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Outcome of the in-depth review of household survey methods**In-depth review of household survey methods in different countries****Note by Statistics Canada***Summary*

The Bureau of the Conference of European Statisticians reviews each year selected statistical areas in depth. The purpose of the reviews is to improve coordination of statistical activities in the region of the United Nations Economic Commission for Europe, identify gaps or duplication of work, and address emerging issues.

The Bureau reviewed household survey methods in November 2011, based on a paper by Canada. The present note is an updated version of the paper, taking into account the discussion at the Bureau meeting.

The outcome of the review is provided in document ECE/CES/2012/4/Add.1 and an overview of household survey methods in selected countries in document ECE/CES/2012/4/Add.2

I. Introduction

1. Together with censuses of population and housing and administrative data, household surveys play a major role as a source of social and demographic data. Household surveys have unique features that allow them to produce statistics that cannot be produced from either censuses or from administrative records. Compared to these other two sources the modern household survey is relatively new, having been spurred in large part by the development of probability sampling methods in the 1930s and 1940s. This may account in part for the relatively small amount of international coordination in the area of household survey methods generally, compared to international coordination efforts for the more traditional sources such as censuses and vital statistics.¹ As well, much of the international effort to date has occurred in the context of specific subject matter topics, e.g., income statistics, household budget surveys, migration, fertility, or time use, rather than for household survey methods as a unified whole.

2. For most national statistical offices (NSOs), household surveys form a key part of their statistical program and statistical infrastructure. But the methodologies for household surveys are facing unprecedented issues and challenges in the twenty-first century. The ever-increasing demands from data users, increasing resource constraints, increasing challenges in contacting households and increasing resistance from respondents have required NSOs to investigate and to invest in new methods to increase survey capacity, improve quality, reduce or contain costs, and lower response burden. While censuses also face some of these challenges, many of them are unique to household surveys. Accordingly, the Bureau of the Conference of European Statisticians (CES) requested at its November 2010 meeting that a paper be prepared to summarize the issues and challenges for the methodology of household surveys, based on the experiences of Canada, Australia, the United Kingdom and the Netherlands. This present version incorporates the discussion of the original paper at the CES Bureau's November 2011 meeting.

3. The main purpose of the paper was to identify issues for household survey methods in the United Nations Economic Commission for Europe (UNECE) region where further international coordination efforts would be beneficial. The report first describes some of the distinctive features of household surveys. Section III addresses related international initiatives and section IV describes the issues and challenges that NSOs face in carrying out household surveys. Sections V and VI present the recommendations to and comments from the CES Bureau in November 2011. A summary of the household survey methods used in selected countries is provided in a separate document.

4. The household survey methods considered in this paper are not specific to any particular subject matter, but they do exclude surveys that are conducted as an integral part of a census of population and housing. In particular, we exclude the use of sampling in a census, where some households get a longer version of a census questionnaire, and post-enumeration surveys conducted to evaluate census quality.

¹ See Section III for an overview of international coordination efforts in household survey methods.

II. Distinctive features of household surveys

A. Frequency and timeliness

5. Compared to a traditional census, which because of its size and complexity is generally limited to a frequency of every five or ten years, a household survey can be conducted much more frequently. For example, many NSOs conduct some form of Labour Force Survey on a monthly or quarterly basis in order to monitor the fast-changing conditions of the labour market. In other cases, the phenomenon under study may change more slowly, and a frequency of yearly or every few years is sufficient. In yet other cases, the need for data may be ad hoc, and the survey may only be conducted once. Household surveys have the flexibility to handle such variations in frequency, and generally have a much shorter lead time than that required for a census.

6. Frequency can be considered from the perspective of both how frequently the data are collected and how frequently they are published. In some cases, data may be collected on a more or less continuous basis, but only published when sufficient sample has been accumulated to permit the publication of reliable data. For example, the American Community Survey (ACS) in the United States collects data every month, but only publishes estimates annually, as one-year, three-year and five-year averages.²

7. While sometimes confused with frequency, timeliness refers to the delay between the reference date of the concept being measured and the date of publication of the results. Because of their smaller scale, household surveys generally have better timeliness than a census, with its massive amounts of data to collect, capture and process (although many countries have made impressive progress in improving the timeliness of the census). In the case of a monthly Labour Force Survey, for example, the results may be published just two or three weeks after the reference period. Timeliness can be improved by automating as many aspects of the survey as possible, using technologies such as Computer Assisted Interviewing (CAI) for simultaneous collection, capture and preliminary editing of the data; using automated coding, editing and imputation for “hands-free” processing; and using automated analysis and smart publishing tools for the preparation of survey outputs and reports.

B. Topics and populations covered

8. The topics covered in a household survey can be more complex and be covered in more depth than in a general vehicle like a census. For example, a census may include only two or three questions on labour market participation, whereas a Labour Force Survey may ask several dozen questions, thus measuring the desired labour concepts much more precisely.

9. Household surveys also have the ability to gather information on sensitive topics such as criminal victimization or on topics that may have a social (un)desirability dimension, such as drug use or drinking and driving behaviour. Such topics must always be approached with sensitivity and concern for the respondent, but are at least possible for household surveys to collect. Household surveys can even go so far as to collect physical measures such as blood or urine samples, to apply psychometric measures to assess education or literacy, or to measure distance travelled by a motor vehicle using a plug-in

² Although the ACS replaces the long form of the U.S. decennial census, its characteristics are closer to those of a household survey, and it is considered as such for the purposes of this paper.

monitor. In collecting data on sensitive topics or subjects that demand considerable effort on the part of the respondent, the NSO may choose to make the survey voluntary for the respondent, rather than compulsory (as a census generally is).

10. Unlike a census, which uses self-enumeration and/or temporary enumerators with minimal training in interviewing techniques, household surveys generally employ trained and experienced interviewers. A skilled interviewer may be essential in convincing respondents to cooperate with surveys with a high response burden, such as a household expenditure survey. An interviewer may also be needed to administer complex questionnaires or to deal with complex methodologies, such as the selection of one person within the household to be interviewed, or the collection of information on all household members from a single knowledgeable respondent (so-called “proxy” response). Nevertheless, training and monitoring of interviewers is still necessary in order to control interviewer effects, or even cheating on the part of interviewers. The use of CAI can facilitate such control, by recording so-called “paradata” about the interview process, such as the amount of time taken to ask each question and to enter the response.

11. As well as surveys of the general population, household surveys may target rare or specialized subpopulations, such as the disabled, minority groups, seniors, children or persons in specific occupations. In some cases, the specialized population can be identified from screening questions on a large general household survey, and the survey can be administered immediately if the person falls into the target subpopulation. In other cases, the subpopulation of interest is too rare, or is too complex to identify with one or two screening questions, and a sampling frame must be found that can identify the subpopulation more directly. Dual frame methods combining these two approaches may be used; see paragraph 16.

C. Sampling

12. Reliable household surveys of the type described above would be impossible without the use of probability sampling. Sampling can reduce costs, permit much faster production of results, and allow non-sampling errors to be controlled more closely because of the smaller scale of operations. Most household surveys conducted by NSOs have sample sizes ranging from a few thousand households to a hundred thousand households or more. The largest household survey in developed countries today is the ACS, with a sample size of 250,000 households each month. Because of the importance of sampling to household surveys, this section is divided into three parts: (i) sampling frames; (ii) sample design; and (iii) estimation methods.

1. Sampling frames

13. In many household surveys, the main interest is in the attributes of the persons living in the household. In order to select a probability sample of persons, it helps to be able to associate each person with one and only one unit on the sampling frame for the survey. In countries with a high quality population register, it may be possible to select a sample of persons directly from the register. In countries without a population register, a commonly-used approach is to associate each person with a single dwelling unit, i.e., the physical structure in which the person usually resides. The occupant(s) of the dwelling can then be contacted and a complete list of the individuals living there can be obtained. While this approach is effective for the majority of the population, it can break down for certain subpopulations. For example, some persons may have more than one residence (e.g., vacation homes, children in joint custody) while others have no residence (e.g., homeless persons). If such subpopulations represent an important part of the survey, the sampling methods may need to be adjusted.

14. Some countries have complete and up-to-date lists of addresses that can be used to select a sample of dwellings directly. Many other countries have no such list and creating and maintaining one would be prohibitively expensive; in this situation, area sampling methods have traditionally been used. Based on a recent census, the entire country might be divided into a number of geographic strata, and within each stratum a number of primary sampling units (PSUs) might be delineated. One or more PSUs would be selected within each stratum, all addresses within the selected PSUs would be listed, and a second stage sample of addresses would be selected to be surveyed.

15. In the last half of the twentieth century, the increasing penetration of telephones in many countries led to the development of telephone frames as an alternative to area frames or address list frames. Telephone frames take advantage of the fact that, while not every telephone number is associated with a dwelling, almost every dwelling is associated with at least one telephone number. Techniques such as random digit dialling (RDD) were developed to select samples of telephone numbers which could then be linked directly to the household. Considerable effort has been expended in refining telephone sampling methods to increase the percentage of attempted telephone numbers that represent a household (Groves et al 2001, Lepkowski et al 2008). Rapidly changing telephone technologies, such as the introduction of cell phones, continue to introduce new challenges for the use of telephone frames; see paragraph 56.

16. In the case of rare or specialized subpopulations, the use of multiple frames may be appropriate. A common situation is when there is a list frame that covers a large portion, but not all, of the subpopulation of interest. By combining such a frame with a more general area frame or telephone frame, the samples from the two frames can be combined to produce an unbiased estimate more efficiently than could be produced from the general frame alone.

2. Sample design

17. Household surveys conducted by NSOs are generally based on probability sampling, and a major factor in the design is the type of frame available. Over time, there has been a trend towards sample designs with fewer stages of sampling, which generally means a more efficient sample design. Stratification plays a role in sample designs for household surveys as well, not only in increasing efficiency but, perhaps more importantly, in controlling the allocation of the overall sample to the various domains of interest (e.g., geographic regions). Unequal probabilities of selection are also common; in a stratified multi-stage area frame design, PSUs are often selected with probability proportional to size.

18. Sample sizes of household surveys are typically sufficient to produce results at national and regional levels, and sometimes for major cities and major population subgroups, but in most cases they are not sufficient to produce estimates with sufficient reliability at the level desired by all users, for example detailed levels of occupation and geography. However the use of relatively low sampling fractions (often below 1%) for household surveys does mean that the chances of a household falling into the sample of more than one survey at the same time are relatively low.

19. In the case of regularly repeated household surveys, such as a monthly Labour Force Survey, the overlap of samples in successive months is an important consideration. Maximization of sample overlap generally allows for the most precise estimates of change from month to month and minimizes collection costs, but sample overlap must take into account the need to relieve respondents of the burden of responding at some point. A typical compromise is to use a rotating panel design, where the household is in the sample for a period of six or eight months. Similar considerations of costs, response burden, and data accuracy apply in the case of longitudinal surveys, which are designed to follow the

same sample of subjects (persons or households) over several waves of the survey. In some cases the respondent may be in the survey for several years.

20. So-called “two phase” sampling methods may be used in some cases. A typical approach is to use a large sample to identify the target subpopulation, and then to select a subsample of those so identified for the real survey of interest. A post-censal survey which uses a question on the census to identify a large first phase sample of the target subpopulation is an example of this technique. A more complex variant is the split form strategy, where doorstep screening is used to optimize the allocation of a set of questions to households, based on a topic by sub-population group matrix of selection probabilities.

3. Estimation methods

21. Samples for household surveys are often selected using stratification, multiple stages of sampling, and unequal probabilities of selection; consequently the estimation methods reflect the complexity of the design. Typically, each household or individual is assigned a weight that reflects the various features of the sample design. In the case of repeated surveys with sample overlap, it may be possible to use composite estimation methods, where estimates of change from the sample in common between two periods are used to improve estimates for the current period.

22. Estimation methods for household surveys must also take into account non-response to the survey. Non-response tends to be unevenly spread across population subgroups and is therefore a potential source of bias. Typically, the sampling weights are adjusted to take account of the differential rates of complete non-response. Item non-response is more likely to be handled by imputation methods, or by publishing “don’t know/refusal” categories. In the case of longitudinal surveys, the patterns of non-response may be quite complex, with response at some waves of data collection but not at others.

23. Auxiliary data, such as independent estimates of the population by geographic, age and sex groups, are often used in estimation for household surveys. Using auxiliary data in estimation can reduce the variance as well as reduce coverage biases resulting from the tendency of a household survey to miss some persons, such as young males, more than others. Where the survey produces estimates for both individual and household characteristics, and auxiliary information is available for both individuals and households (e.g., household size and type), it may be desirable for the weights for all individuals in a household to be the same and to be consistent with the auxiliary information for both individuals and households. Such procedures add further complexity to the estimation.

24. The calculation of weights that account for a complex sample design, that adjust for differential patterns of non-response, and that make use of auxiliary information and sample overlap, means that the estimation methods for household surveys are often very complex. The associated variance estimation methods may also be complex. A high level of statistical expertise may be required to develop and maintain the estimation methods.

D. Data collection, processing and dissemination

25. The methodology used to collect the data on the survey questionnaire depends on a number of factors, including the contact information (e.g., name, address, telephone number) available on the sampling frame, the suitability of the subject matter of the survey to different response modes (e.g., self-enumeration, telephone interview, personal interview), the costs of the various collection methods, the timeliness requirements, and the

accuracy of the resulting data. The three most common approaches of the past several decades have been mail, personal visit and telephone.³

26. Mailing the questionnaire to the household is usually the least expensive approach, but the questions asked in such a survey must be suitable for self-enumeration. Mail surveys alone also tend to suffer from low response rates, so non-response follow-up by telephone or personal visit may be required to achieve acceptable levels of data accuracy, resulting in a longer data collection period and additional costs. Sending an interviewer to the dwelling unit to conduct the interview in person is usually the most expensive approach, and in many developed countries it has become increasingly difficult to make contact at the doorstep. Nevertheless, for complex, long, or sensitive surveys, personal interviews may be the only feasible approach. Telephone interviews have replaced personal interviews as the most common means of data collection in many NSOs, due to the relatively high penetration rates of telephones, the development of telephone sampling methods, and the significantly lower costs of conducting an interview by telephone compared to in person.

27. In many cases a combination of methods is the most effective approach. In a monthly Labour Force Survey, the survey may be introduced to the household by an advance letter mailed to the household, the first month's interview may be conducted in person, and then arrangements may be made to conduct subsequent interviews over the telephone. For a survey that requires the respondent to keep a diary, such as an expenditure or a nutrition survey, the interviewer may conduct an initial interview in person, introduce the diary and show the respondent how to complete it, telephone the respondent during the recording period as a reminder, and return to the household at the end of the recording period to retrieve the diary and to complete any missing information.

28. Automation has been the most important trend in data collection over the past 25 years. The use of CAI for both telephone and personal modes has allowed better control over the interview process, resulting in higher productivity and improved data quality. Whereas processing used to be viewed as a distinct step that followed data collection, in the modern household survey the lines are blurred. The use of CAI permits a certain level of editing to be conducted during the interview itself, giving an opportunity to detect and correct errors, although how much editing can be done without interrupting the "flow" of the interview is a difficult issue. As well, many countries are now experimenting with the use of the Internet as a response mode for household surveys. In cases where a paper questionnaire is still used to conduct the survey, new technologies such as optical character recognition are replacing the older method of key-entry in many NSOs.

29. The remainder of the data processing typically takes place in a centralized environment at the NSO's headquarters. Automated coding systems may be used to reduce the time required to code questions with textual responses and to improve quality. Automated editing and imputation (E&I) of partial non-response and conflicting responses may allow the production of a "clean" response database, although for some surveys or certain survey questions manual intervention by subject matter experts may be required. Record linkage to other datasets to extend the range of variables available for analysis may sometimes be used. Once the analysis database is constructed, the next step is generally the calculation of weights. The final steps before dissemination are the production of the survey estimates, their review and analysis by the relevant subject matter analysts, and the production of the survey reports for release.

30. NSOs are increasingly using the Internet³ as their medium of choice for disseminating results. In the case of survey results with the potential to affect financial

³ Data collection by Internet is covered in paragraph 51.

markets (e.g., the monthly unemployment rate), care needs to be taken to ensure that the release takes place exactly at the pre-announced date and time. “Lockups” may be employed to permit access a short time before official release to let reporters prepare their stories and to permit government authorities to prepare for public reaction to the results, while ensuring the security of the data.

31. Data can be disseminated as aggregate tables or as public use micro-data files. In both cases, the NSO has a legal obligation to ensure the confidentiality of results. Compared to a census, a household survey has some inherent protection by virtue of the fact that it is based on a sample, and a potential intruder may not know whether a specific individual of interest is even in the sample. However for small or rare subgroups the risk of disclosure is greater and more attention to confidentiality protection measures is often needed.

III. International initiatives and efforts relating to household survey methods

A. United Nations Economic Commission for Europe/Conference of European Statisticians

32. The UNECE/CES, often in collaboration with other international organizations, has been active in organizing and steering several task forces on specific subject matter topics involving household surveys. Links to the activities and products of the initiatives described below are available on the UNECE website. To date, most of these Task Forces have completed their work and published the results.

33. In October 2004, the UNECE, the World Health Organization and Eurostat, in partnership with the Washington Group on Disability Statistics, established a Steering Group and a Task Force to promote internationally comparable measurement of population health status within the framework of official statistics; since 2005 the effort has been known as the “Budapest Initiative.” The Task Force developed a new common instrument for measuring health status in its multiple dimensions, to be included in population surveys as a recommended set of questions. The Task Force has completed its work. The Steering Group of the Budapest Initiative will continue to provide a focal point to countries for sharing experiences on measuring health status and disseminating the results of the work until October 2013.

34. Also in 2004, the UNECE, in cooperation with the United Nations Office on Drugs and Crime (UNODC), formed a task force on victim surveys. The Task Force’s work resulted in the publication in 2010 of a *Manual on Victimization Surveys* (UNODC/UNECE 2010). The manual provides methodological guidelines for the design of victimization surveys, with the ultimate goal of improving the international comparability of victimization surveys.

35. Another manual published in 2010 is *Developing Gender Statistics: A Practical Tool* (UNECE/WBI 2010). This manual was produced as part of the UNECE and World Bank Institute (WBI) project on engendering national statistical systems, and was the outcome of the work of the UNECE Task Force on Gender Statistics Training for Statisticians (formed in 2005) and various experts.

36. Also in the area of gender statistics, the UNECE Task Force on the Measurement of Gender-Based Violence (formed in 2005) developed a survey module on violence against women. The module is designed for the collection of data on a set of indicators agreed on by the United Nations Statistical Commission. The experience with testing the survey

module in several countries in different regions of the world will be used for further development of indicators and guidelines for measuring violence against women by the UNSD.

37. The “Suitland Working Group” was formed in 2008 under the umbrella of the CES Work Plan to Improve International Migration Statistics, with the objective of improving migration and migrant data using household surveys. The Group was formed out of a meeting convened in 2008 by the U.S. Census Bureau, the UNECE and the World Bank to discuss the contributions that household surveys can make to the measurement of migration and remittances. The Group is expected to complete its activities by the end of 2012.

38. Finally, a Task Force updated the *Canberra Group Handbook on Household Income Statistics* (see United Nations Statistics Division below). The updated Handbook was published in January 2012.

B. United Nations Statistics Division

39. The United Nations Statistics Division (UNSD) has been active in the area of household surveys for several decades. A National Household Survey Capability Programme was established between 1981 and 1995 to support the development of household surveys in developing countries. As well, several so-called “city groups” on statistical methodologies for specific subject matter topics have been active under the auspices of the United Nations. The original Canberra Group on Household Income Statistics was active from 1996 to 2000; the Rio Group on Poverty Statistics was active from 1996 to 2006, and the Washington Group on Disability Statistics, established in 2001, is still active. Links to the minutes and reports of these groups are available on the Internet site of the UNSD.

40. The UNSD also makes a number of methodology handbooks available on its Internet site; see Section VIII for a complete list. However many of these documents are relatively old, in one case dating to 1950; only two have been published since 1993. The 2005 publication *Household Surveys in Developing and Transition Countries* “...presents the ‘state of the art’ on several important aspects of conducting household surveys in developing and transition countries, including sample design, survey implementation, non-sampling errors, survey costs, and analysis of survey data.” *Designing Household Survey Samples: Practical Guidelines* was most recently published in 2008; it contains a chapter on the planning and execution of surveys, a chapter dealing with non-sampling errors in household surveys, and a chapter on data processing. Nevertheless, as the title suggests, the main focus of the document is on sample design and estimation methods.

C. Other international organizations

41. Only one document related to household surveys was found on Eurostat’s Internet site: *Household Budget Surveys in the EU: Methodology and recommendations for harmonisation – 2003*. The World Bank’s Development Economics Research Group has posted materials under the Living Standards Measurement Study, including guidelines for carrying out such surveys and a description of Household Survey Clinics, which can be given on request. The Internet sites of the Organisation for Economic Cooperation and Development and the International Monetary Fund were also searched, but no documents relating to household surveys were found. An International Household Survey Network with numerous international organizations as participants was formed in 2004, although it focuses on promoting data access and use rather than survey methods.

D. National statistical organizations

42. NSOs have occasionally collaborated outside the framework of formal international organizations. In November 2010, the U.S. Committee on National Statistics of the National Academies sponsored a two-day *Workshop on the Future of Federal Household Surveys*. Participants came from several U.S. statistical agencies, the academic sector, private sector survey organizations, and some international NSOs, such as Statistics Canada, Statistics Netherlands and the Office for National Statistics. Slides from many of the presentations are available on The National Academies Internet site and a Workshop Report is now available (National Research Council 2011). Other conferences have been held on specific household survey methods topics, such as the 1999 International Conference on Survey Non-response (Groves et al 2002), and Statistics Canada's International Methodology Symposia on the topics of longitudinal surveys (Statistics Canada 2009) and the interplay among censuses, surveys and administrative data (Statistics Canada 2010).

43. Overall, compared to censuses and administrative data sources such as vital statistics, international efforts in the area of household survey methods appear to be more fragmented, being either oriented towards specific subject matter topics, oriented towards developing and transition countries, or somewhat dated. Recommendations for increasing the amount of international collaboration in the area of household survey methods are provided in Section V.

IV. Issues and challenges

A. Declining response rates

44. The past twenty years have seen a downward trend in response rates for household surveys in most countries. For example, Statistics Canada's LFS, although it is a mandatory survey, has seen its response rates slip from 95% in 1995 to 90% in 2010. Response rates to the General Social Survey (conducted by RDD) are now often in the range of 60%, compared to the 80% range from 1985 to 2004. Declining response rates have several effects: increased sampling error because the achieved sample size is smaller, a higher risk of non-response bias, and increased collection costs due to the increased effort needed to maintain high response rates.

45. Abraham (2010) cites two reasons for the decline. First, it is becoming increasingly difficult to contact survey respondents. Physical security barriers, telephone and voice-mail screening, more households with no landline telephone, and an increasing proportion of households (particularly those composed of young adults) where all members are away during the day make it increasingly difficult to make contact with the household. Second, respondents are more and more reluctant to cooperate with surveys, due to increasing demands on their time, confusion of legitimate survey requests with market research and sales solicitations, and concerns about privacy and confidentiality. While many of these reasons also apply to censuses, they can have a more severe effect in a household survey context, where the burden on a household may be higher yet the survey (unlike a census) may be voluntary.

46. NSOs have tried a number of steps to cope with declining response rates. Efforts to maintain response rates include:

- (a) Improving survey introductions and questionnaire designs;

- (b) Offering multiple response modes (e.g., Internet) to make it more convenient for the respondent;
- (c) Increasing the amount of follow-up;
- (d) Targeting survey contacts to the times the respondent is more likely to be home;
- (e) Offering incentives (more often used in the private sector, but increasingly of interest to NSOs for surveys demanding unusual respondent effort, such as travelling to a mobile health clinic);
- (f) Using administrative data to replace survey data collection for selected variables; and
- (g) Improving interviewer training.

47. Efforts have also been made to improve the statistical methods for treating non-response after collection, such as using paradata in the imputation or estimation process, using administrative data for imputation, and taking account of imputation in the estimation of survey variance. With no end to the trend in sight, household survey non-response can be expected to be a growing field of study (Bethlehem et al 2011).

B. Resource constraints

48. In many countries, NSOs have been subject to budgetary cuts or freezes imposed by governmental funding authorities, yet the costs of conducting surveys in the traditional manner has often risen even faster than inflation. Higher transportation costs, increased interviewer wage rates, and the additional effort needed to maintain response rates have all contributed to higher costs per completed case. These cost increases have been offset to some extent by the automation of the collection, processing and dissemination processes, but not entirely. NSOs have therefore invested in research into the cost structures of the survey process, with a view to identifying what operations are less productive and can be dropped or modified. Other options may involve replacing surveys entirely with administrative data, where this is feasible.

C. Increasing user demand

49. The increasing role of statistical data in decision-making by governments, the private sector, and even the individual citizen has led to a constantly increasing demand from users. The demand has several dimensions. First, users want a wider variety of data than ever before, covering emerging topics or topics that were once considered too sensitive. Second, users expect more timely production of results with no loss in quality. Third, users want data that are more detailed, both in terms of small geographic areas and subgroups of the population. Fourth, as users become more sophisticated and have the ability to bring together and compare multiple sources of information, they are becoming more demanding of the quality of the data and the coherence of the data with other sources. At the same time, disseminating data primarily by the Internet reduces interaction with the user, making it difficult to understand his or her needs. NSOs have found that they must develop innovative ways to reach the users of their data, to measure user needs and expectations, and to manage the expectations that users have of the statistical agency.

D. Impact of new survey collection modes

50. Household surveys in many NSOs have seen a long-term trend away from personal interviews toward telephone interviews, primarily due to the expense of travelling to the respondent's home. However the increasing use of call screening, the increased proportion of cell-phone-only households, and logistical and statistical difficulties in conducting surveys by cell-phone have led some NSOs to question the future of telephone surveys as a viable option for the future. On the other hand, for at least some simple surveys, the automation of the survey collection process can extend to methods such as automated survey calls with touch-tone response.

51. More recently, Internet penetration rates in many countries are at the point where there is much interest in using the Internet as a response mode. The Internet is seen as a way of reducing costs, improving data accuracy and addressing privacy concerns, and many countries now offer Internet as a response option in their censuses. For household surveys, the Internet is probably most appropriate in repeated surveys such as the LFS where, once contact has been established and cooperation obtained, the respondents can simply be sent an email each month with a link to the Internet site where they can record their answers.

52. There are many considerations in moving to the Internet as a response option. First and foremost, the NSO must ensure the security of the process, not only in reality but as perceived by the public. Second, the questionnaire and its design must be suitable for self enumeration, and respondents must be able to request additional help if needed. Third, in household surveys with tight deadlines, respondents must be encouraged to reply promptly, and if they do not, the NSO must have the ability to quickly switch to telephone or personal interviews to collect the data. To date, the use of the Internet by most NSOs has been viewed as an additional response channel, rather than as a complete replacement for existing modes. The operational need to coordinate multiple response modes and the effects that different modes may have on the data are two of the major challenges facing the introduction of this new but promising collection technology. Whether to tailor the questionnaire to the collection mode or to try to standardize it across modes is another issue which has been the focus of much debate.

E. Sampling frames and survey capacity

53. The area frame approach has served well for several decades. Many NSOs without population registers foresee maintaining the area frame approach, while trying to make sampling frames more efficient by reducing the stages of sampling, reducing the costs of address listing, or including value-added information (e.g., telephone numbers) in their address lists. Several NSOs are also working on the convergence of their address lists for their census and household survey programs. Integration of the listing operations of the census and the household survey programs means that only one software application is needed in the field, only one database needs to be updated, and the scheduling of listing can be optimised between the census and household survey programs. Such developments may be incremental: as the coverage, quality and timeliness of master address lists improve, more and more parts of the area frame can use them directly. Technologies such as GPS and hand-held or tablet computers also hold promise as ways of making address listing more efficient and accurate.

54. Regularly repeated household surveys are often used as cost-effective platforms for conducting supplementary surveys, but their capacity to conduct "live" supplements is limited by the sample size of the main survey and the willingness of its respondents to

answer additional questions.⁴ The frame of an existing survey can also be used to select separate samples of households or PSUs, at additional cost and complexity (although still much less than designing the survey from scratch). In many NSOs, however, the user demand for new and faster surveys has stretched existing survey vehicles and their frames to the breaking point. Many NSOs are struggling with the challenge of how to provide a household survey capacity that is cost-effective, is flexible enough to meet the needs of a wide variety of data demands, and can respond to new needs in a timely manner. The possibility of rationalizing their household survey programs by integrating existing surveys or by developing “Master Samples” is of interest to several NSOs.

55. The use of a recent census to select a sample of persons or dwellings may be considered as a way of increasing capacity. In the case of a post-censal survey planned in advance, individuals may be selected and interviewed just a few weeks after the census. In other cases the need for the survey may arise some time later, and the census may be used to select a sample of dwellings that contained persons with the desired characteristics at the time of the census. Such an approach can often take advantage of the tendency for out-movers to be replaced by in-movers with similar characteristics. In this case, however, measures may be needed to avoid the potential for bias due to frame under-coverage of new dwellings. In countries where the census is conducted on a continuous basis rather than at one point in time, or is based on a population register, the design of the follow-on survey will be necessarily affected. A particular issue with using a census as a frame is that of privacy; respondents need to be informed at the time of the census that it may be used to select samples for other surveys. In some countries, such as the United Kingdom, legislation may actually prevent the use of the census for sampling. Despite the privacy issues, however, increasing user demand for data and the need to control costs has encouraged many NSOs to look to their censuses as an additional source of household survey capacity.

56. The rapid development of telephone technology has made the use of telephone sampling techniques extremely challenging. In particular, the growth of cellular telephones in the past 10 to 15 years threatens to disrupt the future ability to use telephone numbers as a sampling frame. A cellular telephone number tends to be associated with an individual rather than his or her household, yet not everyone has a cell-phone while some persons have more than one. More and more households have no landline telephone at all, and such households tend to have very different characteristics than households with a landline telephone, making it increasingly difficult to ignore them. Yet there are numerous challenges with conducting surveys by cell-phone: the respondent may not be willing to pay for the call, the respondent may be in a public place when contacted, or the respondent may be driving a motor vehicle, raising safety issues. From a sampling perspective, the complex relationships among telephone numbers, the household, and the persons within it may make it necessary to ask a series of additional questions so that the responses can be weighted properly.

57. At present, the use of Internet-based addresses (e.g., e-mail addresses, social networking sites such as Facebook or LinkedIn) as a general sampling frame for household surveys has challenges so extreme that it seems unlikely that NSOs will be able to use such frames for sampling any time in the foreseeable future. There is no standardization of e-mail addresses or other types of Internet addresses and thus no ability to associate them with a dwelling unit or a person in a particular geographic area. As well, any unsolicited contact made by e-mail is highly likely to be screened out by spam filtering software. The

⁴ In this regard, it is interesting to note that Canada keeps its LFS respondents in sample for six months, Australia for eight months, and the United Kingdom and the Netherlands for five quarters.

most promising approach is likely to add Internet addresses to existing frames and to exploit the Internet as a collection tool, rather than as a sampling frame. However, the use of e-mail addresses and social media sites in surveys that require tracing of respondents may be an area worth exploring.

F. Data for small domains

58. As noted above, a dimension of increasing user demand is that of data for small geographic areas and subgroups of the population. With a regularly repeated survey, one approach is to accumulate enough sample size to produce time-period moving averages, trading off detail in the time dimension for increased detail in the geographic or subgroup dimensions. The use of small area estimation (SAE) methods is another approach that has received much interest. Generally, SAE methods combine data from the household survey with auxiliary data, such as census data or administrative data, linked together by a model. However, if the model is not suitable, the associated small area estimates may be seriously biased. In practice there may be thousands of small area estimates produced, and it is likely that at least some local authorities will have sources of data that contradict the NSO's small area estimates, potentially calling the entire SAE approach into question. In addition to developing the methods themselves, NSOs must endeavour to educate the users of the data about the limitations of such methods.

G. Integration with censuses and administrative data

59. As administrative data sources (sometimes referred to as secondary sources) become more available at the same time that traditional household surveys and censuses become more challenging, both the need and the opportunities for closer integration of these three sources of data are growing. As previously described, censuses or administrative sources may be used as sampling frames for household surveys, and data derived from censuses or administrative sources may be used in estimation. A bigger challenge is to use administrative data as a substitute for survey collection. Initiatives such as the Dutch Social Statistics Database, which integrates administrative and household survey data at the micro-data level, may be the way of the future for many NSOs. However it does raise issues of the differences in concepts measured by different sources and the effects of different collection methods on the resulting data. Issues of privacy, where data collected for one purpose are used for another purpose, are also critical to consider. For a recent in-depth review of the issues surrounding the use of secondary and mixed sources for official statistics, see UNECE 2010.

H. Paradata and responsive designs

60. The automation of collection has made it possible to record a huge amount of information about the process, even as detailed as the number of seconds spent on each question during the interview. The challenges in using paradata are several. The first set of challenges is to determine what information should be collected and how to organize it most effectively for analysis. This is often an iterative process, and as experience is gained in analysing paradata and assessing their usefulness, one can expect the salient information to be identified. A second issue is that of privacy; interviewers and respondents need to be informed that such paradata are being collected and how they may be used. A third challenge is to identify where in the survey process paradata can be used; some paradata may be suited to identifying problematic questions, fine-tuning edits or improving

interviewer training, while other paradata may be used in estimation to reduce non-response biases.

61. In cases where paradata can be collected and used in real time, so-called responsive designs can be employed. For example, it may be possible to identify subgroups of the sample that need additional follow-up, to monitor the costs of the collection operation, or to cut off the collection operation when additional effort is unlikely to affect the survey estimates. Such applications are relatively recent but will likely grow as experience is gained (Groves and Heeringa 2006).

I. Longitudinal surveys

62. Longitudinal surveys have several unique challenges; chief among these is keeping response rates high over several waves of the survey. Attrition in a longitudinal survey may be caused by an inability to maintain contact with persons or households who move, or by the eventual fatigue on the part of the respondent, resulting in a refusal. In some cases, however, a non-response at one wave may be followed by a response at the next wave. The resulting “Swiss cheese” patterns of non-response may be difficult to deal with, and depending on the survey may result in complex weighting adjustments. Another challenge with longitudinal surveys occurs when households dissolve and re-form; rules on whom to keep in the sample or to add to the sample must be developed. Third, some longitudinal surveys attempt to provide cross-sectional as well as longitudinal estimates by the addition of a sample of births in the population at each wave; two sets of weights may be required in such cases.

J. Data analysis for complex surveys

63. Because sample designs and estimation methods for household surveys are often complex, there are special issues for the analysis of data that goes beyond simply the production of totals, means and percentages. For example, treating the data as if they came from a simple random sample can lead to severe underestimation of variances. During the past few decades, a considerable amount of research has focussed on methods for analysing data from complex surveys. One of the challenges is simply to educate data analysts that there are issues in dealing with data from complex surveys and that solutions are now available for many common problems. A second challenge is to develop methods for even more complex situations, such as data from longitudinal surveys.

64. As well, decreasing response rates have resulted in higher rates of imputation. Because imputation increases the variance of the estimates, there has been much interest in how to estimate the variance due to imputation and how to report it to users.

V. Conclusions and recommendations

65. The household survey faces a series of methodological challenges over the next few decades. Principal among these are the effects of declining response rates on cost and quality, the deterioration of telephone frames due to rapid technological changes, and the increasing demands from data users. On the positive side, the automation of survey operations, the development of better address lists, the emergence of the Internet as a collection mode and the increasing availability of high quality administrative data show promise as ways to address these challenges.

66. Much of the methodological work on household surveys has been carried on within individual NSOs. Compared to censuses of population and housing and administrative data

there has been relatively little international cooperation effort that has taken place outside of the context of specific subject matter topics. The CES Bureau was therefore invited to consider the following recommendations:

(a) Establish a task force of interested countries of the CES to develop a work program to address cross-cutting issues facing household survey methods in the UNECE region over the next decade;

(b) Request that the task force, in cooperation with the UNSD, review the existing UNSD handbook series to assess its future role and to make recommendations on how to modernize it where appropriate. The latter may involve updating some of the earlier handbooks on household surveys to reflect modern household survey methodologies, or developing new handbooks to fill gaps in the existing series. More specifically, the following were suggested as priorities:

(i) The 1991 handbook "Follow-up Method in Demographic Sample Surveys" be updated and expanded to cover the more general topic of Non-response in Household Surveys, addressing methodologies for both controlling and treating non-response;

(ii) The 1986 handbook "Sampling Frames and Sample Design for Integrated Household Survey Programmes – Preliminary Version" be updated and expanded to cover frame issues more generally, including the rapidly evolving situation with telephone frames and the challenge of household survey capacity in the face of increasing user demand;

(iii) The 1982 handbook "Survey Data Processing: a Review of Issues and Procedures" be updated to reflect the use of modern technology, including topics such as CAI and the collection of data by Internet;

(iv) The other handbooks prior to the year 2000 be reviewed, any of their content that is still relevant be incorporated into newer handbooks, and the older versions archived;

(c) Request that the task force make recommendations at a future meeting of the CES Bureau on ways to improve the sharing of information on household survey methods among NSOs and researchers. Possibilities include the creation of an Internet knowledge base on household survey methods, participation in and promotion of conferences and workshops on the subject of household survey methods, and liaison with related task forces, such as those on the use of secondary sources or on specific subject matter topics, in order to identify cross-cutting issues that need to be addressed.

VI. Comments from the Bureau of the Conference of European Statisticians

67. The CES Bureau considered the topic at its November 2011 meeting in Geneva, Switzerland. In addition to the paper by Canada, Australia, the United Kingdom and the Netherlands, the discussion was based on comments on the paper by UNECE, Ukraine and Eurostat. The following points were raised in the discussion:

(a) One of the main challenges related to household surveys is their integration with other data sources. Surveys are no longer discussed as individual tools but as part of a data collection system. Eurostat and many national statistical offices (NSOs) are currently working in this direction. Another opportunity to discuss the issues related to household surveys is provided by the international fora on data collection methods, such as the High-

level Group for Strategic Developments in Business Architecture in Statistics (HLG-BAS) and the first expert meeting on data collection to be organised by UNECE in autumn 2012;

(b) Integration of surveys and administrative sources raises new issues that deserve attention, such as the different treatment of data and new methods and information technology (IT) tools needed to integrate the data from different sources. Furthermore, census data are becoming an increasingly important benchmark against which survey results are verified. All this has implications for the improvement of knowledge of staff and organization of work;

(c) Development of guidelines or handbooks is a slow process while the area is changing rapidly. Reviewing handbooks is also considered of low priority for developed countries. Establishing a wiki on household survey methods looks more promising as it would permit identification of the gaps where to focus further efforts;

(d) Official statistics should make use of the important advances on household survey methods in academic research. There is room for closer cooperation with academia in this area;

(e) Many countries have progressed quickly with new methodologies such as web surveys and could share their experience and software. The paper could explore more the modern approaches to household surveys;

(f) It was noted that the World Bank, the Food and Agriculture Organization (FAO) and, until recently, the United Nations Statistics Division have been developing materials on survey methodology, primarily for less developed countries. There is a continuing need for guidance on traditional household survey methods in countries where labour cost is low while the cost of new IT tools is high.

68. The CES Bureau then reached the following conclusions:

(a) Household surveys are important building blocks of national statistical systems and they need to be better integrated with other sources. Some resources that allow further exploration of this integration already exist, but there is no single repository or entry point that links to all relevant resources. For the data collection expert meeting in 2012, the secretariat will prepare a list of available resources on this topic, such as web sites and international events, contacting the International Association of Survey Statisticians, the World Bank and other organizations as necessary;

(b) Canada will update the paper reflecting the discussion at the Bureau meeting. The updated paper will be submitted to the CES 2012 plenary session for information;

(c) The meeting on data collection in autumn 2012 should deal with data collection through household surveys, among other topics. A decision on further activities related to household survey methods is therefore postponed until the end of 2012 when the meeting on data collection has taken place.

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VIII. United Nations Statistics Division handbooks

The following UNSD handbooks are listed in reverse chronological order. All are available as PDF downloads, although older ones are PDF images only.

| <i>Title</i> | <i>Year</i> |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Designing Household Survey Samples: Practical Guidelines | 2008 |
| Household Sample Surveys in Developing and Transition Countries | 2005 |
| Sampling Errors in Household Surveys | 1993 |
| Follow-up Method in Demographic Sample Surveys | 1991 |
| Measuring Literacy through Household Surveys: A technical study on Literary Assessment and related Education Topics through Household Surveys | 1989 |
| Sampling Frames and Sample Design for Integrated Household Survey Programmes – Preliminary Version | 1986 |
| Handbook of Household Surveys (Revised Edition) | 1984 |

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| Survey Data Processing: a Review of Issues and Procedures | 1982 |
| Non-sampling Errors in Household Surveys: Sources, Assessment and Control | 1982 |
| Recommendations for the Preparation of Sampling Survey Reports (Provisional Issue) | 1964 |
| Preparation of Sampling Survey Reports | 1950 |
