shown that the failure to adequately test new Census questions can lead to unproductive expenditures, increased response burden for the public, and a negative image among users.

##### (ii) Coverage

The primary objective of the Census is to obtain an accurate count of the population. New cost-effective measures will be required to ensure and improve coverage as much as possible, while at the same time increased emphasis on the issue of coverage measurement and adjustment will be needed.

##### (iii) Collection Methods

There have been several concerns arising out of the 1986 experience about the adequacy of some of our collection methods. There are, for example, questions as to whether collection staff are underpaid for the job they do, and whether the collection

process is too difficult to monitor and control. As a result, there are a number of different areas in collection which are under active review for possible changes.

#### (iv) Respondent Reaction

The 1986 Census saw a small, but significant, increase in refusals to the Census, despite the fact that a justification for each question was provided to respondents. A similar trend towards a deterioration in the "respondent environment" has been noticed, to a greater or lesser degree, in many other countries as well. Measures to counteract this trend must be devised wherever possible, while maintaining the basic mandate of the Census.

#### (v) Cost Reduction

The 1986 Census was conducted in an atmosphere of severe financial constraints, and the situation is unlikely to improve for 1991. While unit costs of taking the Census have declined significantly since 1971, new approaches that have the promise of reduced costs are still of high priority, since these cost savings may be needed to offset rising costs in other areas.

#### (vi) Indian Reserve Enumeration

The problem of how to enumerate, or at least estimate, the population on Indian Reserves will also be a major issue for 1991. The approach used to estimate the population in 1986 is not repeatable for 1991 and new approaches must be developed.

A number of research projects have been initiated to address these important issues for 1991. A brief description of some of the major ones follows:

#### 5.3.2 Content/Questionnaire Testing

The objective of the content testing project is to ensure, for every question on the 1991 questionnaire, that not only will respondents answer the question but they will also understand the question and will answer accurately.

Some evaluation of the existing Census questions is available from studies built into the 1986 Census. For example, there was a study to measure the initial rate of response to each question before follow-up by the enumerator, and the Overcoverage Study included a re-interview for Census questions such as language, aboriginal and ethnic origin. Such studies provide much useful information about how well existing questions work. However for new questions or questions where significant changes are anticipated, there is a need to carry out an extensive testing program to ensure that the 1991 questions will also work.

The current plans involve a series of two small-scale "Modular Tests", in October 1987 and January 1988, followed by a larger "Integrated Test" in October 1988. There are also contingency plans for a fourth test in April 1989 if required. The results of these tests will be available by mid-1989, in time to be used in preparing the recommendation to the government for the 1991 questions.

The Modular Tests are intended to cover topics where it is already known that changes are desirable. The tests include questions on fertility, nuptiality, labour force, income, language, aboriginal status, ethnic origin, mobility, a coverage improvement question, and a question to identify agricultural operators. For each test, a questionnaire will be dropped off to a sample of about 3000 households. The householder will be asked to complete it and hold it for pick-up by the interviewer. At pick-up, the interviewer will conduct a 30 minute re-interview to try to ascertain the "true" answer and to identify areas where the respondent had difficulties.

By comparison, the Integrated Test is primarily intended to test questions which arise out of the Content Consultation program. Since these will in most cases be new topics, it is expected that more than one proposed wording of a question may have to be tested. As well, there may be a need to compare new wordings for existing questions to the wording used in the 1986 (or previous) Census. Different sets of instructions, for example "whom to include" rules, may be tested. For these reasons, the approach envisaged is to use a split panel design, each panel receiving a different version of the Census questionnaire.

The questionnaires will be delivered to a nationally representative sample of about 40,000 households, and the respondents will be asked to complete the questionnaire and return it by mail. The response rates to each question can then be analysed. As well, a sub-sample of respondents will be chosen for a re-interview in order to permit analysis of the quality of response, similar to that for the Modular Tests.

Wherever possible, the analysis of the reinterview results will be based on the linked responses to the test question and the reinterview question, and will be quantitative in nature. For example, an index of inconsistency can be calculated for each version of a question and the "best" version selected.

### 5.3.3 Research on Coverage Errors

Research on the topic of coverage errors, primarily undercoverage, is focussing on two aspects of the problem: coverage improvement and coverage measurement.

A number of solutions to the undercoverage problems encountered in the 1986 Census have been suggested. Among these are:

- (i) the use of an "address register" as a coverage check during collection;
- (ii) pre-listing a sample of dwellings and using this to quality control the listing done by the enumerator;
- (iii) reinstatement of the Postal Check;
- (iv) better advertising of a telephone number to call for persons who did not receive a Census questionnaire;
- (v) the addition of a "household roster" question to improve within-household coverage of persons;
- (vi) simplification of the "whom-to-include" instructions on the questionnaire;
- (vii) enumeration of temporary residents on the regular Census questionnaire.

Several of these avenues, such as address register research and testing of a household roster question, are under active investigation. (Research on address registers is described in section 5.3.4 of this paper.)

In terms of coverage measurement, the basic approach for 1991 so far has been to concentrate on areas needing improvement regardless of whether the results will be used to adjust the final Census figures. However the results of the Reverse Record Check, expected in the fall of 1987, are expected to bring additional pressure to review the entire coverage evaluation program for 1991, including the possibility of adjustment.

One of the current gaps in coverage measurement is the exclusion of the Yukon and Northwest Territories from the Reverse Record Check. Because of the small populations and the high level of inter-censal migration in and out of the Territories, the current procedures and sample size of the RRC are not adequate to produce reliable estimates of undercoverage. Other methods, such as drawing a sample from administrative records, have been tried on an experimental basis but with poor results. Estimates of undercoverage for the Territories are essential if adjustment is to be considered for 1991, and considerable investigation and refinement of methods is needed.

A second area of investigation concerns the methodology of the Reverse Record Check. There is a need to review the frames used to select the sample, particularly in terms of persons not covered by the frames currently used. The address updating and tracing procedures must be reviewed in light of the 1986

experience. The estimation methods must also be revisited, particularly the methods used to weight for non-response. In addition, the classification of cases, especially those in the "missed" category, should be reviewed. Other uses of the RRC, such as for response error measurement and longitudinal analysis, must also be considered.

Alternatives to the basic Reverse Record Check methodology will also be researched. The use of administrative records as a source of a frame is being investigated in one of the provinces where provincial health care records are felt to be relatively complete. The possibility of a post-enumeration survey will also be investigated. At the present time, however, it is felt that the Reverse Record Check is still the preferred method in Canada and it will form the core of our coverage evaluation program in 1991.

Finally, there will be a need to evaluate the results and the methodology of the Overcoverage Study. Measures of overcoverage would be essential if adjustment were contemplated, since the Reverse Record Check only provides a measure of gross, not net, undercoverage.

#### 5.3.4 Collection Research

Because of the problems encountered during collection in 1986, there is considerable emphasis on research and development of new collection methods. This section describes the major studies being conducted.

##### 5.3.4.1 Elimination of Pickup

One of the changes being contemplated is to eliminate the pickup methodology, currently used in small urban centres and rural areas, and replace it by mailback with telephone follow-up. The primary motivation behind such a change would be to reduce the "local enumerator" problem, where the respondent may have to hand over the completed questionnaire to a neighbour. As well, it would get rid of the perception that residents of rural areas are not capable of returning their questionnaires on their own, and would eliminate the confusion caused by publicity messages intended for urban residents, urging respondents to mail in their questionnaire. Finally, elimination of pickup could result in cost savings, while the simplification due to having a standard set of procedures for most of the country should result in better procedures, training and implementation.

A study is currently underway to evaluate the potential impact of this change in terms of coverage of the population and agriculture universes, the quality of response, the cost savings, impact on timeliness, and respondent acceptance. The primary concern is over the impact on coverage and quality of response for the Census of Agriculture. Much of the study will be based on a

re-analysis of a 1977 test of this methodology and updating information on costs, the incidence of party lines in rural areas and so on. As well, mailback was used for the Census of Agriculture in mailback areas in 1986 for the first time, and evaluation of this operation should provide much useful information on which to base a decision. The study is to be completed by December 1987 and a decision will be taken early in 1988.

#### 5.3.4.2 District Office Concept

Another study is being conducted into the possible use of centralized edit and telephone follow-up from district offices. At the present time, the completed questionnaires in mailback areas are returned to the same enumerator who dropped off the questionnaire. The enumerator carries out the edit and follow-up operations out of his or her home. The process is very decentralized, and only very rudimentary acceptance sampling quality control is possible. It is felt that centralizing the edit and follow-up operations could facilitate the use of specialized personnel, allow better control and would lead to better overall quality.

One of the major difficulties with a centralized operation is co-ordinating the centralized office with the field follow-up operation which is still required. In the past, this has been limited by the fact that the list of addresses has only been available in paper form. However a machine-readable address register which could be used as an address control file has the potential to eliminate this problem.

At the present time, the plans are to carry out a test of centralized edit in the 1991 Census. It is felt that only under actual census conditions can a true test of such an operation be done. The first phase of the project is to carry out a feasibility study to identify the parameters for such a test. The study is to be completed by April of 1988.

#### 5.3.4.3 Address Register Research

Research into address registers has already been mentioned several times in this paper. A more detailed description of the plan for address register research for 1991 is contained in Royce (1986).

The basic concept of an address register is to create a machine-readable file of addresses which are geocoded to Census geography. Such a register has a number of potential uses, for example coverage improvement, an address control file for centralized edit and data processing operations, improved geographical delineation, planning of assignments in the field, and telephone follow-up of non-response (if the register contains telephone numbers), to name just a few. Automation of the address,

a basic Census entity, is in many respects the key to future improvements in virtually every aspect of Census-taking.

The approach being pursued at present is to use automated record linkage methods to merge and unduplicate a number of administrative files, such as tax files, municipal assessment files, utility company files, family allowance and old age security files. Geocoding of the files is then done by linking the address to Census geography using the Postal Code, which is almost universally present on these files.

Results to date have been encouraging. A field check in the Ottawa area showed an overall coverage rate of 96.0%. As well, a comparison with listings from the Labour Force Survey showed a potential coverage improvement of 0.9 percent. Similar comparisons to listings from the 1986 Census showed an overall coverage rate of 95.5%, with a potential coverage improvement of 2.2 percent.

Further testing on a larger scale is planned for this fall. An address register will be created for five urban centres spread across the country. Two methods of using the register for coverage improvement will be tested, namely providing the register to the enumerator for use during the listing, and using the address register only as an independent check after the enumerator has listed the area. Each centre will be independently listed by both methods, so that significant differences between the methods can be attributed directly to the methods used.

A further description of the current status of this project is given in Drew et. al. (1987).

#### 5.3.4.4 Collection Training

Training of the temporary field collection staff is one of the most expensive and the most important components of the Census. For 1991, the training program will be completely reviewed in terms of content, sequencing, timing, duration and training methods. The possibility of contracting out parts of the training program will be investigated, and research into automated methods, for example computer-assisted training, will be done.

#### 5.3.4.5 Sampling and Weighting Research

The use of sampling during data collection will be re-examined. Potential cost savings and reductions in overall response burden achievable through a reduction in the sampling ratio from the current 1 in 5 will be investigated. The possibility of different sampling ratios for different geographical areas will also be considered. Options not being considered, however, are schemes such as interlocking or nested samples, because of the additional complexity, cost and risk these introduce.

Closely associated with this work is a review of the methodology used to weight the sample data. The primary motivation is to lower the sampling error through better weighting procedures. In addition, a number of other related topics will be looked at, such as the methods used to form weighting areas and the use of weighting instead of imputation to handle complete non-response. A decision on the sampling ratio will be made by March 1988 and changes to the weighting methodology will be identified by March 1989.

#### 5.3.5 Automated Coding Research

In comparison to collection, there is relatively little research in the area of census processing. The major topic of research is in the area of automated coding. The main rationale of automating the coding of write-in answers such as Industry and Occupation is to reduce costs, especially salary costs. There may also be some improvements in the quality of coding. A research project was started on this topic in 1983-84, but was cancelled due to the pressure of the 1986 Census. The project was resurrected in early 1986.

To date, a prototype system has been developed and is currently undergoing testing. During the summer of 1987, a large sample of 1986 Census questionnaires will be captured and used to form the starting point for the reference files needed to do automated coding. As well, the computer-assisted approaches used in both Australia and New Zealand may be investigated.

The most likely scenario for 1991 is a large-scale test of automated coding. Results to date have not been sufficiently good to justify going deeply into automated coding for 1991. However the attempt to use actual Census responses as the basis of reference files may change this situation in the next twelve months. A decision on the role automated coding will play in the 1991 Census will be made by late-1988.

#### 5.3.6 Geography Research

The basic strategy for research in geography is primarily to extend and refine programs begun in earlier Censuses, rather than attempting to make radical changes. The use of automated mapping will be extended for 1991, areas covered by the Area Master File (a machine-readable street network) will be extended, and there will be an increased use of postal code geography for data retrieval.

The one research project in this area is a feasibility study into the possibility of a "Block Program". Under such a system, the entire country, or at least the urbanized areas, would be divided into blocks and a unique identifier associated with each one. The identifier would, as much as possible, remain constant from one

Census to the next. In other words, the block, rather than the Enumeration Area, would become the basic Census Geography unit.

A basic geographical building block that is smaller than the current Enumeration Area has the advantage that delineation of field collection assignments would be much more flexible than at present, since blocks can be put together to suit local conditions. In addition, block boundaries would tend to be more permanent than Enumeration Area boundaries, and therefore an output program centred around blocks would result in more stability from one Census to the next.

#### 5.3.7 Indian Reserves

At the present time, there is no active research into the approach to be taken for enumeration of Indian Reserves in 1991. Most of the problems that occurred in 1986 were political in nature, and changes to the methodological approach are not likely to have a major impact in gaining cooperation in 1991.

It is assumed that we will attempt to enumerate the Reserve population in 1991. Suggestions that have been made to improve the quality of enumeration in 1991 (where it proves to be possible) include more use of local Band records where non-response is a problem, developing a separate questionnaire tailored to the reserve population, or using teams of interviewers instead of hiring a local person.

It is planned as part of the 1986 output program to establish bilateral contacts with native organizations to maintain these contacts throughout the years leading up to 1991. It is hoped that ongoing contact will help to convince native people of the value of Census data and improve the situation for 1991.

Finally, as we approach 1991, we will have to develop contingency plans for estimating the population, and possibly the characteristics, of the reserve population in case we encounter large-scale refusals as happened in 1986.

### 6. Conclusions From the 1986 Census

A number of lessons can be drawn from the experience with the 1986 Census. To the extent possible, we are attempting to build on these experiences to assure the success of the 1991 Census.

First, it is clear that in Canada the Census is still wanted and supported by the vast majority of data users and by the general public. This was demonstrated unambiguously by the re-instatement of the Census just a few weeks after its initial cancellation. However, the cancellation did point out the need to maintain ongoing contact with data users and the effort at broad public consultations on the content of the 1991 Census is one approach to

maintaining awareness of the importance of the Census.

Second, there is the realization that there must be an appropriate balance between costs and quality, and that this balance must be vigorously defended. Programs to ensure quality cost money, but as the problems with the aboriginal question clearly showed, lack of quality also costs money. There is a renewed sense of the legitimacy of building "safety factors" into our procedures. The emphasis on thorough pretesting of questions and the search for measures to improve coverage, even if they may increase the cost of collection, reflect this philosophy. As a result, if costs must be cut for 1991, the option of dropping questions rather than risking the basic quality of enumeration will be proposed.

Next, the need for a long-range program of research and testing has been recognized. For the 1986 Census, the decision to repeat 1981 meant that there was virtually no research done for 1986, and what research had been planned became the first victim of budget cuts. The result for 1991 is that Canada is now behind several other countries, especially in the area of the application of automation to activities like collection and coding. To make significant changes, we must take a longer-term view to Census research and not try to build the next Census simply by reacting to the last one.

1986 experience also recognized the need to maintain a balance between the basic purpose of the Census and special interest topics. In 1986, there was tremendous but belated emphasis on the enumeration of aboriginal people and on the conduct of a post-censal survey of disabled persons. These were important new initiatives, but the extra effort needed to implement them at times competed with that needed to carry out the basic census program.

There is also the perception that the respondent environment is becoming more difficult. Clearcut evidence cannot be obtained simply by comparing 1981 experiences to 1986 because of the differences in publicity strategies, the use of student enumerators, and the fact that 1986 was still perceived by much of the public as the smaller, less important, mid-decade Census. Nevertheless, there is a widespread feeling in Canada, as in many other countries, that respondent resistance to surveys and Censuses has increased in the last few years. As well, the trend to smaller household sizes and more persons working outside the home has made contacting respondents increasingly difficult. To combat this, it is essential that the Census remain relevant in the eyes of the public. The fact that a question on disability became a key selling point of the 1986 Census made this quite clear. There must also continue to be a strong emphasis on confidentiality of information throughout the Census process in order to maintain the trust of respondents.

The use of only unpaid publicity was a calculated risk for the

1986 Census. While the experience (at least as judged by mail return rates) indicates that it can work, it is less clear that the same approach can be repeated in 1991. Some of the goodwill on the part of private organizations and associations may have been used up in 1986 and may not be there to the same extent in 1991. Also, there is an added risk in depending only on the voluntary efforts of others, no matter how well intended. At times, census collection may require controlled, concentrated messages to an uncooperative public. The common view is that such a capacity can only be assured by means of purchased radio, television or print media messages. Fortunately, there was no 1986 Census collection crisis that necessitated testing this view.

Mixed conclusions can be drawn about the widespread use of students as enumerators. In terms of a negative public reaction, which was a concern going into 1986, none materialized. The effect on quality of the collection operation is less clear. There is some feeling that students were less committed to the job than our traditional enumerator workforce and that this may have resulted in higher non-response and undercoverage. A number of evaluation studies which will be completed in the coming months will shed more light on this.

In summary, the 1986 Census can be considered a qualified success. Despite the disruption of the cancellation and reinstatement, it has been completed on time and within budget. The one area where it may not completely meet its objectives is that of the quality of the results, especially in terms of coverage. We still have much to learn from the 1986 Census, as evaluations are completed and as the processing and output phases of the Census unfold. Despite this incompleteness in our knowledge, however, the fact that the 1991 Census is only 46 months away requires that we make key decisions now on the direction for 1991.

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