

Running a census in a tight labour market

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Canadians value government services that are timely, cost effective and appropriate to their needs (Marson 2007). Many services—such as schooling, health care, public transit and immigration support—require information on small geographic areas for effective delivery. Moreover, accurate population counts are needed to determine the intergovernmental transfers that support these services. The Census of Population is conducted every five years to meet the needs of all levels of government in serving the public.

In addition to supporting service delivery, the census also enables research on a wide range of social and economic issues. Income inequality, returns to education, the integration of immigrants and changing patterns of employment are just a few of the topics that have been explored with census data. Moreover, demographic information is of great value to Canadian businesses, providing them with commercial opportunities.

While the census provides input to a number of other government activities, it is a huge and labour-intensive activity in and of itself. A small core of project managers within Statistics Canada begins planning each census years in advance. In the year leading up to the census, hundreds of Statistics Canada employees are reassigned to temporary duties in the design, development and implementation of the census. Finally, thousands of temporary workers are hired to conduct the footwork necessary to complete the collection fieldwork. For the 2001 Census, 36,000 enumerators and other field staff were hired.

Although census content remains relatively consistent across time,¹ Statistics Canada is continually examining means to remain relevant to evolving information

needs and to maintain and improve the quality of the data, the sense of confidentiality for respondents and the efficiency of operations. To advance these aims, the inner workings of the 2006 Census experienced greater changes than they had for decades. Most conspicuous to respondents was the collection methodology.

2006 Census innovations

In the past, census forms were distributed and picked up by enumerators at every dwelling in the country. Enumerators put a very personal face on census collection, strengthening the connection between community-based collection and downstream community benefits. Even though most of the forms were filled out by respondents without enumerators present, the impression that enumerators recruited from their own neighbourhoods might see their personal data was a perceived confidentiality issue for some.

For the 2006 Census, for the first time, forms were mailed out to 70% of households. In the remainder of the country, addresses needed to be verified by enumerators who left questionnaires at the same time (list/leave areas). Both sets of households then had the option to return their paper forms by mail or online, using a secure Internet form. For all returns, quality issues and incompleteness were dealt with by telephone follow-up from one of three central locations. The Internet form had automated quality checks built in so that the amount of follow-up was significantly lessened. Overall, one in five households responded by Internet, the highest proportion among countries that have introduced an Internet-response option.

Changes to data capture and processing were less visible to the public but nevertheless integral to the overall plan. Capture operations were centralized in Ottawa-Gatineau and automated through the use of high-speed scanners and software able to digitize handwritten responses.

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Even though the primary motives for the changes were to provide response options, increase long-term efficiencies and address privacy concerns, the new processes also resulted in a significant reduction in anticipated staffing. Since enumerators had fewer tasks to complete relative to earlier censuses, they could cover larger areas and thus fewer needed to be hired and trained. Moreover, the built-in quality controls in the Internet forms were designed to reduce the volume of call-backs required to resolve missing or incomplete responses. Overall, these and other changes led to a drop in planned temporary staffing from 36,000 in 2001 to some 27,000 in 2006.

As is common with large-scale projects and now required by federal government policy, the 2006 Census operated under a risk-management framework. Some of the significant risks identified during planning were the development schedule for all the new information-technology components, the functionality of the Internet forms, the ability of the hardware to handle Internet traffic at peak times, and the ability to recruit enumerators in several cities in Alberta with very tight labour markets. In the end, technological developments came off very well, but labour shortages proved to be more acute and widespread than anticipated.

A hot labour market

In 2006, the census took place in the hottest labour market in a generation. In the 12 months leading up to the May 16 Census Day, the economy had added more than 400,000 full-time jobs while shedding 36,000 part-time positions (Statistics Canada 2006). In May alone, full-time employment increased by 151,000. Nationally, the unemployment rate was at a 32-year low of 6.1%. The unemployment rate dipped to 3.4% in Alberta and was under 5% in all provinces west of Ontario. Although unemployment was somewhat higher in eastern Canada, many regions were nevertheless at long-term lows.

The accelerating demand for employment had an inflationary impact on wages. While the Consumer Price Index had increased 2.8% in the preceding 12 months, average earnings were up 3.8%. In the tight Alberta labour market the increase was 7.3%. As a point of reference, average hourly earnings were \$19.60 nationally and \$20.95 in Alberta, compared with the legislated rate of \$11.88 for enumerators and \$15.62

for supervisors (or piece-rate equivalents). These rates were set to account for the generally tighter national labour market in 2006 and a different mix of tasks compared with 2001.

The big day approaches

Since the 2006 Census was to rely heavily on the mail-out of forms, it was important that they be mailed to correct addresses. Addresses were generated from a central database, the Address Register (AR), based on information collected from the past few censuses and updated through a variety of sources, including field verification. The field verification of the address information from the AR is called 'block canvassing' and it represents the first labour-intensive field work of the census cycle. Block canvassing for the 2006 Census was carried out in two waves, beginning in September 2005 and ending in April 2006. The late block canvassing focused on areas like new subdivisions, where changes to the list of addresses were expected. Approximately 2,000 temporary workers were hired for block canvassing, with no major problems being encountered.

In the weeks before census day, the technological innovations were the foremost concern of the management team—particularly the Internet application. A team of external experts had certified the security of the Internet applications, but would the online form engage respondents and perform under such real-world situations as dropped connections and user-based interruptions? Would the hardware handle the volume? To experience, as best as possible, census day conditions, the application underwent a series of automated volume tests simulating large numbers of concurrent users prior to going live.

On census day and during the following weeks, the Internet application worked very well. The number of respondents who could log on at one time was limited in order to avoid bogging down the system, but this 'graceful deferral' had to be invoked only for six hours on Census Day. (The peak was on Census Day when the total number of responses was almost 300,000.) Respondents who were deferred were asked to come back and try later—in many cases that meant only a few minutes. Overall, one in five respondents chose to use the Internet, which was at the high end of the forecast range. And the data proved to be of high quality relative to paper responses.

The role of enumerators

As mentioned earlier, 70% of households live in areas covered by the AR. They received their census forms—along with the invitation to respond by Internet—in the mail about one week before census day. The delivery of census forms to households not covered by the AR (list/leave) represented the first major task for the small army of census enumerators. It took place about the same time as the mail-out—in the two weeks leading up to census day.

Since the accuracy of population estimates for small areas is important for the delivery of public services such as education and programs for the elderly, achieving consistently high response rates across the country is a key objective of the census. The second major task for enumerators was to follow up on households from which no response, either by paper or Internet, had been received 10 days after census day. The enumerators had to determine whether the dwelling at the address was indeed occupied and, if so, collect the form from occupants or help them complete the form. Non-response follow-up was to have continued into July with collection activities wrapping up by the end of that month.

Enumerators were hired by a network of local field offices according to standards and wage levels set in federal legislation. The network consisted of 3 regional centres, 36 local offices and 38 sub-local offices. Hiring for list/leave and non-response follow-up operations began in April 2006 with the goal of hiring 27,000 enumerators in phases during this process. Approximately 260,000 applications were received.

The first signs of problems

Past censuses have run into hiring difficulties in localized areas with tight labour markets. As identified in the risk management document, some difficulties were expected in Alberta where unemployment was at an unprecedented low and wages were rapidly rising. The 2006 wage rates had been set to account for a tighter labour market and the more skill-intensive follow-up work, but once the rates had been legislated few options were available. To make the temporary enumeration jobs as attractive as possible, some enumerator positions were offered at supervisors' pay rates where shortages were most acute.

While response to recruitment efforts seemed adequate in the aggregate, the geographic distribution of applicants was very uneven. In areas covering 9,000 collec-

tion units and representing about 4,500 jobs no applications were received. These were mainly rural areas. Thus it was evident early on that enumerators from adjacent units would have to be moved in to cover the workload. Moreover, many of those who did report were willing to work only part-time hours. Although these problems were particularly acute in hot labour markets in Alberta, a number of other trouble spots cropped up: Vancouver, Toronto and Montreal, without question, but also medium- and smaller-sized cities in Ontario and Atlantic Canada (e.g. rural and bedroom communities just north of Toronto—Orangeville, Stouffville/Uxbridge; Halifax/Dartmouth; and eastern P.E.I.).

Overall, no more than 17,000 enumerators were on the job at any point during the 2006 Census. This number dwindled rapidly to 9,000, with only 3,000 willing to work more than 20 hours per week.

Although the labour issues appeared early in the collection period, the scope and acuity of the problems did not become evident until interim response rates were tallied in preparation for non-response follow-up. Response rates were slightly lower than anticipated across the country and were particularly low in the areas with list/leave hiring problems. These two observations had several implications. First, without a late wave of responses, non-response follow-up would generally require more labour input than anticipated. Second, the demand for this labour would be greatest in areas where hiring difficulties were most acute. Finally, the patterns of non-response could lead to data quality problems if they weren't successfully addressed in the follow-up.

Assessment and response

The risk-management framework is intended to guide response to these types of problems. Since the early returns indicated widespread non-response issues, some national-level responses were required. The first was to extend the Census communications program, which normally tapers off after the collection period. The program emphasized the importance of the census and highlighted the two response options. The second general response was to extend the collection period for one month.

The decision to extend the collection period was influenced by very positive experiences on the technical side. The Internet application was working well, producing very clean data and, as mentioned, the level

of use was at the high end of expectations. The high-speed scanners were working to specification in the central processing facility and passing good volumes of data for further processing. One important aspect of processing is a loop-back to telephone follow-up where incomplete responses are noted by quality control software. The high quality of the Internet response data and the quick pass-through from the scanned data resulted in a lower volume of work and rapid progress for this manual process. Thus it was anticipated that the collection period could be extended, at least for a short period, without affecting subsequent processing and dissemination milestones. It also provided the opportunity to try another process innovation, shifting some non-response follow-up from field enumerators to the telephone unit that had been doing the failed edit follow-up.

Another piece of the technological puzzle would help guide the non-response follow-up. Since individual responses could be coming from either the Internet or paper forms, a control file that integrated responses from both sources was required. This file was continually updated and could therefore be used to direct the most intensive follow-up activities to areas with the lowest response rates.

With the extension of the collection period and the geographic targeting of activities, the human resource philosophy of non-response follow-up gradually changed from trying to hire more people to more effectively using those already on the job. As overall response rates inched upwards and were tallied in the control file, active collection management could kick in. Enumerators in areas with high response rates were shifted to nearby areas with low response rates. For example, enumerators from suburban or nearby rural areas would be shifted to city centres where response rates were generally lower. This shifting of resources had occurred in previous censuses, but not to the extent required in 2006.

While the movement of enumeration 'triage' teams was effective in many areas, in others widespread labour shortages or other difficulties (like the reluctance of some rural enumerators to work in downtown neighbourhoods) called for further escalation. Several weeks into the collection extension, it was clear that adequate response rates could not be achieved for some areas with available staff in the region. With the volume of processing winding down, temporary workers from the Ottawa processing centre were recruited for local

non-response follow-up since Ottawa was one of the problem areas. More significantly, a call went out to headquarters employees to volunteer for follow-up activities in other areas where non-response remained high—particularly Alberta. Overall, some 400 employees responded to the call and 130 were selected and trained. Most were deployed to Alberta for non-response follow-up and, working long hours, provided the push required to achieve adequate response rates in many areas. A peripheral benefit of this exercise is that ongoing staff now have a better appreciation for some of the collection challenges and issues faced by field staff.

Downstream consequences

Large-scale collection activities and the Internet application were cut off at the end of August. As a result, processing activities had to be extended until mid-October. Review of the remaining milestones indicated that compressing the activities to meet the original dissemination targets presented unreasonable risks to the quality of the information to be released. Therefore, in October 2006 the decision was made to set back the first release date by one month. Since the technological innovations had been anticipated to speed up the release schedule by one month compared with the 2001 Census, in the end, the labour-shortage issue offset the gains from the technological advances.

In terms of data quality, it is difficult to pinpoint the impact of labour shortages. Response rates to all surveys have generally been declining in recent years and the census proved to be no exception, as evidenced by somewhat lower than anticipated response rates across the country. Certainly, some areas presented particular difficulties, resulting in unprecedented actions. Active collection management limited the impact, but some variation in results persisted. Overall, a response rate of 98% had been targeted for the 2006 Census collection activities, while the actual rate achieved was 97.3% (comparable to the 98.4% in 2001). Of the 47,500 collection units across the country, 55% achieved the benchmark, 35% were certified with somewhat lower rates, and the remaining 10% were accepted with an average response rate of 94% after remedial actions (Office of the Auditor General of Canada 2007). More detailed data-quality indicators are produced along with census releases and through specialized post-censal studies.

Obviously some of the measures taken to increase response rates in the most affected areas resulted in relatively higher collection costs in those areas. But these higher-than-expected costs were managed within the context of greater-than-expected savings from technological developments and the lower-than-expected staffing levels early in the collection period. As a result, the 2006 Census was managed within its allotted budget. An examination of the management of the 2006 Census by the Office of the Auditor General concluded the actions taken appropriately balanced accuracy, timeliness and cost.

Lessons learned

Although considered the riskiest aspect of the 2006 Census, the process and technological innovations contributed significantly to the overall operation. The mail-out of questionnaires using the Address Register reduced listing costs and increased respondents' sense of confidentiality. The Internet-response option yielded high-quality data with little need for post-collection follow-up. The paper questionnaire scanners performed to specification resulting in significant savings compared with manual entry. The master control system required to integrate the paper and Internet responses increased the ability to actively manage the non-response follow-up process. All of these positives helped to offset the difficulties encountered on the human resources side.

Given these successes, the 2011 Census will re-use the 2006 technological approaches while increasing the targets for mail-out areas and the Internet. Through further investments in the Address Register in the coming years, the target for mail-out coverage will be increased from 70% in 2006 to 80% in 2011. As for Internet response, the aim is to almost double the rate to 40%. This seems attainable since recent polling by a private contractor indicated that the Internet was the preferred method of survey response by over half of those polled.

Achieving these goals should also significantly reduce the labour input required for the list/leave and failed edit (telephone) follow-up operations.

Even assuming the best-case scenarios for Address Register development and Internet-response take-up, the 2011 Census will remain a labour-intensive undertaking requiring approximately 20,000 temporary workers. Plans to minimize the type of staffing difficulties encountered in 2006 include a higher hourly pay rate, improved geo-mapping tools to better match applicants to available positions, a streamlined hiring process to more quickly confirm to applicants if they have been retained for jobs, improved communication strategies, and additional tools for recruiters (like labour-force profiles for their respective areas).

Perspectives

■ Note

1. Changes to the forms (particularly the long form) do occur over time, subject to a prescribed consultation process during each inter-censal period.

■ References

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