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Housing and Households

1991 Census Technical Reports

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Statistics Canada

1991 Census Technical Reports

Housing and Households

Reference Products series

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Preface

Through time, the Census of Canada has become the primary source of information about Canadians and how they live. Decisions based on this information affect the social and economic affairs of all Canadians.

Statistics Canada, as the professional agency in charge of producing this information, has the responsibility for informing users of data quality. The agency must describe the concepts and methodology used in collecting and processing the data, as well as any other features that may affect their use or interpretation.

In order to describe the quality of the 1991 Census data, Statistics Canada has prepared the following publications: a census **Dictionary**, which provides concise and easy to understand textual and graphical information pertaining to census concepts; a **Handbook**, which provides an overview of how the census is conducted; and a series of **Technical Reports**, which present in greater detail, information on the quality of data for specific characteristics, such as occupation, as covered in this report.

Information on data quality is important for users. It allows them to assess the usefulness of census data for their purposes as well as the risks involved in basing conclusions or decisions on these data. The 1991 Census was a large and complex undertaking and, while considerable effort was taken to ensure high standards throughout all collection and processing operations, the resulting data are inevitably subject to a certain degree of error.

Information on data quality is also important to Statistics Canada. It is an integral part in the development and maintenance of pertinent and reliable statistical programs.

This publication is a major contribution to achieving these goals. It has been prepared by Pierre Gauthier and Oliver Lo of the Housing, Family and Social Statistics Division.

Finally, I would like to express my appreciation to the millions of Canadians who completed their questionnaires on June 4, 1991, as well as to those who assisted Statistics Canada in planning and conducting the census.

Ivan P. Fellegi

Chief Statistician of Canada

Table of Contents

	Page
List of Tables	ii
I. Introduction	1
II. Concepts and Definitions	2
III. Data Collection and Coverage	5
IV. Data Assimilation	7
V. Edit and Imputation	9
VI. Data Evaluation	12
VII. Historical Comparability	17
VIII. Products and Services	19
IX. Conclusion	21
Regional Reference Centres	23

List of Tables

Tables	Page
5.1 Non-response, Invalid and Total Imputation Rates for Dwelling and Household Variables, Canada, Total, 1991 Census	11

I. Introduction

Every five years a census of population is carried out in Canada. The national Census of Population is a major project conducted by Statistics Canada to collect, verify and publish data. The national Census provides the most comprehensive database on the characteristics of Canadians, their families and their households. The information ranges from age and sex of individuals to their ethnic origin, education, occupation, labour force activity, industry, sources of income, their family and household characteristics. The census is an invaluable source of information that is useful to the various levels of government, to businesses, associations, educational institutions, interest groups, and to the general public. The data can be used in government planning of social and economic programs, assessment of the need for educational and health facilities, and planning by private enterprise.

Information is obtained through a series of questions established after detailed consultation and testing. It is collected by trained enumerators, checked for inconsistencies and errors and forwarded to Revenue Canada Taxation (RCT) regional centres for data entry. The final results are placed on a computer database at Statistics Canada. Data are analyzed, published and disseminated in various forms.

In a massive project such as the census, however, the results are never perfect. Although considerable effort has been made to maintain high standards of quality, errors inevitably occur at various stages of the collection and processing operations. Users must be aware of the nature and scope of any errors that the census data may contain, as well as the risks involved in basing conclusions or decisions on these data.

The **1991 Census Technical Reports** have been designed to inform data users of the potential problems or intricacies of the data. The reports inform users of the conceptual framework and definitions used in the data collection, any unusual circumstances which may influence the data, likely principal sources of error and, where possible, the size of the error.

This product is a specialized analytical tool. It complements and co-ordinates other reference products and assists the more sophisticated user to understand variable details and methodological information on coverage, sampling and weighting.

II. Concepts and Definitions

The definitions of census terms, variables and concepts are presented here as they appear in the *1991 Census Dictionary* (Catalogue No. 92-301E). Users should refer to the 1991 Census Dictionary for full definitions and additional remarks related to any concepts and definitions not found in this chapter.

Census Variables

While the 1991 Census consisted of fifty-three (53) questions, the *1991 Census Dictionary* (Catalogue No. 92-301E or D) lists well over 200 variables. Obviously, there is not a one-to-one correspondence between questions and variables. Several variables can be produced from one question only, while other variables are derived using responses from several questions.

By the same token, some census variables closely resemble information as it was gathered on the questionnaires while others are very different. For example, sex has two answer categories, male and female: the categories on the questionnaire correspond exactly to those on the database. Sex is therefore called a **direct** variable.

Derived variables have undergone transformations. For example "date of birth" was asked on the questionnaire but *age* is the database variable. Sometimes the link between collected information and the database variable is not so straightforward. For example, several questions are used to identify the *unemployed*, yet the word "*unemployed*" does not appear anywhere on the questionnaire, and its definition is not intuitively obvious.

Census variables are grouped into these categories:

- counts and demographic data;
- ethnic origin and immigration data;
- language;
- aboriginal status;
- schooling;
- religion;
- labour force;
- income;
- families;
- housing and households;
- institutions and other collectives;
- disability.

The potential for creating new census variables is virtually limitless. Some variables can be very conventional and **direct**, while other variables can be **derived** and tailored to user needs.

Universes

A "**universe**" in the census refers to what is counted in a tabulation. The possibilities are:

- population (i.e., persons);
- families;

- households;
- dwellings.

The **Population Universe** includes variables that provide information about individuals. It covers a wide variety of characteristics such as demographic, ethno-cultural, language, mobility, schooling, income and labour force. A complete list of these variables can be found in the Table of Contents of the *1991 Census Dictionary* (Catalogue No. 92-301E). Some variables within this universe are collected for the entire population of Canada; others are collected for a sample of the population only.

The primary objective of the Census is to provide accurate coverage of the entire population of Canada at various geographic levels. The 1991 Census provided counts for:

- all Canadian citizens and landed immigrants with a residence in Canada;
- Canadian citizens and landed immigrants who are abroad, either on a military base or attached to a diplomatic mission;
- Canadian citizens and landed immigrants at sea or in port aboard merchant vessels under Canadian registry;
- non-permanent residents (persons who hold student or employee authorizations, Minister's permits or who are refugee claimants).

"Families" are groups within a household. Within the *Family Universe* two general categories are identified: *census families* and *economic families*.

- A Census Family refers to a now-married couple (with or without never-married sons and/or daughters of either or both spouses), a couple living common-law (again with or without never-married sons and/or daughters of either or both partners), or a lone parent of any marital status, with at least one never-married son or daughter living in the same dwelling.
- An Economic Family refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. For example, a brother and a sister living together, or a mother and her separated daughter, would constitute an economic family, but not a census family.

The **Household Universe** is composed of subuniverses and variables which pertain to a person or a group of persons (other than temporary or foreign residents) who occupy a dwelling. Examples of household universes are private households, collective households, households outside Canada.

The **Dwelling Universe** is composed of subuniverses (collective and private) and variables pertaining to characteristics of dwellings in Canada. Dwellings are distinct from households. Dwelling characteristics refer to physical attributes of a set of living quarters, whereas household characteristics pertain to the person or group of persons (other than foreign and/or temporary residents) who occupy a dwelling.

Census Geography

Statistics Canada uses a very accurate and detailed geographic structure that makes it possible to obtain information for many different geographical units, known as geographic areas. Data from the 1991 Census is available for numerous standard geographic areas, as well as non-standard or user-defined areas.

Census Boundaries

In order to take a census for a country as large as Canada, smaller geographic boundaries must be established to facilitate enumeration. The basic boundaries are the provinces (PROV's), the federal electoral districts (FED's) and, finally, a smaller unit called the enumeration area (EA).

Standard Geographic Areas

Census data are disseminated for a number of standard geographic areas. These areas are of two (2) types: legislative/administrative and statistical.

- (a) Legislative/administrative areas are defined, with a few exceptions, by Canadian federal and provincial statutes. These include:

Geographic Area	Total Number
• Provinces and Territories;	12
• Federal Electoral Districts (FEDs);	295
• Census Divisions (CDs);	290
• Census Subdivisions (CSDs);	6,006
• Subprovincial Regions (SPRs).	68

- (b) Statistical areas are defined by Statistics Canada as part of the spatial frame used to collect and disseminate census data. These include:

Geographic Area	Total Number
• Agricultural Regions;	76
• Census Consolidated Subdivisions (CCSs);	2,630
• Census Metropolitan Areas (CMAs);	25
• Census Agglomerations (CAs);	115
• Primary Census Metropolitan Areas (PCMAS);	12
• Primary Census Agglomerations (PCAs);	21
• Census Tracts (CTs);	4,068
• Provincial Census Tracts (PCTs);	1,815
• Urban Areas (UAs)/Rural Areas;	893
• CMA/CA Parts;	N/A
• CMA/CA Components;	N/A
• Enumeration Areas (EAs).	45,995

Other geographic units of quasi-standard nature are **unincorporated place (UP)**, **township**, **range** and **meridian** and **postal code**.

User-defined Areas

Census data can also be produced for areas other than the standard geographic areas, that is for user-defined areas. These are of two (2) types: aggregation of standard geographic areas and custom **query areas**.

An in depth look at terms related to the geography of the 1991 Census are defined in the geography section of the **1991 Census Dictionary**. They describe, more extensively, concepts related to geographic areas and census cartography.

III. Data Collection and Coverage

Data Collection and Coverage (General)

For the 1991 Census, information was collected from more than 11 million dwellings both in Canada and abroad. The data collection process consists of the drop-off and retrieval of approximately 11,500,000 questionnaires. These questionnaires are then edited to ensure they have been properly completed by all Canadians across the country. This phase employed approximately forty thousand (40,000) people in a variety of tasks from mapping to post-censal activities.

1. Data Collection Methods

Two collection methods were used for the 1991 Census: **self-enumeration** and **canvasser enumeration**. In self-enumeration areas, a questionnaire (Form 2A or Form 2B) was dropped off at each household before Census Day (June 4th). A member of the household was to complete the questionnaire on Census Day. Questionnaires were mailed back in pre-addressed envelopes. In 1991, less than 2% of households were enumerated by canvassers: Census Representatives completed a long form questionnaire (Form 2D) for these households by interview. This method was used to enumerate each household in remote or northern areas and on Indian reserves where irregular mail service makes mail-back impractical. Some of the remote areas were enumerated as early as March 1991. Data was collected on every Canadian citizen, landed immigrant and non-permanent resident alive at midnight between June 3rd and June 4th 1991.

The two main types of accepted **enumeration approaches** used by census takers are the "**de jure**" approach and "**de facto**" approach. The "**de jure**" approach assigns the person to the dwelling in which he/she usually resides. The "**de facto**" approach assigns the person to the dwelling in which he/she is staying at the time of enumeration. In Canada the "**modified de jure**" approach is used. It allows a subsequent matching process to determine whether or not a person enumerated in one dwelling as temporary was also identified as a usual resident in his/her stated usual place of residence. This approach recognizes, and compensates for the potential failure of a straight "**de jure**" approach to enumerate persons away from their usual place of residence on census night.

In 1991, a number of initiatives were taken to improve coverage. These included:

- Using paid advertising to inform Canadians on when and how "to count themselves in";
- Creating an address register from other sources of information and using this list to check if any dwellings were missed;
- Establishing special procedures to count homeless people through soup kitchens;
- Establishing special procedures to count the population on Indian reserves;
- Respondent-friendly questionnaire;
- Public Communications Program and a multilingual Telephone Assistance Service;
- Edit and follow-up by CR for non-response and missing information;
- Quality checks of the CR's assigned by the CC and the Quality Control Technician.

The primary components, documents and geographical unit used for data collection and coverage are:

- **Visitation Record (VR) (Form 1)**

A document used by Census Representatives to list the household numbers and the number of persons per household including temporary residents in all enumeration areas. The VR lists every private and collective dwelling (occupied and unoccupied), as well as every agricultural holding in an enumeration area. The VR also provides control totals to help ensure that all dwellings and persons were enumerated.

- **Census of Population Questionnaires**

Seven questionnaires have been designed for the collection of data. The 1991 Census Questionnaires include:

Collective Dwelling Record	(Form 1A);
Short Questionnaire	(Form 2A);
Long Questionnaire	(Form 2B);
Overseas Population Form	(Form 2C);
Long Canvasser Questionnaire	(Form 2D);
Individual Census Questionnaire	(Form 3);
Soup Kitchen Questionnaire	(Form 3B).

- **Enumeration Area (EA)**

An EA is an area canvassed by a Census Representative. It is the smallest geographical unit for which census data are available. The number of dwellings vary from 375 (maximum) in large urban areas to 125 (minimum) in rural areas.

Please refer to the **Long Questionnaire (Form 2B)** for questions asked in the 1991 Census of Canada.

2. **Address Register (AR)**

In 1991, to help increase coverage, an Address Register (AR) was implemented in urban areas with populations of fifty thousand (50,000) and over. The Address Register is a list compiled by merging several administrative data files from a variety of sources. The Census Representative was to compare the addresses in the Visitation Record when the questionnaires were delivered with the addresses in the list taken from the Address Register. If an address appearing in the AR did not match any address in the Visitation Record, the Census Representative returned to the sector to locate the dwelling at the missed address. Conversely, any address entered by the Census Representative that was not in the AR was added to the AR after the census.

3. **Special Coverage Studies**

Since one hundred percent (100%) coverage is virtually impossible in such a large survey, a number of checks are performed on the collection of data. These studies measure the extent of coverage errors that occur when dwellings or individuals are missed, incorrectly included, or double-counted. Some examples of these checks are the **Vacancy Check**, **Temporary Residents Study**, **Reverse Record Check**, and the **Overcoverage Study**. These studies will be discussed in more detail in the following chapters on Data Assimilation (Chapter IV) and Data Evaluation (Chapter VI), and in the technical report on **Coverage** (Catalogue No. 92-341).

IV. Data Assimilation

Data assimilation is the processing phase during which data from the Census questionnaires are edited, coded and captured. The process includes the transformation of the questionnaire responses into machine-readable form. The four main components of data assimilation are:

- Regional Office Processing;
- Direct Data Entry;
- Head Office Processing;
- Automated Coding.

1. Regional Office Processing (ROP)

At this stage, ROP staff will ensure that information appearing on the questionnaires is suitable for key entry into the computer. This operation employs approximately 2,000 people, and is conducted in Revenue Canada - Taxation (RCT) regional processing centres in St. John's, Jonquière, Shawinigan, Sudbury, Winnipeg and Surrey. In Ottawa it is conducted in the Statistics Canada head office. For the 1991 Census, the operation took place during the period between July and November of 1991.

ROP operations consisted of the following:

(a) Receipt and document preparation

When completed questionnaires reached the Regional Processing Centres, they were logged, counted and prepared for key entry. Preparation included consistency checks between the questionnaires and the Visitation Record - making sure, for example, that the number of household members on both documents matched. Legibility checks ensured that the documents were suitable for computer entry. Finally, all written answers on household relationships (Question 2) were converted to numerical codes.

(b) Reverse Record Check

A sample of persons was selected from the 1986 Census records and external sources, and 1991 documents were searched for these same persons. If a person was found, 1991 characteristics were noted and sent to head office. For those not found, further tracing determined if they had been enumerated elsewhere in Canada or missed altogether. The results of these searches are coded and captured and the file is turned over to the Social Survey Methods Division for weighting and production of undercoverage estimates.

(c) Economic Coding

Written responses for some labour market questions on the long census forms were converted into numeric codes suitable for direct data entry. Three tasks were involved:

- editing to determine if the respondent had worked at any time during the period of January 1, 1990 to June 4, 1991;
- converting the industry, occupation and place of work to numeric codes;
- editing the class of worker question.

Supervisors and coding consultants resolved any discrepancies in coding before the questionnaires for an enumeration area (EA) proceeded to the next stage. Sometimes other sources, city directories and subject-matter personnel for example, were consulted.

(d) Processing

Questionnaires were transferred in work units for direct data entry at Revenue Canada - Taxation regional processing centres: from there, after keying, they were sent to Statistics Canada in Ottawa.

2. Direct Data Entry (DDE)

The data entry activity was completed on behalf of Statistics Canada by Revenue Canada - Taxation (RCT). Questionnaire data was key entered at seven (7) RCT regional centres, transmitted to RCT Headquarters in Ottawa and stored on tape cartridges. This operation employed approximately 1,500 people sworn to secrecy under the *Statistics Act*.

3. Head Office Processing (HOP)

Head Office Processing is a combination of automated and manual processing designed to carry out structural edits on the census data and to process special enumeration returns. Included are returns for Canadians overseas, temporary residents and merchant and navy ships personnel. HOP also processes coverage study returns such as **Reverse Record Check (RRC)**, **Vacancy Check (VC)**, and **Overcoverage Study (OC)**. In addition, HOP is responsible for the preliminary and final population and dwelling counts and for the microfilming of census questionnaires for archival purposes. This operation employs approximately 150 people and is conducted in the Statistics Canada head office in Ottawa.

Head Office Processing consisted of four (4) major activities performed in three (3) phases:

- **DA I - Receipt, Registration and Storage**
Visitation Records and questionnaires for each enumeration area were received, registered and stored at the head office. Tapes containing respondent data were copied and loaded onto the HOP database.
- **DA II - Data Analysis**
Automated structural edits were carried out at the enumeration area, household and person levels, and inconsistencies, such as person count conflicts and household number conflicts were resolved manually.
- **DA III - Special Processing**
Special enumeration returns from Canadians living outside Canada, temporary residents and persons aboard merchant, naval and coast-guard vessels were adjusted to include them. In addition, coverage study returns for checking vacant dwellings, under- and overcoverage were processed, and adjustments were done to the data based on the results of the vacancy check.
- **DA I and/or DA II**
HOP was also responsible for the preliminary and final population and dwelling counts and for the microfilming of census questionnaires for archival purposes.

4. Automated Coding (AC)

The automated coding operation converted written responses to questions on mother tongue, home language, knowledge of other languages, registered Indian status, place of birth, ethnic origin, major field of study, religion and place of residence 1 year ago and 5 years ago to numeric codes.

The responses were matched against an automated reference file/classification structure containing a series of words or phrases to obtain corresponding numeric codes. An analysis was conducted for each variable to ensure data quality objectives were maintained prior to transferring the records to edit and imputation.

V. Edit and Imputation

In the edit and imputation phase, all remaining errors, discrepancies, inconsistencies and missing answers are identified and corrected (including imputation) by a fully automated series of computer programs. The final set of usable "clean" data (free of invalid, inconsistent and missing responses) is produced, comprising a unique database which provides Canada's most detailed information about the population and its characteristics, ranging from the national to the neighbourhood level.

Errors found at this stage can be the result of respondents answering the questions incorrectly or incompletely, or they can be due to errors generated during coding activities and data capture. After errors are detected, values for missing or incomplete entries are imputed. Imputation, which is the correction of the errors, is done using either a "deterministic" or a "hot deck" method. For deterministic imputation, errors are corrected by inferring the appropriate value from answers to other questions. The "hot deck" approach selects a record that has a number of characteristics in common with the record in error, and imputes the missing information from this "donor" record.

Two (2) automated systems are used for editing and imputing census data:

- **CANEDIT**
This system is used to correct the 100% demographic data for age, sex, relationship and marital status, and the labour data from the 20% sample (Form 2B).
- **SPIDER (System for Processing Instructions from Directly Entered Requirements)**
The SPIDER system was developed for the 1981 Census to handle the more complex coded variables and absolute values such as income. Most of the questions asked of 20% of the population are processed using SPIDER.

1. The Edit and Imputation Strategy for the Dwelling and Household Variables

Both SPIDER and CANEDIT software were employed in the edit and imputation of dwelling and household data. The variables processed through CANEDIT included: structural type of dwelling, number of rooms, number of bedrooms, period of construction, and condition of dwelling. Variables processed through SPIDER were: tenure, household maintainer, number of household maintainers, gross rent and owner's major payments (and their components, as explained below), condominium status, and value of dwelling.

The edits for household and dwelling variables identified non-responses (where there should have been a response), and invalid responses (such as out of range values, or data that conflict with other data). Both non-responses and invalid responses, once identified, were subject to imputation.

For the imputation of household and dwelling variables, a set of matching conditions was specified for the selection of suitable "donor" records. Generally, households or dwellings having similar characteristics (such as the same structural type of dwelling, number of rooms/bedrooms, tenure) and in the same geographic area were selected for imputation purposes. The justification for this geographic selection criterion was that dwellings in the local areas were likely to have similar characteristics. Analysis of results confirmed this.

2. Changes to Edit and Imputation in 1991

In the 1991 Census, for the first time, the edit and imputation of the tenure and household maintainer variables was entirely carried out using the SPIDER system. This represented a change from previous censuses, when they had been processed using the CANEDIT system. Those variables which remained with the CANEDIT system saw almost no change in processing strategy from the 1986 Census.

The conversion to the SPIDER system coincided with fairly major changes to the tenure question. In 1991, the tenure question contained, for the first time ever, a separate category for band housing. This category appeared only on the 2D questionnaire, which was used to enumerate Indian reserves and settlements.

In addition to this change to the categories, it was also decided to implement a cross edit of the tenure question. The question on tenure, which was asked of all households, was cross edited with the shelter cost questions, which were asked of a one-fifth sample of households. The reason for this was so that in cases where tenure was blank or invalid and shelter cost data were available, the "correct" value could be imputed for tenure, and the shelter cost data would not be lost. This represents an improvement over the previous system, wherein shelter cost data were lost when an incompatible tenure value had been imputed. These two changes are felt to have improved the quality of data for the tenure variable.

The move to the SPIDER processing system also coincided with major changes to the household maintainer question. For the first time, the census questionnaire was designed to accept more than one response to the question on the person responsible for household payments. In 1991, up to six names were accepted. This necessitated major revisions in the approach to editing and imputing the household maintainer question. After the resulting data were analyzed and certified, there was confidence that the question and the processing had proven fully satisfactory.

For the shelter cost variables, there was little change in the processing, other than adding condominium fees to owner's major payments, and updating upper limits and default values. As in previous censuses, the component variables (annual payments for electricity, fuel, and services, monthly rent for renters, and monthly mortgage payments, property taxes, and condominium fees for owners) were processed individually, then combined into the two variables used for output and analysis, owner's major payments and gross rent.

This approach of aggregating shelter cost data had been used in past censuses, and was felt to yield reliable data. Processing the components (individually yet simultaneously) before aggregation allows the identification and resolution of conflicts among those components.

In addition, it had been observed in previous censuses that respondents tended to underestimate certain components and overestimate others, producing poor estimates at the component level. Aggregating the components cancels these two biases to yield reliable estimates at the aggregate level. For these reasons, shelter cost data were certified and published only at the aggregate level, although all edit and imputation actions were performed at the component level, and the processes were monitored to ensure that the reliability of the component data was as high as possible. The resulting aggregate data were therefore of high quality.

3. Non-response and Invalid Rates

An evaluation of the impact of edit and imputation on household and dwelling data was undertaken at the end of the process. Table 5.1 summarizes the extent of imputation on the household and dwelling data in the 1991 Census. Note that the rates are for direct household and dwelling variables only. No rates are shown for the gross rent and owners' major payments variables, since these composite variables do not lend themselves to such analysis. Counts for the dwelling and household universes and sub-universes are not shown either, since these were not subject to imputation.

As it can be seen in most cases, only a small percentage of household/dwelling data were changed as a result of the edit and imputation process. Overall, these rates compare favourably to previous censuses and to surveys. The non-response rates are somewhat higher than in previous censuses, but this is felt to be due to a repositioning of the housing-related questions to the end of the questionnaire, rather than at the beginning, where they had been located in previous censuses.

Table 5.1 Non-response, Invalid and Total Imputation Rates for Dwelling and Household Variables, Canada, Total, 1991 Census

Variable	Non-response rate (%)	Invalid rate (%)	Total imputation rate (%)
Structural type of dwelling	1.96	0.0	1.96
Tenure	1.88	0.19	2.07
Household maintainer	2.22	N/A	2.22
Number of rooms	1.2	0.1	1.3
Number of bedrooms	1.3	0.6	1.9
Period of construction	3.5	0.0	3.5
Condition of dwelling	1.8	0.0	1.8
Condominium status	6.9	0.1	7.0
Value of dwelling	10.5	1.7	12.2

4. Weighting

One in every five households or 20% of the population receives a more detailed long questionnaire (Form 2B) and is asked additional socio-economic questions. A weighting algorithm is developed so that these data can be used to estimate response from 100% of the population. The procedure to weight sample data in 1991 has been revised from the 1986 and is known as the "Generalized Least Squares Estimation Procedure (GLSEP)". The GLSEP begins with initial weights of approximately 5 and then, using basic census information known for every person, i.e., age, sex and marital status, adjusts them to obtain the desired agreement between the sample estimates and the population counts. Once data are finalized and weights are calculated, final data are transferred to the Canada Retrieval Databases; these database are used to produce the published and custom products.

VI. Data Evaluation

Throughout the census-taking process, care was taken to ensure high-quality results. Rigorous quality standards were set for data collection and processing, and the Public Communications Program assisted in minimizing non-response. A Data Quality Measurement Program was established to provide users with information on the quality and limitations of census data.

Although considerable effort is made throughout the entire process to ensure high standards of data quality, resulting data are subject to a certain degree of inaccuracy. To assess the usefulness of census data for their purposes and to understand the risk involved in drawing conclusions or making decisions on these data, users should be aware of their inaccuracies and appreciate their origin and composition.

Error can arise at virtually any stage of the census process from preparation of materials to data collection and through the various processing stages. Some errors occur at random and tend to cancel each other out when individual responses are aggregated for a large group. For errors of this nature, the larger the group the more accurate the corresponding estimate and therefore it is important to be cautious when dealing with estimates derived using small aggregated groups of responses. On the other hand, some errors occur more systematically and errors are more serious to data users than random errors.

For census data in general, the principal types of errors are as follows:

- **Coverage Errors**
Occur when individuals and/or dwellings are missed, incorrectly included, or double counted;
- **Non Response Errors**
Occur when responses are not available from some households and/or individuals due to extended absence or for other related reasons;
- **Response Errors**
Occur when respondents, or in some instances Census Representatives, misinterpret a census question and record an incorrect response;
- **Processing Errors**
Can occur during **coding**, when write-in responses are transformed into numerical codes by clerks, **data capture**, when responses are transferred from questionnaires to computer tapes by key entry operators, and **imputation**, when a valid, but not necessarily correct, response is inserted by the computer into a record to replace missing or invalid data;
- **Sampling Errors**
Only apply to supplementary questions on the long (2B) questionnaire, asked of only a twenty percent (20%) sample of households, arise due to the fact that they are weighted to represent the whole population and inevitably differ somewhat from results that would have been obtained had the questions been asked of the total population.

All of the above errors have both random and systematic components. Usually the systematic component of sampling errors is very small in relation to its random component. For other non sampling errors both random and systematic components may be significant.

Four (4) studies are undertaken to measure coverage errors:

- Vacancy Check
- Temporary Residents Study
- Reverse Record Check
- Overcoverage Study

Two (2) studies are conducted to evaluate response errors:

- Reverse Record Check Content Study
- Overcoverage Content Study

Four (4) studies are undertaken to evaluate the effect of sampling errors on the sample data:

- Sampling Bias Study
- Weighting Evaluation
- 2A/2B Consistency Study
- Sampling Variance Study

Two (2) further studies are done to evaluate the data:

- Edit Sample Study
- Clustered Non-response Study

Besides these studies, before the data are approved for dissemination, the certification task is performed to detect any anomalies not identified during the other stages. This process involves analysing the evolution of trends for the variable to be published.

On some Indian reserves and settlements, (total of 78), enumeration was not permitted, was interrupted before completion or the quality of collected data was considered to be inaccurate. These areas are called **Incompletely Enumerated Indian Reserves and Indian Settlements**. Under these circumstances, data are not available for these areas, not included in tabulations, and are noted accordingly where applicable. Caution should be exercised when analyzing data from areas affected by incomplete enumeration especially in small areas where the impact is the greatest.

The inclusion of **non-permanent residents** in the 1991 census will affect the variables that were collected on a one hundred percent (100%) basis such as age, sex, mother tongue, and marital status. Census data on immigration will have to be examined carefully to determine the extent of the variations caused by enumerating non-permanent residents.

For additional information on non-permanent residents, please refer to Chapter III on Collection and Coverage.

Evaluation of Household and Dwelling Data

An evaluation of the quality of household and dwelling data was undertaken upon completion of the edit and imputation operation. A complete certification process was carried out for each of the following in the 1991 Census:

- number of and population in private households;
- number of and population in collective dwellings;
- number of and population in households outside Canada;
- occupied dwellings;
- unoccupied dwellings;
- dwellings occupied solely by temporary or foreign residents;
- type of collective dwelling;
- structural type of private dwelling;

- type of private household;
- number of persons per private household;
- tenure of private household;
- primary household maintainer;
- number of maintainers per private household;
- number of rooms per occupied private dwelling;
- number of bedrooms per occupied private dwelling;
- period of construction of occupied private dwelling;
- need for repair of occupied private dwelling;
- value of owner-occupied private dwelling;
- condominium status of owner-occupied private dwelling;
- owner's major payments;
- gross rent.

A consistent approach was used in all cases, with certification being conducted, where possible, in the following steps:

1. Historical Analysis

The objective of comparing the 1991 data with those from previous census(es) was to identify significant intercensal changes, and to determine whether the magnitude of change was reasonable in light of known socio-economic and demographic trends between 1986 and 1991.

2. Internal Consistency Checks

Internal consistency checks were performed to ensure that illogical combinations of response did not persist which would have compromised the usefulness of the data. An example of such a check would be to verify that renters have not entered a response for monthly mortgage payment.

3. Checks for Consistency With External Sources

Checks for consistency with data from other sources were used to evaluate the quality of household and dwelling data from the 1991 Census. In essence, this comparison was done to ensure that the 1991 Census data by and large conform to the data from other sources for roughly the same reference period of measurement. Differences between the census and other sources in coverage, sampling and weighting methodology were taken into account in the evaluation.

Data from the 1991 Household Facilities and Equipment Survey were compared with the 1991 Census data for most dwelling variables, while data from the 1990 Family Expenditure Survey were used for the evaluation of shelter cost data from the census. Data for the variable "value of dwelling" were compared with data obtained from the Canadian Real Estate Association for major metropolitan areas. Data from other Statistics Canada surveys served as sources for comparison in the evaluation of collective dwellings.

4. Pre- and Post-imputation Comparison

Response patterns and distributions were compared before and after imputation to ensure that the imputation process did not introduce any bias in the data. Where response patterns were identical within narrow limits, the imputation process were deemed to have preserved the distribution.

5. Geographical Analysis

Finally, the geographical distributions for the variables were checked to see if they conformed to expectations. Through familiarity with regional differences and with the housing situations of Canada's large cities, it was possible to determine whether some element of error was embedded in the data.

Anomalies Detected in 1991 Census Household and Dwelling Data

A small number of data anomalies pertaining to dwelling sub-universes and household or dwelling variables in the 1991 Census were identified in the course of data evaluation. Five of these warranted cautionary notes to data users. These are noted below:

1. Unoccupied Private Dwellings

According to the results of the Vacancy Check, the count of unoccupied private dwellings represented an over-reporting of about 134,700 dwellings. This amounts to about 19% of the national count of total unoccupied dwellings. "Unsuitable" dwellings (dwellings which were under construction or not suitable for year-round occupancy at the time of the census but which were not identified as such during enumeration) accounted for most of the over-reporting. The rate of over-reporting was higher in rural areas than in urban areas.

2. Collective Dwelling Type

For various reasons such as differences in universe and data collection methodology, the counts of "institutions for the handicapped" and of "psychiatric institutions" in the 1991 Census do not correspond to those published in **Residential Care Facilities** (Catalogue No. 82-003S). The subtleties involved in classifying collective dwellings are felt to be responsible.

3. Usual Residents of Collective Dwellings

The following data anomalies were identified:

- 26.8% of institutional residents (IRs) in "children's group homes (orphanages)" were aged 20 years and over;
- 8.9% of IRs in "young offenders' facilities" were 20 years or older;
- 2.9% of IRs in "correctional and penal institutions" were under 20 years.

These anomalies are likely due to the problem of classifying institutions that have more than one use into one single category.

Similarly, the expanded classification of special care homes into chronic care hospitals, nursing homes, and residences for senior citizens may have resulted in:

- 1.9% of the IRs in "nursing homes" were under 45 years;
- 1.3% of IRs in "residences for senior citizens" were under 45 years.

4. Number of Rooms per Private Dwelling

The counts for dwellings having one room or two rooms may be too low, due to the editing procedure used in processing the 1991 data. It is estimated that at the national level, the counts for one-room and two-room dwellings may be too low by 20% and 30% respectively. These dwellings would have been incorrectly classified as having three

rooms or more. Because the misclassification represents less than 0.9% of the total number of dwellings in Canada, the counts for other categories of "number of rooms" are considered accurate. Users can increase the reliability of their analyses by combining one-, two-, and three-room dwellings into a single category (i.e., dwellings having one to three rooms).

5. Structural Type of Dwelling

Movable dwellings, one category of structural type of dwellings, were suspected to be under-reported in the 1991 Census. This is thought to be due to the misclassification of a number of mobile homes as other structural types. For large geographic areas, this error is not expected to have a significant impact upon other dwelling categories because of the relatively large number of dwellings in that area. However, for small geographic areas, the impact may be more pronounced. This problem is significant in the Northwest Territories where the count for mobile homes decreased by 64% between 1986 and 1991. Users should be aware that the causes for intercensal variations in different provinces/ territories are unrelated.

VII. Historical Comparability

To fully utilize census data we must not only analyze the historical trends of the data we are presenting, but the historical changes in what information is desired and how it is collected. In the past, the Census of Canada has undergone continuing change to meet Canadians ever changing needs for timely and accurate information on Canada's statistical profile. This versatile perspective has endured in 1991.

The census questionnaire was completely redesigned for the 1991 Census. The following changes were made since the 1986 Census:

- Twelve (12) questions not asked during the 1986 Census appear on the 1991 Census Questionnaire;
- Of the twelve (12) questions, seven (7) appeared for the first time and five (5) were reinstated from previous censuses;
- Four (4) questions found on the 1986 Census Questionnaire were excluded from the 1991 Questionnaire;
- Two (2) new Census Questionnaires were added in 1991 (Form 2D - Canvasser Questionnaire and Form 3B - Soup Kitchen Questionnaire).

Form 2D was introduced to enumerate remote northern areas and Indian reserves. It contained the same questions as the Form 2B but was set up to be administered in a person to person environment. Form 3B, an experimental pilot questionnaire, consisted of eleven (11) questions. Interviews were conducted on a person to person basis in a sample of soup kitchens in major Canadian cities. This special enumeration procedure resulted in better coverage in major cities.

For the 1991 Census, Statistics Canada implemented a Canada wide Address Register to improve coverage in urban centres with population of fifty thousand (50,000) and over. It is estimated that the coverage increased by over sixty-eight thousand (68,000) people. Please refer to Chapter III on Collection and Coverage for additional information on the Address Register.

For the first time since 1941, both **permanent and non-permanent residents** of Canada were enumerated. A growing segment of Canada's population, non-permanent residents can create a demand for government services such as schooling, language training, health care, and employment programs. Users should be careful when comparing data from 1991 and previous censuses.

Publicity and advertising of the 1991 Census was viewed in a slightly different light. The Sponsorship Program continued to enlist the voluntary support of corporations, associations and government as in 1986 and previous censuses but to compliment this program Statistics Canada implemented a paid publicity campaign aimed at increasing public awareness of the importance of census data and to encourage Canadians to respond accurately to their census questionnaire in a timely fashion. For the 1991 Census, teachers' kits have been introduced to help promote a greater awareness of the availability and uses of census data produced by Statistics Canada.

Historical Comparability of Household and Dwelling Data

For the most part, the dwelling/household variables in the 1991 Census remained the same as in previous censuses. However, the following changes may affect the historical comparability of data.

Tenure

For historical and statutory reasons, shelter occupancy on reserves does not lend itself to the usual classification by standard tenure categories. Therefore, a special category, **band housing**, has been created for 1991 Census products. The response categories for this variable in 1991 comprise: owned; rented; band housing.

In 1986, dwellings on Indian reserves were all classified in the "on reserve" category.

In some publications or through special tabulations, it is possible to obtain comparable data for 1986 and 1991, by grouping together the data referring to Indian reserves or Indian settlements.

In 1961, 1966, 1971, 1976 and 1981, dwellings on Indian reserves were classified as being "owned" or "rented."

Household Maintainer(s)

A major conceptual modification was introduced in this variable for the 1991 Census: for the first time, respondents in private households were able to identify more than one person as responsible for the shelter expenses. The maximum allowable number was six.

In the 1981 and 1986 Censuses, only one person could be counted as the household maintainer. Comparisons with the 1991 Census can be made using the **primary household maintainer** variable.

Number of Household Maintainers

Since respondents are able to identify more than one person as responsible for the shelter expenses, private households can now be classified by the number of household maintainers. In previous censuses, each private household had one household maintainer only.

Owner's Major Payments

The 1991 data for this derived variable include an additional component of shelter cost, "condominium fees." Data for condominium fees were not collected in the 1981 and 1986 Censuses.

VIII. Products and Services

Consultation on user needs

Greater emphasis was placed on user consultation for the 1991 Census products and services. Over the course of two years, over 3,000 organizations from private and public sectors were approached to solicit their comments for the proposed product and service line.

The primary objective of the project was to consult with current and potential census data users to evaluate the proposed 1991 product and service line. Client feedback obtained in this way was used to assist census personnel in assessing and determining product features, content, prices, etc.

Consultations varied considerably in format and in terms of numbers and client sectors consulted. For example, some smaller consultations, restricted to Regional Reference Centres and Provincial Focal Points tended to be preliminary investigations of newly-developed product types. At the other end of the scale, the Dimensions Series was the subject of a mail survey to 2,500 users and potential users, as well as cross-country focus group discussions. Another mail survey to more than 200 libraries yielded an 80% response rate and provided valuable insights into concerns librarians had with regard to census products. Most other products were presented for consultation to several dozen users from a variety of sectors, either by means of face-to-face interviews or mail-back questionnaires. In many cases, the Regional Reference Centre staff was heavily involved in the organizing of the consultations, conducting the interviews and providing their own feedback.

Between November 1 and November 15, 1990, eight (8) Focus Groups on Census Data Support Information were surveyed for their comments and recommendations regarding the **1991 Census Technical Report Series**. Suggested fundamental changes and improvements to the product helped meet the needs of current and potential users.

Product content determination

While users overwhelmingly endorsed most products and services presented to them, they also provided valuable critiques. Many of the suggestions confirmed the need for changes already planned. In some cases, this feedback provided evidence that there was less demand for a product and therefore no need for its production. Findings from the Task Force on the Census Custom Products Service resulted in a complete restructuring of service to provide better and more timely service. Consultation on the place of work variable was carried out to determine the interest in and level of funding available for coding to the submunicipal level.

Consultation proved to be an essential exercise in developing the shape and content of the census product and service line, and determining market potential and pricing. Furthermore, the public relations aspect cannot be underestimated: consultation enabled members of the public to preview census output and provided assurance that their input makes a difference.

Marketing of products and services

The 1991 Census Marketing Program ensures that potential data users receive the information they need on census products and services in order to make informed decision. It seeks to reach those individuals or enterprises that rely on census data to inform them of the products and services available from the census database and their potential uses and applications. The national headquarters in Ottawa and the regional reference centres across the country work in partnership to ensure that the largest number of people possible are aware of what the census database has to offer.

The Census Marketing Program assumes these tasks by:

- planning and co-ordinating census data releases and publication releases;
- developing a client-oriented approach to the promotion of the census database;
- maintaining relations with sponsors who provided support prior to June 4, 1991;
- sustaining relations with purchasers of 1986 Census data and of similar Statistics Canada products and services;
- providing sales support and training workshops to present users and potential new users of census data;
- integrating the products and services generated by the census with many other products and services available from Statistics Canada.

For each data release, the Census Marketing Program, ensures that the information relative to the release is available to the general public through many outlets, especially the media. Communications with other government departments is achieved through letters to deputy ministers indicating release highlights as well as through briefing sessions and special lecture presentations. In addition, *The Daily* is sent to every Member of Parliament and Senator informing each of the results of every data release. For the first time, in conjunction with census data releases, classroom activities will be made available to teachers across the country. This will promote awareness of the availability and uses of census data and other products and services provided by Statistics Canada. Ten official data releases are scheduled for the period of April 1992 to April 1993.

For 1986 and 1991, the main publications (from The Nation series) concerning dwellings and households are the following:

1986

Dwellings and Households: Part 1 (100% data); Catalogue No. 93-104.

Dwellings and Households: Part 2 (sample data); Catalogue No. 93-105.

1991

Dwellings and Households (100% data); Catalogue No. 93-311.

Occupied Private Dwellings (sample data); Catalogue No. 93-314.

Housing Costs and Other Characteristics of Canadian Households (sample data), Catalogue No. 93-330.

IX. Conclusion

This report examined the quality of the 1991 Census data on dwellings and households. The various aspects that were examined included the concepts and definitions, data collection and assimilation, edit and imputation, data evaluation and historical comparability.

The analysis has shown that, given the low non-response rates, the 1991 data on dwellings and households were not altered by data processing. Nevertheless, some data anomalies were identified. The cause of some of these anomalies may be attributed to difficulties encountered during enumeration. As a result, the counts for unoccupied private dwellings, the classification of certain types of collective dwellings, and the classification of structural type of dwelling, particularly movable dwellings, were affected.

Special notes on the data quality of the affected counts appear in the data products.

Regional Reference Centres

Statistics Canada's regional reference centres provide a full range of census products and services. Each reference centre is equipped with a library and a sales counter where users can consult or purchase publications, microcomputer diskettes, microfiche, maps and more.

The staff of the regional reference centres provides consultative and research services in addition to providing after-sales service and support, including seminars and workshops on the use of Statistics Canada information.

Each centre has facilities to retrieve information from Statistics Canada's computerized data retrieval systems CANSIM and E-STAT. A telephone inquiry service is also available with toll-free numbers for regional users outside local calling areas. Call, write, fax or visit the nearest regional reference centre for more information.

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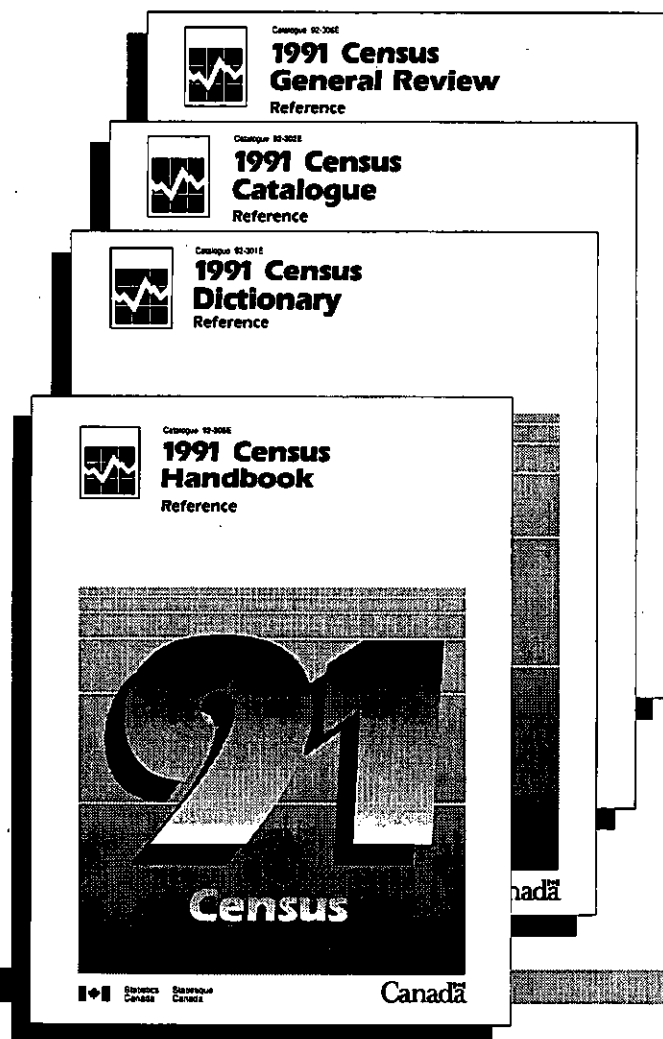


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