

## **Future developments on the Canadian Census of Population**

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### **Abstract**

The Census of Population Program in Canada has seen the introduction of several innovative approaches over time. The most recent censuses were no exception with the introduction of new methodologies and technologies. More than 54% of households completed their 2011 census form online, making Canada a world leader in internet collection. Canada, like many countries around the world, faces a number of challenges in preparing for its next census in 2016. Statistics Canada will need to continue to innovate as it faces fiscal pressures and as concerns around privacy and response burden continue to rise. This paper will first describe key successful activities of the 2011 Census and discuss areas of enhancements that are being considered for the methodology of the 2016 Census and beyond.

Key words – Census of population, internet data collection, collection wave methodology, innovation

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### **1. Introduction**

The Census of Population collects demographic (i.e. sex, age, marital status, relationship to Person 1) and linguistic (i.e. mother tongue, home language, official languages spoken) information on every person living in Canada. It is the main source of data on Canada's population at the small area level. The Census of Population is taken to meet statutory requirements. Indeed, census data are required by all levels of governments to direct the affairs of the nation. Each person counted in the census affects the distribution of annual transfer payments from the federal government to the provinces and the territories. In turn, provinces and territories make grants to local and municipal governments based on census counts. Several pieces of legislation (e.g. the Electoral Boundaries Readjustment act, the Official Languages Act, the Canada Health Act, the Canada Pension Plan, the Old Age Assistance act and the War Veterans Allowance Act) prescribes procedures which refer to or require Census data.

The Canadian Census is conducted every five years across the country since 1956. Prior to 1951, it was conducted every 10 years. In 1971, with the exception of Indian reserves and remote areas, self-enumeration was first introduced where census representatives were dropping off questionnaires at every private dwelling and collecting them back soon after. Starting in 1991, all respondents in self-enumeration areas (over 98% of the population) were asked to return their completed census forms by mail. In the 2006 Census, forms were delivered by Canada Post to about 70% of households. The remaining 30% received the form from a census representative as in previous censuses. In the 2011 Census, 54% of Canadian households completed their census form on-line making Canada a world leader in the area.

Continuous improvement to the way Canada takes a census is built into how the Census operates from one cycle to another. Prior to each census, a strategic planning conference takes place to reposition it by questioning the fundamentals and by critically assessing its rationale, role, value, efficiency and effectiveness of data products and impact against available options, changing needs and expectations in a changing environment, and progress in technology.

This paper will review the main elements that led to the successful implementation of the 2011 Census of Population and the lessons learned from it. It will then discuss the overall plans for the 2016 census.

## 2. Key Activities of the 2011 Census

### Address register

The Statistics Canada Address Register was first developed for the 1991 Census of Population. Prior to the 2006 Census, it was used as a post-drop-off coverage improvement tool. In the 2006 Census, it was used, for the first time, to create the list for the mail-out of questionnaires in mail-out areas. To ensure a complete and accurate list of addresses prior to mailing, a 100% field verification operation referred to as the Block Canvass was conducted six months before the 2006 Census. For the 2011 Census, the mail-out area was expanded to cover 79% of dwellings, but instead of conducting a full Block Canvass operation, administrative data sources were used to identify new dwellings and these were geo-coded to Census Blocks. Areas of concentrated growth were then targeted for field listing in order to limit under and over-coverage. Approximately 50% of dwellings in the mail-out area underwent targeted listing in the field over a two-year period before Census Day. Administrative sources included telephone companies billing files, commercial telephone file, personal income tax record files, and Canada Mortgage and Housing Corporation files among others.

### Collection

The 2011 Census collection methodology varied by geographic area. The delivery of census questionnaires to all dwellings in Canada was achieved through one of the following delivery modes:

- Mail-out (used for 79% of all dwellings)
- List/Leave – areas where mail-out is not feasible (19% of all dwellings)
- Other approaches (2% of all dwellings).
  - Canvasser
  - Indian Reserves
  - Early Enumeration

Canadian residents living in mail-out and list/leave areas could complete their census questionnaire using one of the four response channels:

- Mail-back – paper questionnaires were completed and returned in an enclosed mail-back envelope directly to the centralised Data Operations Centre.
- Internet – respondents used a secure access code to complete the questionnaire online.
- Direct response through the Census Help Line (CHL) – respondents called the CHL and requested to complete the Census through interview on the telephone. CHL operators completed paper questionnaires on behalf of the callers provided that the location of the respondents' dwellings could be identified on the census Master Control System.
- Field completed during Non-Response Follow-Up (NRFU) – after a certain date, enumerators contacted dwellings that had not yet responded to complete a questionnaire through personal or telephone interview.

### Census Collection Wave Methodology

The wave methodology involved a sequence of introductory letters, reminder letters and questionnaires delivered by mail to encourage self-response by Internet or paper and ended with the field Non-Response Follow-Up where telephone or face-to-face interviews conducted by enumerators.

### Mail-out areas (79% of all dwellings)

Wave 1 commenced on May 3, 2011. Approximately 60% of all dwellings were mailed an introductory letter only to encourage them to respond by internet (called Group 1), and 19% of all dwellings were mailed a questionnaire package (called Group 2). The questionnaire package contained an English and a French census questionnaires as well as an envelope to use for mailing back the completed form. This questionnaire also contained the necessary information to be completed online if it was the respondent's preference. Wave 2 started on Census Day, May 10 when a reminder letter was mailed to all dwellings that had not yet responded. Wave 3 started 8 days after Census Day, May 18 where questionnaire packages were mailed to all non-responding dwellings that had received the Wave 1 letter (Group 1). Non-responding dwellings that received a Wave 1 questionnaire package (Group 2) received a Voice Broadcast reminder message via telephone if we had the telephone number. Finally, Wave 4 was field Non-response Follow-up and started June 1, 2011.

### List/Leave areas (19% of all dwellings)

Wave 1 commenced on May 3, 2011 when enumerators started to drop-off a questionnaire package at each dwelling in their area of responsibility. At the same time, they listed the dwelling in a visitation record book. Wave 2 took place on Census Day, May 10 when a reminder card was dropped off by Canada Post at all dwellings in list/leave areas. There was no Wave 3 in list/leave areas. Finally, Wave 4 started on May 20 since there was no Wave 3.

For the remaining 2% of areas (Canvasser, Indian Reserves and early enumeration areas), the collection consisted exclusively of face-to-face interviews conducted at the respondents' door.

### Dwelling Occupancy Verification

The Dwelling Occupancy Verification (DOV) was a new operation in the 2011 Census which consisted of determining the occupancy status of strategically selected dwellings in mail-out area as close to Census Day as possible. The main objective of DOV, which covered approximately 75% of the mail-out area, was to increase the accuracy of the dwelling occupancy status to mainly reduce the workload of enumerators for Wave 4 in terms of non-occupied dwellings and focus on interviewing non-respondents. The operation started on May 13 and lasted until the start of Wave 4. Each DOV enumerator was provided with an assignment of dwellings to be classified as occupied, unoccupied or cancelled (when not a dwelling) by enquiring with an occupant or other knowledgeable person or by visual inspection. In total about 18% of all dwellings (close to 2 million dwellings) were in scope for DOV.

### Field Management System

The Field Management System (FMS) was one of the most important innovations introduced for the 2011 Census. It was developed mainly to improve the flow of information between the field staff and Head Office and to support field collection work. The FMS is a web based application that all field personnel (approximately 30,000 temporary staff) accessed using their own personal computer and an Internet connection. It allowed field staff to have access to lists of dwellings requiring non-response follow-up, notification lists of received questionnaires at the Data Operation Center, services requests, management information reports, and timely instructions and messages from management. Field staff also used it to indicate daily what work was performed, and to enter their pay and expense claims.

## Data processing

All completed census questionnaires were returned to a centralized Data Operations Centre (DOC) for initial processing. The DOC supported all of the processing requirements as well as the Census Help Line (CHL). The processing activities and CHL were collocated for the first time to efficiently share staff between different operations. The peak period for CHL was in May while most processing operations peaked in June and July. DOC operations used two work shifts a day including 600 temporary staff per shift. The processing activities included: registration and imaging of paper questionnaires, capture from images using intelligent character recognition technologies, automated and manual coding of write-in answers and editing. The CHL answered over 1 million calls during collection.

### **3. Plans for the 2016 Census**

As mentioned earlier, continuous improvement in the way Canada takes a census is a key driver from one census cycle to the next. The basic approach for defining the main elements of the next Census starts with leveraging on the processes and technological advancements that were successfully implemented in previous censuses while addressing the challenges that were encountered. Following the strategic planning conference held after the 2011 Census, five high level drivers have been identified for the 2016 Census: (i) improve cost effectiveness, (ii) improve timeliness of releases, (iii) optimize contacts with households, (iv) maintain coverage, relevance and quality and (v) reduce reliance on paper. The next section gives high-level strategies and enhancements planned for the 2016 Census.

## Wave Methodology

As part of the 2011 Census, a live test of two different methodologies was conducted in the mail-out area to better understand the reaction of Canadians to Wave 1. The approach was inverted for two small random samples where a questionnaire was sent to Group 1 dwellings and an introductory letter to Group 2 dwellings. The test basically concluded that a sending an introductory letter only to all dwelling in mail-out areas in Wave 1 is more efficient than sending a paper questionnaire. For the 2016 Census, Wave 1 will consist of mailing out an introductory letter to all dwellings located in the mail-out area in the country which will consist of 80% of the total universe of dwellings. It is expected that this modification to the wave methodology will result in a reduction in printing and collection costs as well as an increase in the Wave 1 and Internet response rates. The target for Internet response has been set to 65% for 2016.

In preparation of the 2016 Census, several aspects of the communication strategy associated to the wave methodology will be tested through both qualitative and quantitative testing. Various messages for the introductory letters or to be printed on the mail-out envelopes will be tested as part of small behavioural tests with Canadians. As well, minor adjustments to the calendar of waves (especially the start dates of Waves 2 and 3) will be quantitatively tested with the objective of balancing the effectiveness of each wave with key operational constraints. One constraint is that the first 3 waves must occur in the same calendar month (i.e. May) to minimize the negative impacts of household moves which tend to take place at the end of each month in Canada. Another constraint is that Wave 4 must start not later than the beginning of June to allow for sufficient time for enumerators to conduct the bulk of follow-ups before July and August when migration is at its peak.

## Integrated Collection and Operation Systems

The Integrated Collection and Operation Systems (ICOS) is a new and innovative project which will provide Statistics Canada with efficient, effective and sustainable processes and tools for carrying out data collection activities in the future. The overarching objective for Statistics Canada is to reduce the number of different software platforms and tools and implement collection processes and tools common to both the census and ongoing surveys, achieve cost savings and allow surveys to be implemented more

efficiently. All key functionalities of the Field Management System used in the 2011 Census as described above will be embedded in ICOS. The 2016 Census will make use of this new tool in many areas such as:

- Manage human resources – common and integrated processes and tools to recruit, hire, train using computer-based training modules and performance evaluations.
- Manage workloads and manage cases in a real-time, multi-mode, multi-site environment – common tools and systems to plan survey collection and to direct workloads to available staff to maximize the efficiency and effectiveness of available resources. As well, enumerators will have easy access to scheduled calls and dwelling histories among others.
- User-friendly portal and systems that enable communication effectively with managers and field staff.

### Increased Use of Administrative Data

As part of the 2016 Census Strategy Project, Statistics Canada evaluated several options for defining the methodology of the 2016 Census. Among others, the evaluation concluded that the necessary conditions for conducting a census solely based on administrative registers are not currently met in Canada. In particular, Canada has neither a Central Population Register nor a universal Personal Identification Number that could be used to link such a population register to various administrative data sources (Royce, 2011). Nevertheless, Statistics Canada will continue to build on the success of the use of income tax records of the last censuses. The plans for the 2016 Census program calls for replacing data collection of income data by increasing the use of administrative data. The income question will be removed completely from the household survey questionnaire and Canadians will simply be informed that Statistics Canada will be linking to their tax records instead of asking them for their consent as it was done in previous censuses. In theory, this would permit tax data to be used for almost 100% of the population. To ensure public acceptability Statistics Canada plans to validate this proposal through focus group testing.

### Data Processing

The large volume of questionnaires to be processed in the production window requires the development and implementation of a thorough model to predict the expected inputs for each activity (receipt and registration, capture, coding, failed edit follow-up, etc.). Any small deviations in expected inputs or difficulties in production operations can have impacts on operation costs, timeliness of the outputs or the data quality of the processed data. Combining in the same location the processing activities with the Census Help Line was very successful in the 2011 Census as it allowed managers increased flexibility to move staff across the various activities during peak operations. The same approach is planned for the 2016 Census.

Several enhancements are planned for the Data Operation Center operations of the 2016 Census. Among them, an increased use of the Interactive Voice Recognition technology to be used in the help line operations will be tested. It was observed in the 2011 Census that many calls for help/information from Canadians were identical and it is believed that a large portion of them could be handled with automated messages. This would result in a reduction in the number of staff planned for the help line.

Several studies are planned before census production to further reduce on manual intervention and to improve data quality during processing activities. With respect to data capture, new approaches will be evaluated to identify words with frequent Intelligent Character Recognition misspelling by adding misspelled words to the data capture and coding dictionaries. This enhancement should reduce the number of manual intervention.

## Behavioural Testing

Because the Canadian Census of Population is conducted every 5 years, significant changes to methodologies/processes are generally incremental and are made as part of an overall set of strategic objectives set for the longer term. A fundamental planning assumption for the Census of Population program is that any significant change to concepts, questions and operations must be tested prior to implementation. Over the last censuses, several types of testing has been conducted such as qualitative testing, content tests, proof of concept tests, volume/performance tests, penetration/security tests and dress rehearsals.

Although the level of change is not as extensive as that introduced for the 2011 Census in which the wave methodology was implemented, some proposed changes/enhancements for the 2016 Census will require thorough testing before implementation. Changes identified as higher-risk changes will be evaluated as part of a series of tests called behavioural tests. It was felt that most of the changes requiring testing were changes representing a risk in relation to either staff behaviour or respondent behaviour. Some of the proposed changes that require an assessment on the impact of staff behaviour are: potential use of mobile devices by enumerators, Integrated Collection and System platform to support collection activities, new field operations organisational structure, and new field procedures for collective dwellings. Changes that could have an impact on the behaviour of respondents and require testing are: questionnaire format, communication material for each wave and pre-Census-Day registration phase to collect email addresses. There are four behavioural tests scheduled to take place between spring 2013 and spring 2015. The largest is the second test in which, among others, various versions of the questionnaire formats will be tested on a sample of 25,000 Canadians.

## Dissemination of Census Data

The census data are used by a broad range of data users, including government officials, media, academic researchers, grade school students and the general public. There is also a great range with regard to the sophistication of the users and the complexity of the data products. Over the last censuses, Statistics Canada has developed a communication and dissemination strategy around the internet to efficiently meet the various requirements of its users via the same platform. In the 2011 Census, Statistics Canada took advantages of the new technologies and offered chat sessions with the analysts, webinars and short videos describing the main results. As well, advanced notices of upcoming releases were sent to key clients on Facebook and Tweeter.

Statistics Canada has recently launched a new corporate initiative to modernize its current methods and framework to disseminate data to the public via the web. The main drivers for the New Dissemination Model that will have an impact of the way the Census program disseminates its data are (i) radical simplification of the product line including a consistent approach across programs for presenting data tables, (ii) establishing an output metadata framework and (iii) complying with the new Government of Canada Open Data principles (such as self-serve free data and no licensing fees). In preparation of the 2016 Census, Statistics Canada will continue its tradition of consulting with data users and other interested parties to obtain their views on the product line and on how to integrate their various requirements with the new corporate initiative.

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