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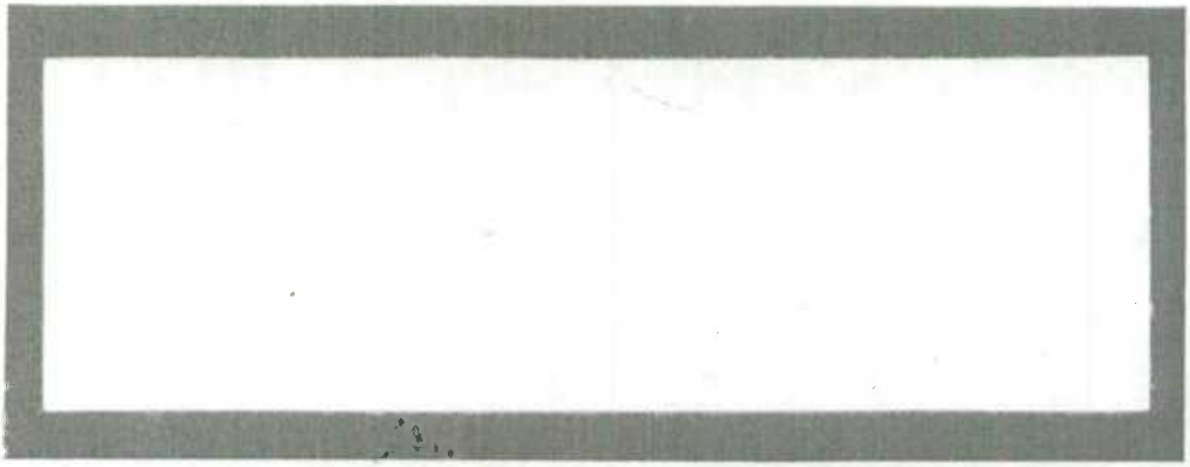

Methodology Branch

Household Survey
Methods Division

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WORKING PAPER

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CURRENT ISSUES IN HOUSEHOLD SURVEY NONRESPONSE AT STATISTICS CANADA

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CURRENT ISSUES IN HOUSEHOLD SURVEY NONRESPONSE AT STATISTICS CANADA

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A variety of current and recent initiatives and studies related to unit nonresponse for both cross-sectional and longitudinal household surveys at Statistics Canada is presented. First is an overview of the household surveys program and the current nonresponse situation. Surveys discussed include the Labour Force Survey (LFS), supplementary and longitudinal surveys based on the LFS frame, the General Social Survey, and several household surveys carried out as special surveys. Factors influencing response and initiatives taken to maintain and maximize response are then reviewed. The next section presents adjustment techniques, followed by an examination of the monitoring and reporting of nonresponse. Brief remarks are then made on Statistics Canada's nonresponse databases and on nonresponse standards. Last is a summary of the major themes discussed in the paper.

Key words: Response rates, maintaining and maximizing response, nonresponse adjustment, nonresponse monitoring and reporting, nonresponse databases and standards.

QUESTIONS ACTUELLES CONCERNANT LES NON-RÉPONSES AUX ENQUÊTES-MÉNAGES DE STATISTIQUE CANADA

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Ce document présente plusieurs initiatives et études récentes (ou en cours) sur les cas de non-réponse dans les enquêtes-ménages transversales et longitudinales de Statistique Canada. D'abord, on y donne un aperçu du programme des enquêtes-ménages et de la situation actuelle des cas de non-réponse. Parmi les enquêtes examinées figurent l'Enquête sur la population active (EPA), des enquêtes supplémentaires et longitudinales utilisant la base de sondage de l'EPA, l'Enquête sociale générale, et plusieurs enquêtes-ménages menées contre recouvrement des coûts. Ensuite, on passe en revue les facteurs qui influent sur les réponses et les mesures prises pour maintenir et maximiser le taux de réponse. La prochaine partie du document présente des techniques d'ajustement et examine différents aspects du contrôle et de la déclaration des non-réponses. Sont ensuite brièvement présentées quelques remarques sur les bases de données de Statistique Canada en matière de non-réponses et sur les normes relatives à ces dernières. Suit enfin un sommaire des principaux sujets examinés.

Mots clés: Taux de réponse, maintenir et maximiser le taux de réponse, techniques d'adjustement, contrôle et déclaration des non-réponses, bases de données et normes en matière de non-réponses.

1. Introduction

Despite the best efforts of survey managers and operations staff to maximize response, some degree of nonresponse is virtually certain to occur in household surveys. Nonresponse has two effects on survey data: one contributing to an increase in the sampling variance of estimates as the effective sample size is reduced from that originally sought; the other contributing to bias of estimates if nonrespondents differ from respondents in the characteristics measured. Survey budgets and potential nonresponse bias influence the decisions made about the degree of nonresponse that is tolerable and the depth of research into adjustments to survey data that compensate for nonresponse. Nonresponse is monitored for feedback to survey staff for immediate and future action and is reported to users of the survey data as part of the overall considerations of data quality.

This paper is intended to take stock of recent and current events in household survey nonresponse at Statistics Canada in order to determine underlying themes. It is not intended to be a complete overview of all activities but is to be topical. The emphasis is on unit nonresponse, and not item nonresponse.

2. Household survey response rates at Statistics Canada

Like many national statistical agencies, Statistics Canada conducts a wide variety of household surveys. Some are part of the regular ongoing program while others conducted on an occasional or one-time basis are known as special surveys. The major example in the former group is the Canadian Labour Force Survey (LFS). The LFS is a monthly multistage rotating panel survey in which sampled dwellings remain in the sample for six months before rotating out of the sample. Data collection is done by means of a personal interview in the first month with telephone interviews in the subsequent five months.

Supplemental surveys can be annexed to the LFS. Four important examples from the ongoing program are the Family Expenditure Survey, the Food Expenditure Survey, the Household Facilities and Equipment Survey, and the Survey of Consumer Finances. Three major longitudinal surveys are also based upon the LFS design, primarily using sample units which have rotated out of the LFS. These are the National Population Health Survey, the Survey of Labour and Income Dynamics, and the National Longitudinal Survey of Children and Youth. Outside the purview of the LFS frame, the General Social Survey is a multipurpose national household survey conducted by telephone using random digit dialling (RDD) techniques.

Many special surveys are supplements to the LFS. Many others are conducted as samples from list frames or via random digit dialling. Topics covered are diverse and include literacy, travel, smoking, volunteerism, research on earnings supplements for employment insurance and income assistance recipients, and many others. Most are conducted using Computer Assisted Telephone Interviewing (CATI).

Response rates of household surveys at Statistics Canada do vary (Bérard and Kumar 1994). The Labour Force Survey is the flagship of Statistics Canada's household survey program. Because its primary purpose is to produce key economic indicators on employment and unemployment and because it also serves as the vehicle for many other surveys, significant efforts are made to maximize response to the survey. At the national level, response rates to the LFS are generally 95%, with monthly rates over the past three years varying from 92% to 97%. Components of nonresponse include refusal rates of about 1.5%, temporarily absent rates of 1% and no one at home rates of 2% with other types of nonresponse at about 0.5% (e.g., because of technical problems, language difficulties, illness, weather). Variations occur by province, by number of months in the sample, by month of enumeration, by regional office and by type of area (urban, rural, remote).

The Family Expenditure Survey (FAMEX) now operates on an annual cycle (but formerly on a four-year cycle), collecting through recall detailed expenditures by households covering their complete budgets for the reference calendar year. Personal interviews generally take several hours to complete, with response rates varying between 70% and 80% (although the questionnaire is currently being shortened for the 1997 reference

year). The Food Expenditure Survey, on a four-year cycle, collects detailed data on food expenditures and quantities purchased by households by means of diaries maintained by respondents for two one-week periods. Response rates from 70% to 85% are achieved. Plans are currently underway to redesign these two surveys as one survey of household spending.

Response rates for the Household Facilities and Equipment Survey, enumerated primarily by telephone, are close to 88%. The Survey of Consumer Finances (SCF) generates annual estimates of household and individual income and achieves response rates between 75% and 82%. Respondents are first mailed questionnaires for their completion, then collection is done through computer-assisted telephone interviewing. An individual is considered a nonrespondent for the SCF if his or her major source of income is not stated or is unusable.

For the second wave of the longitudinal National Population Health Survey (NPHS), the response rate for longitudinal respondents was 94%, with 3% refusing. In the Survey of Labour and Income Dynamics (SLID), the longitudinal response rates were 91% and 85% for the first two longitudinal waves, while for the National Longitudinal Survey of Children and Youth (NLSCY), the second wave had a longitudinal response rate of 92%.

The General Social Survey (GSS) is designed to monitor important features and changes in Canada's social structure and to provide statistical data that addresses social and policy concerns of importance to the federal government and to the Canadian public. Recent subject matter themes include victimization, time use, family history and support networks. Response rates are generally between 80% and 85%, although this range is conservative as all households for which there is no contact through the application of the random digit dialling procedures are assumed to be in scope.

The 1994 Survey of Smoking in Canada, a quarterly longitudinal survey with four waves of data collection whose first wave was conducted by RDD, got response rates in the order of 84% at each wave. Other recent RDD surveys have had response rates ranging between 50% and 70% and are discussed later in this paper.

Most special survey supplements to the LFS have response rates in excess of 85%. Some recent examples include the following. The Residential Telephone Services Survey, conducted quarterly since November 1996, has about a two minute interview administered to the person responding to the LFS for the household and gets a response rate of about 95%. The Canadian Travel Survey is a monthly survey administered to one person per LFS household and achieves a response rate of 91% for an average twelve minute interview. The recent Survey of the Importance of Wildlife to Canadians, conducted in spring 1997, got a response rate of about 70%. However, it was a mail-out mail-back survey with a twelve page questionnaire including requests for expenditure and detailed destination information. All adults in the LFS sample were included. Up to three telephone follow-ups were used, resulting in about half the data being collected by telephone.

Under normal circumstances, response rates for other special surveys are 70% or more. The quarterly Employment Insurance Coverage Survey, a CATI survey administered to persons who had just rotated out of the LFS achieved a response rate of 84%. The National Private Vehicle Use Survey, conducted from September 1994 to August 1996, contacted households that had rotated out of the LFS - initially, ones that had been out of sample for twelve to eighteen months and later, ones out of sample for only about four months. In the initial period there was about a 22% tracing loss while in the latter period, with more recently rotated out households, about 14% of cases could not be located. In both periods, an additional twelve percentage points were lost due to refusals to the telephone-administered background questionnaire. Subsequently, households with at least one vehicle were sent a fuel consumption diary, covering one month, to be completed for the selected vehicle. The response rate to the diary was about 50%.

An interesting example is provided by the 1994 Youth Smoking Survey in which youths aged 10 to 19 were interviewed about their smoking habits and knowledge. It consisted of two components. Fifteen to nineteen year olds were covered via the LFS. The survey was administered via CATI as a supplement to the LFS as well as to households that had recently completed their six month period in the LFS sample. It faced a number of collection challenges: persons in this target population are often hard to contact; owing to the sensitivity of the subject, proxy interviews were not allowed; would parents perhaps deny permission to interview their

children? The survey was quite successful in overcoming these hurdles, achieving a response rate of 81%. Ten to fourteen year olds were contacted through the schools they attended. Aspects of communications were critical to this survey. Permission had to be obtained from school boards, school principals, and parents. Various introductory letters and advance telephone calls were used. A questionnaire was administered to children for self-completion using paper and pencil in their classrooms while parent interviews were by telephone. Rates for parental consent, parental response and youth response were all over 90%, resulting in a final response rate of 80% for cases where all three were obtained.

A final example is provided by the Survey of 1995 Graduates, conducted in spring 1997. Graduates of universities, colleges, and trade and vocational schools were contacted by telephone, 1.5 to 2.5 years after graduation, using information provided by institution registrars. The response rate was about 80%. Over half the nonresponse was due to tracing losses.

3. Maintaining and maximizing response

3.1 Factors influencing response

Within available budgets and time frames, survey managers strive to maintain or improve response rates as much as possible. There are, however, many factors which influence response to a particular survey (Sheridan *et al.* 1996). The survey budget, the importance of the survey to the users and to the respondents, the relative priorities of the allocation of budget to the various survey operations, the content of the survey, the survey population, the method of collection, the season and time of collection, the length and complexity of the survey questionnaire, the degree of follow-up and field quality assurance all play important roles in the response to a survey. Major factors on which Statistics Canada has recently exerted special efforts are presented below and include language of the questionnaire; the cultural background of the respondent; the tracing of respondents who have moved; the use of technology; the occurrence of survey redesign; concerns of privacy; respondent burden; the communications strategy; several factors related to the interviewers themselves such as training, experience, interpersonal skills, rapport building and turnover; various aspects related to collection; and incentives to respondents.

3.2 Language and culture

Canadian society has been changing significantly over the most recent several years. Canada has always been a country to which many immigrants have come. However, more and more immigrants to Canada speak neither official language well on their arrival to the country, making their response to surveys difficult at best unless suitable interviewers are available. Many come from repressive regimes where governments and their agencies are not well trusted and so are often very reluctant respondents. This has given rise to many new challenges to collection staff, particularly in the large cities in which many immigrants settle. Collection managers need to ensure they have interviewers available who can communicate in languages other than French and English. Interviewers need to be equipped to understand the concerns of recent immigrants and to persuade their response to our surveys.

A recent pilot test of a longitudinal survey of immigrants to Canada specifically targeted this population. A sample of immigrants, initially identified upon landing in Canada, was later followed up for administration of the survey questionnaire. Questionnaires and other materials were prepared in a number of other languages like Cantonese, Mandarin, Punjabi and Spanish. Interviewer training included a module on cultural sensitivity. Interviewer assignments were constructed so as to match interviewer language abilities to those of respondents. These actions as well as a careful communications strategy helped make a big difference in the success of the test.

Part of a recent test of redesigned collection procedures for the International Travel Survey (ITS) included the use of questionnaires in Japanese and the use of Japanese speaking interviewers. Results are currently being analysed. In addition to the two official languages, questionnaires for the National Population Health

Survey have been translated into Spanish, Portuguese, Chinese, Punjabee and Italian to try to reduce non-interviews because of language problems. When administered on paper, the Labour Force Survey questionnaire was available in several languages; now with conversion of the LFS questionnaire to computer-assisted interviewing, questions are available in paper form in many languages.

3.3 Tracing

Tracing is an integral part of maintaining response for longitudinal surveys and various means are used by the eight Statistics Canada regional offices to find the longitudinal respondents who have moved. These include using the contact information provided earlier by the respondent and, where received, the change of address card sent by a respondent who moved; contacting the former household in cases where only the respondent has moved; contacting the postmaster in small communities; searching commercial CD-ROMs containing names, addresses, postal codes and telephone numbers; using telephone directories; contacting neighbours or apartment superintendents for a forwarding address; searching for relatives with the same last name and postal code; contacting municipal city hall tax departments to determine the owner of the building the respondent lived in before moving; using city directories, telephone directory assistance and the internet. Interviewers and regional office tracers have demonstrated initiative and thoroughness in trying to find respondents. On occasion, they have used resources such as alumni associations of universities, government employee telephone books, the Association for New Canadians, local pharmacies in small towns, the respondent's last employer, real estate agents, military base commanders, local utility companies and local schools.

More specifically, for the National Population Health Survey (NPHS), the Survey of Labour and Income Dynamics (SLID) and the National Longitudinal Survey of Children and Youth (NLSCY), one or two supplementary contact names were obtained to aid in tracing. For the NPHS, however, one contact was for the longitudinal respondent and the other for the overall household. For SLID, the contact had to be from outside the household. In addition for NPHS, a summer student worked at head office after the second wave to try to find hitherto untraced respondents for the next wave of collection. Also at head office, for each of NPHS, SLID and NLSCY, a coordinated record linkage was done with income tax files to trace address and telephone number changes. For NPHS, an additional linkage with mortality files helped determine those respondents who had died.

For all these longitudinal surveys, in addition to tracing initiated by the interviewers themselves, tracing teams were set up temporarily in Statistics Canada's regional offices in response to the needs of the longitudinal surveys. There are, however, no standard procedures for the tracers to follow. Although tracing techniques are similar from survey to survey, they do differ by regional office. In order to identify the effectiveness of current techniques and resources and to improve those procedures, the current use of resources for tracing is being evaluated and standards for tracing are being developed for Statistics Canada's regional offices (Wooltorton 1997). Although efforts are being made to improve tracing, there has been good success to date: for the second wave of the NPHS, the proportion of longitudinal respondents that were unable to be traced was only 1.7%; for the second wave of the NLSCY, preliminary data indicate a similar rate.

Clearly, tracing is important not only for longitudinal surveys but also for other surveys such as those based on aging list frames or surveys in which previously contacted persons or households are contacted a second time. An example of both of these is the Survey of 1995 Graduates discussed above in section 2. The contact information received from registrars was, on average, two years out of date. Even before sending out the sample to regional offices for data collection, some initial tracing was done at head office to minimize that which would be necessary for interviewers. There was about a twelve percent loss due to tracing failure. Since it was planned to contact respondents again in about two years, additional contact information was collected during the interview. Previous Follow-up of Graduates surveys have had tracing losses of about ten percent.

3.4 Technology

Technology also plays a role in response (Dufour *et al.* 1995). When the Labour Force Survey (LFS) was

converted from a paper questionnaire to the use of computer-assisted interviewing (CAI) in late 1993, technical problems created a new category of nonresponse (Dufour 1996). This category replaced one which had earlier represented questionnaires received too late for processing because of postal problems. Technical problems occurred primarily in the transmission of data from the interviewer's laptop computer to the regional office because of situations such as hard disk crash, insufficient memory allocation, excessive heat, power outages or telephone troubles. In most cases specific problems were resolved for the next month but with very tight release deadlines for LFS data, were unable to be done in time for the current month. Although initially reaching highs of 1.7% as a component of nonresponse, technical problems are now well under control as the experience with CAI increased. Familiarity of interviewers with the hardware and software, software updates and a streamlined communication process between interviewers and technical support staff have also contributed to the virtual non-existence of nonresponse resulting from technical problems. Although initially the LFS managers had been concerned about a possible increase in refusal rates because of the presence of a notebook computer at the first interview, no increase was detected.

Other technical innovations are also taking place. The regional offices are initiating a complete revamp of their case management software used for the LFS, its supplements, and other surveys. The current case management system was first put in place in 1993. From a systems development perspective, it needs replacing because the combination of its design limitations and the various patches and updates so far make further development very difficult. From a user perspective, the system needs to be more robust. It needs to provide easy and reliable movement of workloads between interviewers working via CATI and CAPI at possibly widely distant geographic locations. It needs to provide much improved management information especially for supplements to the LFS. Its call scheduling capability may be upgraded as well. These improvements are scheduled for implementation by summer 1999.

Improvements have also been made to call scheduling methods for telephone surveys conducted at the centralized telephone survey facility. This has facilitated a more effective use of interviewing capacity and resulted in higher response rates. This was first done for the Sun Exposure Survey, a recent random digit dialling survey. The status (probably residential, probably business, unknown) of sampled telephone numbers was used for the scheduling of call attempts throughout the first several days of the interviewing period. Residential numbers were called between 16:30 and 21:00, business numbers between 09:00 and 16:00, and unknown status numbers between 09:00 and 18:00 respondent's local time. Calls were made at the time of day when it was felt that contact was most likely to be made. Collection managers and interviewers were very happy with this change. Managers were well able to assess progress much earlier in the collection period because a higher proportion of the sample had been called at least once and because more of the sample had been resolved (i.e., determined to be not working, business, respondent, etc.). Interviewers' time was being used much more effectively.

In the future, there are plans to put in place more sophisticated call scheduling features taking account of the call history of sampled telephone numbers, such as suggested by Stokes and Greenberg (1990), and Reedman and Robinson (1997).

Telephone technology available to residential users has made significant advances in recent years. Not only are telephone answering machines becoming more and more common, but also features such as voice mail systems, call display, call blocking, and call forwarding have become available to consumers. Oldendick (1993) found that the use of answering machines for screening of calls did not appear to be widespread. Two years later, Tuckel and O'Neill (1995) found that even though about 40% of households with answering machines screened at least most of the time, this did not necessarily translate into a major problem for refusals and those unable to be contacted. Statistics Canada has not formally studied the issue. However, anecdotally, these telephone technologies are not yet presenting a major problem. Collection staff have put in place special procedures to deal with them and good response rates are being maintained. (Many respondents even return messages left by interviewers on their answering machines!)

3.5 Redesign

The phase-in of a new LFS sample resulting from a redesign of the sampling plan resulted in temporary increases in nonresponse (Dufour *et al.* 1996). The new design allocated a greater proportion of the sample to urban areas which generally have a higher nonresponse rate than rural areas. In addition, some of the new sample's assignments were given to new interviewers who typically have higher nonresponse rates than more experienced interviewers.

As a last step in the survey redesign, the LFS questionnaire and data processing systems were overhauled. Phase-in of the new questionnaire took place between September 1996 and January 1997; in general the new questionnaire was applied to each new rotation group as it entered the survey for the first time so that by February 1997, all six rotation groups were receiving the new questionnaire. Comparisons during the phase-in period indicated that the national nonresponse rates for the new questionnaire were higher than for the old questionnaire. However, after accounting for the birth rotation group being the group most subject to nonresponse, no discernible differences in response rates could be attributed to the introduction of the questionnaire per se. It had originally been hypothesized that a new question on workers' earnings would have an effect on household nonresponse.

3.6 Privacy

Increasingly, Canadian society has become sensitive regarding personal security, privacy and confidentiality matters. As well, there appears to be much more household survey taking activity in Canada than formerly, not only by Statistics Canada (e.g., major new longitudinal surveys and a much increased volume of surveys for clients on a cost recovery basis) but also by private sector polling firms. Further, telemarketing is an ever present and growing irritant to the population. These factors have combined to make respondents less trusting of telephone inquiries, and make it more difficult for interviewers to convince that they are conducting legitimate survey research.

A recent example illustrating this phenomenon is a test of a survey on Unregulated Child Care Providers, conducted as a supplement to the LFS. In addition to other information, each LFS respondent with children was asked if he/she used the services of an unregulated child care provider and, if so, to provide the name and telephone number so that the care provider could also be contacted. The response rate by parents to the screening questions was an excellent 92%. However, of those, only 64% would give the provider contact information. Finally, only 62% of the providers identified would respond. These lower response rates are likely indicative of respondents' concerns regarding privacy and confidentiality in this situation.

A related issue is that of data sharing. Canada's Statistics Act requires that Statistics Canada protect the confidentiality of its respondents' data. Normally, a master data file with complete detail is prepared for each survey; such files will often contain data that could facilitate identification of individual respondents. In addition, a public use micro data file is also prepared in which appropriate actions have been taken so that individual respondents cannot be identified. Occasionally, respondents are asked to sign an agreement that their detailed data be shared with specified third parties (usually survey clients) who in turn are then bound by the requirements of the Statistics Act. Typically about ten percent of respondents will refuse to agree. But when interviewers are well prepared and where the survey plans provide for the necessary effort, this can be reduced to one or two percent.

3.7 Respondent burden

The supplementary survey capacity of the LFS provides a microcosm of the increased household survey taking in Canada. This facility has been available for many years now and offers clients access to all the data collected for the LFS itself and use of the LFS infrastructure including its collection staff. This supplemental capacity has been very popular both for internal and external clients who have realized the substantial cost and quality benefits as compared to independent surveys.

The LFS infrastructure is also used in two other manners. Households which have rotated out of the LFS sample can be used as sample for other surveys for which active LFS households are not available on a sufficiently timely basis or which are considered too burdensome or too sensitive to be conducted on households

still in the LFS sample. Two-phase methods can be applied for both supplements and for surveys of rotate-outs to target a wide variety of subpopulations. Secondly, the LFS frame can be used for selection of independent samples. In both cases the LFS design, its processing systems, and usually its interviewers are used.

Surveys on rotate-outs realize the benefit of being warm contacts. However, in cases where the sampling unit is the household or a person in the household rather than the dwelling (and the people who happen to be living there), some reduction in response rate is typically observed due to tracing losses related to moving of respondents. This reduction is less severe than what might otherwise be, since telephone numbers are available on these rotate-outs from the LFS collection. Surveys based on independent samples are of course cold contacts and more effort is required to obtain similar levels of response.

This supplementary capacity is now being used much more heavily than before. Years ago, the LFS would have a supplemental survey in most months; now it is every month. In some months, respondents may receive two or three (smaller) supplements. Compared to the past, rotate-outs are being used for surveys more often and sooner after completion of their six month time in the LFS sample. (Rotate-outs used to be given at least about a six month rest before any subsequent use.) These factors are contributing to respondent fatigue and resistance as well as to demands on the interviewing staff.

In addition, there are societal factors that may be contributing to respondents' sensitivity to burden. For example, in more Canadian families than ever, both parents are employed. There are more single parent families. These factors and others have contributed to a common belief that for many Canadians, time has become a scarce commodity, and that consequently it is becoming more and more difficult to convince respondents to use their scarce time to reply to surveys.

As well, the nature of the surveys being done has gradually changed over, say, the last twenty years. Early in this period, supplemental surveys were typically fairly brief and simple - one to two pages. More recently, especially with the advent of computer assisted interviewing (CAI), much longer interviews are being undertaken. Surveys with interviews of 30 minutes to an hour are becoming common. They are more complex not only in terms of the flows and skips in the instruments - facilitated by CAI - but also in terms of the concepts being addressed and the detail of information requested. More sensitive topics are being covered. Two closely related consequences of these factors have a direct impact for nonresponse rates. Both by their length and their complexity, these are more burdensome interviews for respondents and they may be less willing to respond to such demanding surveys. As well, these surveys are much more demanding of our interviewers to understand their requirements and to be able to persuade response to sometimes long and difficult interviews.

A new challenge in recent years has been surveys of children. For example, the Youth Smoking Survey interviewed children aged 10 to 19 years concerning their smoking habits. The National Longitudinal Survey of Children and Youth (NLSCY) has interviewed children as young as ten and has administered tests to children as young as four. In these and other like surveys, special attention is devoted to communications - permission must be obtained from parents to interview their children and interview materials for children must be developed so that they require suitable levels of literacy. For older children, innovative means of eliciting response are needed.

Managers of supplements to the LFS consistently feel that these challenges have been met reasonably well, with only fairly minor deterioration in response rates to the supplements and no deterioration in response rates for the LFS (Beebakhee 1993a,b). They also note that it has become much more difficult than in the past to achieve these results. Survey managers feel that a kind of threshold in the use of the supplementary capacity has been reached and that the burden cannot be increased any more without substantial risk of increasing nonresponse and decreasing data quality for the supplements due to respondent resistance, interviewer fatigue and possibly to resulting interviewer turnover. There are tradeoffs associated with solutions such as the selection of an independent sample or the creation of a separate interviewer workforce. Further, it is critical that the supplements to the LFS continue not to have any negative impact for LFS data quality. Although there are other factors, effective communication with respondents and others including basic interviewer training and survey specific training regarding making respondent contact and getting their cooperation has

become much more important than ever before, not only for LFS supplements but for all household surveys.

3.8 Communications

Concerns about privacy and respondent burden have led survey managers to be far more thorough with the communications strategies for their surveys. A number of recent project teams have included representatives from Statistics Canada's Communications Division to specifically address these concerns. More attention is being paid to ensuring that public enquiry officers, collection managers, and interviewers are well informed and prepared to respond to questions concerning surveys. Special interest groups related to subject matter of surveys are being more often consulted to solicit their support for our surveys. Advance letters to respondents are being used more often. Not so long ago, survey managers at Statistics Canada rightly tended to believe they could get sufficiently high response rates (say 80% or more) without advance letters.

The Sun Exposure Survey, for the first time at Statistics Canada, used an advance letter in the context of a random digit dialling (RDD) survey. This was done as a test with half the sample assigned to the letter group. Statistics Canada's RDD frame is constructed on the basis of telephone company billing files, and so sampled telephone numbers can be classified as being probably residential, probably business, or of unknown status. The probably residential numbers in the letter group were matched to a commercially available CD-ROM of telephone numbers, names and addresses in Canada. Those having good quality matches with complete name and address, including postal code, were sent an advance letter shortly before the collection period began. All letters were personalized by using the name, and since one respondent per household was to be selected, the recipient was encouraged to show the letter to other members of the household. The response rate for the telephone numbers to whose matching name and address a letter was sent was 75%, about nine percentage points higher than for the corresponding probably residential numbers (ones with good name and address matches) from the no letter group. The difference was due to reduced refusals. This improvement is consistent with that observed by other authors (e.g., Groves and Lyberg 1988; Clarke *et al.* 1987). Interviewer debriefing suggests that the letter had the effects of both legitimizing the survey in the minds of respondents as well as facilitating better performance by interviewers. (Interviewers knew which telephone numbers corresponded to households which had been sent an advance letter.)

While clearly successful, there are problems to be overcome. A more effective and efficient means of finding good quality and up to date names and addresses is needed. Although its cost was modest, the CD-ROM telephone directory is based upon published telephone directories and hence contains information that is 12 to 18 months out of date. As well, a significant impediment was the amount of manual work required to resolve multiple close matches. A consequence was an 18% non-match rate of telephone numbers to the CD-ROM and a further loss of 11% due to post office returns (PORs) so that at most 71% of the probably residential numbers in the letter sample actually received a letter. As well, it is likely that some of the people sent advance letters no longer had the telephone numbers to which the address matched; not all of these would have been PORs. So whoever actually had such telephone numbers would never have received (or even been sent) an advance letter.

To motivate their continued cooperation, longitudinal respondents of the National Population Health Survey were sent a thank you letter after the first wave of collection and were encouraged to send a change of address card to Statistics Canada should they move. Later, they were sent an advance letter before the second wave appreciating their earlier response and soliciting their participation for the second wave. As well, they were given a brochure containing a summary of the first wave survey results. After the second wave, they will be sent a calendar as a reminder of the upcoming third wave. To encourage response to the National Longitudinal Survey of Children and Youth, activity books for children were provided by interviewers in the first wave of collection. In the second wave, interviewers gave out calendars and showed newspaper clippings of coverage of the first wave to respondents. For the future third wave, newsletters are being considered for both children aged 10 and above and their parents. For the Survey of Labour and Income Dynamics, a newsletter about the survey, encouragement to respond and change of address card are sent to respondents before collection. After collection, respondents receive a letter of appreciation and a change of address card.

A great deal of effort is expended in designing respondent material. Research through the use of focus groups has led to a distinction by region in the content of the material prepared for SLID. Further research addressing the appropriateness, content and need for respondent-specific material is being considered for the Assets and Debt Survey. In fact, the question of what keeps individuals responding needs exploration as the longitudinal surveys age.

As part of Canada's 1996 Census of Population, a new data collection methodology, dubbed "centralized edit", was tested in a selected geographic area of the country (Béland 1996). In testing the mail-out of Census questionnaires where possible, it was anticipated that there could be a negative impact on the mail return rate owing to the switch from the traditional drop-off of questionnaires to mail-out as a mode of delivery. Thus, the inclusion of a mandatory appeal message on the mail-out envelope was examined using an interpenetrating sample to one-half the households in the Census test. It was found that the message, "By law, you must complete and return the enclosed census questionnaire", had the effect of an increase of 2.5 percentage points in the return rate of questionnaires from 80.7% to 83.2%. The increase was similar for both long and short Census questionnaires. As well, with the message, questionnaires tended to be completed and mailed back earlier although this stabilized after about one week.

Statistics Canada's Self-Sufficiency Project (SSP) has obtained excellent response rates by use of a number of strategies well suited to longitudinal surveys. It is a longitudinal study of income assistance (IA) recipients with the goal of assessing the efficacy of the offer of a temporary earnings supplement to help recipients make the transition to economic self-sufficiency. The sample, selected from provincial IA files, was partitioned into control and program groups. Persons in the latter group were offered a temporary earnings supplement if they could find a job within a specified length of time after entry into the study. After a baseline survey, follow-up waves took place after 18, 36 and 54 months. Sample intake took place over several months and, consequently, so did interviewing for each wave.

The 36 month follow-up required interviewing of children, parental consent for this, and the parent interview. Given the longer and more complex interviewing, an advance letter and more in-depth interviewer training were again used. Two other innovations were also used. A series of conference calls involving survey managers and interviewers was initiated to discuss challenges and techniques to obtain parental consent and child participation. This was found to be very helpful. As well, a small incentive of a twelve page activity book was given to each young child in the house at the time of the interview. Finally, taking a lesson from SLID, a newsletter will be sent to each study participant two to three months prior to contact for the 54 month interview.

3.9 Interviewers

Moving now from communications with respondents to that with interviewers, the SSP has benefited from the use of a small group of interviewers working only on this survey. Their training was lengthy and thorough, including special emphasis on obtaining informed consent from study participants. This was particularly important since survey data was to be linked to administrative data from three different sources and then shared with a third party involved in the research. Prior to contact for the baseline survey, at which the informed consent was obtained, study participants received an advance letter from their provincial Ministry of Social Services explaining why the study was being done and its potential benefits. Finally, survey questionnaires were made available in a set of four common non-official languages. These strategies combined to yield a response rate of 92%.

Although the General Social Survey has been conducted in annual cycles, its data collection is spread out across all months of the year. Thus like the SSP, it has been able to hire a small interviewing staff dedicated to just the one survey. This has helped keep its nonresponse rate low and has likely helped reduce other sources of nonsampling error.

In some cases, collection is done through third parties, usually only when survey requirements are such that there really is no other choice. Staff who are not professional interviewers sometimes need to be asked to conduct (hopefully brief) interviews or distribute questionnaires on behalf of Statistics Canada on top of their

regular responsibilities. Immediately, there is a perception of reduced importance of the survey, particularly if supervising staff do not feel a sense of ownership and interest in the research objectives. Without a great deal of special care, results are often less than satisfactory.

A recent pilot test sponsored by the research branch of a federal government department required some collection work to be done by the operational staff of another branch of the same department. Persons selected at this stage would become the sample for a longitudinal survey. Realizing the inherent challenge in this, the survey's project team took a number of communications initiatives to address it. Managers of the collection staff were initially contacted by telephone and sent basic information by mail. On the first day of collection, a Statistics Canada representative briefed the collection staff, their supervisors, and their managers on the purpose of the survey, the procedures, the importance of following them exactly, and other related matters. Each collection officer was provided with a copy of the procedures and an explanatory letter from a senior manager in the branch. Copies were posted at work stations and in common areas. Despite the best intentions, these efforts were still not enough. The sample size ended up being much smaller than expected primarily because procedures were frequently not followed exactly, to the extent that collection did not take place at all during some shifts or during busy periods. In some cases where a Statistics Canada representative obtained permission to be present during collection (and this was difficult), procedures were adhered to more closely, clearly indicating the desirability of ongoing monitoring by the actual survey taking organization. It is vital that such collection activities have the support of the collection staff and their managers.

Data collection for the large majority of Statistics Canada's surveys is done through its network of regional offices spread out across the country. Results are usually excellent. These are organizations with long histories in survey taking with very experienced staff and an outstanding culture in which doing a top notch job, including minimal nonresponse, is an integral part.

Over the last two or three years, data collection for a number of special surveys has been conducted through a new centralized telephone interviewing facility located at head office in Ottawa. These have all been conducted via CATI and some have been by RDD. This facility has been successful in getting these surveys up and running quickly and at reasonable cost, in fact more quickly and more cheaply than would have been the case through the regional offices. There are a number of reasons for this and a number of consequences that are illuminating.

As a centralized and smaller organizational unit, the centralized telephone interviewing facility is more flexible in its ability to respond rapidly to client needs. Many management activities are simplified and logistics of project implementation are easier. Questionnaire instruments can be reliably developed more quickly perhaps because the unit has fewer surveys active at any given time and hence its programming staff have fewer competing priorities. Development of training materials is done more quickly. Implementation of interviewer training is certainly easier and cheaper as fewer trainers are needed; in fact, the trainer is typically the same person who develops the training materials.

Staffing of interviewer positions, or "CATI clerks" as they are called, has been awkward. The volume of interviewing business for this group has not yet been large enough to make hiring a permanent interviewing staff viable. Consequently, they have been hired on a temporary or term basis.

The strong culture that exists in the regional offices does not yet exist in this relatively new group. This is made difficult also because turnover of CATI clerks has been comparatively quick. Thus, they are also a less experienced staff, not as adept at the various means used to persuade respondents. For example, two recent RDD surveys, one on electronic media usage and another a pilot test of the Sun Exposure Survey, had response rates of just under 50%. By contrast, Canada's Alcohol and Other Drug Survey - a RDD survey conducted through the regional offices in 1994 - achieved a response rate of 76%.

Further illustration of the point is provided via the subsequent Sun Exposure Survey, also conducted by the centralized facility, which got a response rate of 70% after making a number of changes including the advance letter test described earlier, a simple change to the call scheduler described above and some changes to the training for the CATI clerk staff.

Most of the staff had previously worked on both the Electronic Media Usage Survey and the Sun Exposure

pilot test as well as on another survey in the meantime, so they had become somewhat more experienced. Their training was upgraded from that used in the pilot test. Additional emphasis was placed on basic interviewer skills. A new module on refusal avoidance and conversion was developed. Based in part on the interviewers' own comments, the background information on the survey, including questions and answers useful to reply to respondents' questions and to help persuade them to comply was lengthened and made easier to use. These efforts facilitated a decline in the refusal rate from 25% in the pilot to 19% (about 13% for those sent an advance letter and about 21% for the remainder). This remains high, but further reductions can likely be achieved with a still more experienced and better trained staff.

There are some indications that some nonresponse to interviews done from the central location may result from the call coming from Ottawa and not from more local origins. It is suspected that public mood does affect respondent relations, especially when the relationship is with the federal government (Sheridan *et al.* 1995).

3.10 Collection

In order to maximize response to the longitudinal surveys on health (NPHS) and on children and youth (NLSCY), a supplementary collection period was added in June of 1995 in which unresolved cases were addressed. In fact, the NPHS has made this additional collection period a permanent feature of the survey and has dubbed it "quarter 5". Response rates were increased by two percentage points through this follow-up for NPHS in each of the 1994 and 1996 surveys with over one-third of all unresolved cases being converted to full or partial response.

One of the reasons for adding the supplementary period resulted from restrictions associated with the introduction of CAI. For example, in the first wave of the NPHS core sample, collection for each quarter was restricted to a two-week period in one month outside the Labour Force Survey collection period. This occurred because unresolved cases could not be stored on the laptop computers for later action. Storage has since been made possible and collection has been extended within the quarter and into subsequent quarters. The NLSCY carries over unresolved cases into its second period of collection.

In the vacation months of July and August, the Labour Force Survey extends its collection period with enumeration on Monday and Tuesday of the second week of collection rather than on the Sunday.

The supplementary buy-in RDD samples for the NPHS were done by independent sets of interviewers from the NPHS core sample. Part way through the collection period for these buy-ins, revised sample assignments were introduced to help improve response rates for harder to reach households. In earlier collection periods, the month's sample was assigned to each interviewer at the beginning of the month. At the end of the month, all unresolved records were assigned a final status code and returned to Head Office. This resulted in interviews for easy to contact households being done in the first two-thirds of the month with the hardest to reach ones being left to the final third. The revised procedure provided for a collection period of two months with the sample being assigned at the start of the first month and around the 23rd of the first month. Efforts were made for the sample sent out in the first wave to have a greater likelihood of containing telephone numbers for residential addresses. An advantage of this method is that more time is provided to contact the harder to reach households. In addition, at the end of the first month, instead of working only on the difficult households, a combination of these along with the easy ones from the second wave can be worked on at the same time.

In the second wave of the NLSCY, parental consent forms to administer tests in the child's school and to send questionnaires to the child's teacher and principal were incorporated into CAI as well as maintained on paper. This gave a better control over the consent process and thereby improved response through reduction of lost paper forms or late arrivals.

In general, the use of CAI permits a more rigorous and more frequent monitoring of response rates while field work is underway. Actions can be taken sooner to understand and alleviate problems. In fact, target response rates are set for many surveys and knowledge of shortfalls is more immediate with the use of CAI in both the regional offices and head office.

For SLID, to aid in response, there are two collection periods: one in January for the labour portion of the

survey as this month immediately follows the reference year for questions; the other in May for the income part as this is immediately after the deadline for completion of tax forms. In fact, for the income questions, respondents are asked for permission to have tax records accessed rather than have them complete the May income questionnaire.

3.11 Incentives

Although Statistics Canada does not generally offer incentives for survey response, some limited research has been carried out. Kumar and Durning (1992) reported on a test in the 1990 Family Expenditure Survey to evaluate the impact of incentives. The Statistics Canada publication "A Portrait of Canada" and a clipboard bearing the Statistics Canada logo were used as incentives to part of the sample. The incentive was given at the time of introduction of the interviewer and was not conditional on the household's later decision to respond or not. No significant effects of the incentives were found nationally although in some cities response rates were significantly improved. Of course, these results apply specifically to the two incentives used and do not necessarily generalize.

More recently, part of a test of redesigned collection procedures for the International Travel Survey (ITS) included the use of incentives (poster, travel planning guides, interactive CD-ROM). Results are currently being analysed.

Non-monetary incentives are being considered for the upcoming Assets and Debt Survey.

3.12 Other related initiatives

The International Travel Survey (ITS) questionnaires are distributed by Canadian Customs officials to returning Canadians and to international visitors for mail-back to Statistics Canada. Although the ITS is a survey of individuals but not a household survey, it is worth noting some of the efforts underway since the major goal of its current testing is to improve response rates. In addition to the testing of Japanese questionnaires, Japanese speaking interviewers and incentives already noted, the following are being tested or are under consideration for future testing: distribution of questionnaires by Statistics Canada, short entry interviews to obtain key variables to examine nonresponse bias adjustment methods, questionnaires available in other languages, exit surveys, use of administrative data for content or as a sampling frame, and an improved harmonization of data with the domestic travel survey.

3.13 Remarks

Survey managers are finding it harder and harder to maintain acceptably high response rates due to a variety of societal pressures, including a growing collective burden of telephone enquiries from telemarketers and survey taking organizations. They are dealing with this by putting a premium on varied and effective communications strategies with respondents. Communications experts are more often included on project teams. Interviewers are being better trained and equipped to be politely and effectively persuasive. Advance letters are being used more frequently than in the past, including in new situations, viz. RDD surveys.

All of the above discussion leads to an important issue. What level of nonresponse, or more generally of data quality, is required given the survey objectives? While it is reasonable for an ongoing survey of national importance such as the LFS to spend the budget required to achieve nonresponse rates of five percent - with substantial quality and nonresponse dividends for its supplements - this is often not affordable or perhaps even appropriate for many clients. Reducing or minimizing nonresponse must be taken in the context of some kind of Total Quality Management or fitness for use point of view in which there are many elements of quality to be managed so that the best overall quality is achieved given the resources available. Some examples of other aspects of quality among which there is some element of tradeoff are: making theoretical concepts operational, developing and testing questionnaires that will collect the necessary information in a problem free manner, developing a suitable sampling plan, minimizing assorted sources of non-sampling error other than nonresponse, etc. Survey managers need to take the actions necessary to minimize nonresponse within the constraints of their own data quality standards (Statistics Canada's, in our case) as well as the budget and data

quality requirements of clients.

4. Adjusting for nonresponse

Ignorable nonresponse can be compensated through increases in sample size in anticipation of an estimated nonresponse rate. Subsequently, adjustments are made in the weights applied to survey data. However, if nonrespondents differ from respondents in the characteristics measured, then nonresponse will contribute to the bias of estimates. As limited budgets generally preclude extensive research into the measurement of biases, the weight adjustments are generally done in ways that attempt to account for possible biases.

For the Canadian Labour Force Survey (LFS), if a nonrespondent was a respondent in the previous month of the survey, the previous month's data are used for the current month (Dufour 1996). This accounting for nonresponse applies only if there was a response in the previous month, i.e., data are carried forward only once. All remaining nonresponse is treated through weight adjustments within weighting classes. Weighting classes are defined in such a way that nonrespondents in a weighting class are more likely to have similar characteristics as respondents in the same class. For the LFS, weighting classes contain all households that belong to the same Employment Insurance Region (a subprovincial administrative unit used also for analytical purposes), belong to the same type of area (based on the type of frame from which the sample is drawn, i.e., a combination of geographic, sample design and urban/rural/remote factors), and have been in the sample the same number of months (i.e., in the same rotation group) (Kennedy 1997). Based on research and recommendations contained in Kennedy *et al.* (1994), the last adjustment using rotation group is new to the LFS and was implemented as part of the most recent sample redesign.

Nonresponse adjustment for supplements to the LFS is usually a fairly straightforward matter. Multiplicative adjustments are calculated using the same nonresponse adjustment groups - sets of strata - as the LFS. Sometimes, due to subsampling for the supplement, it is necessary to collapse strata further for nonresponse adjustment. When the ultimate sampling unit is the person, poststratification to province, age group and sex demographic control totals is also included. Adjustment for nonresponse for other special surveys is usually similarly straightforward. For the General Social Survey (GSS), nonresponse adjustment is done within each geographic stratum and month group.

Canada has a mobile population with about 12% of the population changing address each year. For movers, addresses and telephone numbers on frames can get out of date rapidly, typically resulting in higher nonresponse rates than for non-movers unless considerable time and energy are devoted to tracing. Since these two groups differ in substantive ways, careful nonresponse adjustment is needed to reduce bias.

Exploratory research was carried out on the Survey of Consumer Finances (SCF) in which nonresponse was modelled and a profile of nonrespondents determined (Bérard and Kumar 1995). Logistic regression techniques were used to model the probability of nonresponse in the SCF given a response in the LFS (since the SCF is a supplement to the LFS). Nonresponse adjustment factors were calculated on the basis of observed proportions and predicted proportions, along with a poststratification adjustment by age-sex groups. Future work may include examination of the impact on the standard error of survey estimates, the inclusion of earnings data instead of income data in the model, extension from the examination of the conditional SCF nonresponse categories to the unconditional probabilities, and the use of CHAID (Chi-Square Automatic Interaction Detection) techniques to generate nonresponse adjustment classes.

The School Leavers Survey was first conducted in 1991 to collect data on young adults aged 18 to 20 years. Four years later, respondents were contacted again in a follow-up survey to collect more data on their education and work experiences. The response rate in the School Leavers Follow-up Survey was about 66%. An exploratory study was carried out (Mian 1997) to compare several weight adjustment methods and investigate the impact of revised weights on survey estimates. Logistic regression techniques were used to create response propensity classes with weight adjustments based on response probabilities rather than proportions of respondents.

It is generally known that nonresponse to longitudinal surveys does not occur completely at random and there tends to be differential nonresponse among different subpopulations (Binder 1997). As a result, the method of adjustment for nonresponse requires special consideration. Binder *et al.* (1994) used logistic regression techniques to compare estimates using model-based weights with those using standard weighting. They concluded that modelling could reduce the nonresponse bias that results from attrition in a longitudinal sample. Its success, however, depends on the availability of good predictors of the nonresponse behaviour.

For SLID, logistic regression was used to identify predictors of response propensity from which weighting classes were created for longitudinal weighting (Michaud and Hunter 1992). With the preliminary SLID survey and two subsequent waves, questions naturally arose on which prior wave's data should be used in the model for nonresponse adjustment (Michaud *et al.* 1997). For SLID, the decision was made that data for modelling nonresponse would come from the preliminary survey for relatively stable variables (which represent most of the variables) and the most recent wave for the more dynamic variables.

In the NPHS, weighting classes for the 1994-1996 longitudinal file of individuals were determined at the province level using the CHAID algorithm within the software Knowledge Seeker (Stukel *et al.* 1997; Tambay *et al.* 1997). Geographic and design variables, household level variables and person level variables were considered. For cross-sectional household nonresponse from the 1996 NPHS, the same software was used but resulted in different weighting classes. For cross-sectional individual nonresponse for the 1996 NPHS, weight adjustments were at the provincial level. In the first wave in 1994, adjustment for household nonresponse was by geographic stratum/season combinations while individual nonresponse adjustment was based on province-age-sex classes. In the third wave of the NPHS, imputation may replace nonresponse adjustments in order to create a "square" or complete data set to facilitate analysis using standard packages.

For the first wave of the NLSCY, nonresponse adjustment was done by geographic region. For the second wave, research is being carried out to use Knowledge Seeker or logistic regression techniques to determine weighting classes for nonresponse.

More generally, Singh *et al.* (1995) found that commonly used methods of reweighting for nonresponse do not ensure internal consistency of estimates of gross flows. In addressing this issue, they considered and recommended a method of Generalized Weight Calibration in Sampling for nonresponse adjustment for longitudinal surveys.

5. Monitoring and reporting nonresponse

Statistics Canada's policy on informing users of data quality and methodology (Statistics Canada 1992) requires that survey documentation, whether on paper or in electronic format, include a discussion of data quality. In support of this policy, standards and guidelines for reporting nonresponse rates have been prepared (Statistics Canada 1993). These standards provide a basis for the reporting of information about nonresponse and are intended as an aid in analysing and reducing nonresponse. Reporting will generally include a detailed breakdown of response rates by important domains of interest and discussion of particular problem areas, if any. Technical reports on nonresponse are prepared for internal usage, not only for the general purpose of monitoring but also to determine possible directions for improvements in response in the field or in adjustments for nonresponse.

For the Labour Force Survey (LFS), detailed descriptions of data quality are prepared monthly and semi-annually. On a monthly basis, the report includes an overview of the sample; number of households and dwellings by month in survey; nonresponse rates by regional office, by month in survey, by type of area and by type of nonresponse; the incidence of Z-codes (technical problems) by regional office; vacancy rates by regional office; and slippage rates by province and by age and sex. Semi-annually, the quality report contains chapters on sampling error (coefficients of variation, design effects), nonresponse and vacancy rates, coverage, and edit discrepancy and failure rates. On occasion, chapters on special topics are included (e.g., phase-in of the new questionnaire, trend and seasonal analysis of the LFS nonresponse rate series). Nonresponse rates are

closely monitored by LFS managers and immediate feedback is provided to one or more LFS operations to maintain and improve quality. Some indicators are also monitored on a long-term basis to aid in identifying trends or effects of certain design or operational changes.

With the introduction of computer assisted interviewing (CAI) in the LFS and many LFS-related surveys, it is now possible to track nonresponse related statistics that did not exist earlier because of the complexity of their collection in a paper environment. Coding of the reasons for refusal helps identify causes and permits action to be taken to reduce refusals (e.g., training of interviewers in how to handle certain types of refusal, adapting the letter of solicitation sent to refusals that are not deemed hard-core) (Allard *et al.* 1996b). Automated case management can provide data that can be used not only to monitor individual interviewers but also to draw an overall picture of interviewer behaviour patterns such as the number of converted refusals, number of attempts before contacting the respondent, the best time of the survey week and day to complete an interview, duration of interviews as well as number of edit rules overridden (Allard *et al.* 1996a). With CAI, the Z-code which had formerly represented questionnaires received too late for processing owing to postal problems has taken on a new meaning, that of technical problems (described earlier in section 3.4). Originally, when first associated with technical problems, all Z-codes were treated as nonresponse. However, beginning with the LFS quality report of January to June 1995, Z-coded questionnaires from dwellings occupied the previous month or which were first month in the sample were treated as nonresponse while those from dwellings that were vacant the previous month were treated as vacant.

The presentation of weighted nonresponse rates was introduced to the semi-annual LFS Quality Report for the period January to June 1995. The weighted rates are calculated using the design weights. Generally, weighted rates exceed the unweighted rates because urban households, which have higher weights owing to their smaller sampling fraction, are more prone to nonresponse than rural households. Analysis of the weighted rates is presented in the LFS Quality Report nationally and by province.

Since the July to December 1995 LFS Quality Report, seasonal and trend cycle analyses of the nonresponse rate have been presented and examined for thirty-month periods. National and provincial seasonally adjusted and trend series of nonresponse rates are derived with Statistics Canada's X11ARIMA/88 software, first by using a multiplicative decomposition model, then using an ARIMA model adjusted to the series (when possible). Results help clarify the underlying movement of nonresponse rates.

Further exploration into the use of residuals modified control charts for the LFS (March and Wronski 1994; Hapuarachchi *et al.* 1997) to identify out-of-scope patterns as an aid in determining potential causes of variation in non-response is yet to be pursued.

In order to determine characteristics of LFS nonrespondents, a match of LFS nonrespondents was made with the Census. The LFS June 1991 sample, plus the exiting May rotation group, formed the basis for the linkage. Nonrespondent households from other months' rotations were added to increase the sample for the nonresponse study. Linkage to the Census, done through Statistics Canada's Address Register (AR), was limited to AR areas (Census Metropolitan Areas and Census Agglomerations). Addresses were standardized through the Postal Address Analysis System (PAAS) and matched to the AR to get the Census Province, Federal Electoral District, Enumeration Area and household number. Collectives and other types of units were removed. The household level match left 28,774 matched dwellings. The study of characteristics of nonrespondents confirmed results of a similar study done a few years ago, namely that nonresponding households are generally smaller. Also, nonrespondents in one-member households tended to be younger than respondents in other one-member households. Age distributions were similar in households with more than one person. Employment rates were slightly lower in nonrespondent households, especially those of size one.

Reporting of nonresponse rates among survey managers, particularly for special surveys, is important as a good knowledge of recent response rates and the factors affecting them is valuable to them in forecasting response rates for upcoming surveys. This information is critical for determining sample sizes to meet client needs as well as developing budgets and schedules for data collection.

With longitudinal surveys, the determination and reporting of nonresponse becomes more complex (Michaud and Webber 1994). Defining longitudinal and cross-sectional response over several waves, handling

partially responding households (i.e., some household members missing), handling partially responding individuals because of interviews occurring at different phases of the same wave (i.e., some blocks of data missing) and a possible proliferation of legitimately defined response rates and components of nonresponse (e.g., refusals, unable to trace) merit serious consideration.

6. Nonresponse databases and standards

The Central Nonresponse Information Database (CNID) is a repository of detailed response and nonresponse information for Statistics Canada's major recurring household and business surveys beginning with the 1993 survey reference year. The database is used to compute response and nonresponse rates, to monitor survey operations and to analyse trends over time and across surveys. The Statistical Data Documentation System (SDDS) is a repository of documentation on all of Statistics Canada's surveys and includes information about objectives, content, coverage, methodology, reference period, frequency, size and summary quality indicators, including basic nonresponse information.

Data reported to the CNID and SDDS are subject to Statistics Canada's standards and guidelines for reporting of nonresponse rates (Statistics Canada 1993), issued in support of the policy of informing users of data quality and methodology (Statistics Canada 1992). These standards, however, were designed with cross-sectional surveys in mind and additional measures must be considered for longitudinal surveys (Michaud and Webber 1994).

7. Conclusion

Although the overview provided above contains a wide variety of information and detail, a few main themes arise. Longitudinal surveys bring forth a more complex set of considerations in the adjustment, determination and reporting of nonresponse for both longitudinal and cross-sectional purposes and therefore standards need to be developed. As well, with the longitudinal surveys, information from previous waves or related questionnaires in the household have permitted the use of modelling in the adjustment for nonresponse. The introduction of new technologies has provided new information on nonresponse, more immediate access to data about nonresponse and improved call scheduling to increase the chance of getting response. Societal changes seem to require increased efforts on the part of field staff to maintain the levels of response to which we have become accustomed. Lastly, although more information is now available on nonresponse and nonrespondents, a sufficient understanding of response mechanisms and measurement of the bias component of nonresponse are still lacking.

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