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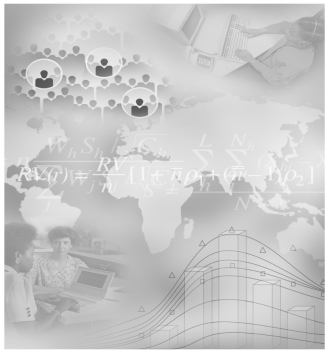
The Newsletter of the International Association of Survey Statisticians
No. 46 July 2002



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The Survey Statistician is published twice a year in French and English by the International Association of Survey Statisticians and distributed to all its members. Information for membership in the Association or change of address for current members should be addressed to:

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In This Issue

No. 46, July 2002

Letter from the President

Tore Dalenius

Tore Dalenius left us at the beginning of this year. One of the founding fathers of our Association, he was the first Scientific Secretary from 1973 to 1977 and then served as President from 1979 to 1981. I myself met him only briefly once or twice, and I am hardly qualified to write about his career and accomplishments. This issue contains a lengthy tribute by two of our eminent members, Lars Lyberg and Anders Christianson, fellow Swedes who knew him well.

Committees

The Programme Committee for the **Berlin** Session, which is chaired by Danny Pfeffermann, completed its work, which was finalized in the ISI's Programme Committee. In this issue, Danny reports on the conclusions they reached and the decisions they made.

The Programme Committee for the **Sydney** Session, chaired by Pedro-Luis Do Nascimento Silva, is being organized. Pedro-Luis can be contacted at pedrosilva@ibge.gov.br.

Short Courses for the Berlin Session

Our Scientific Secretary, Seppo Laaksonen, has already started organizing the short courses that will be offered, as dictated by tradition, on the margins of the Berlin Session. This is one of the Association's core activities.

Six courses are now planned:

1. Workshop on Survey Sampling
2. Variance Estimation in Complex Surveys
3. Small Area Estimation
4. Editing and Imputation of Survey Data
5. Business Survey Methods
6. Designing Surveys:
    - Introduction to Questionnaire Design
    - Mail and Internet Surveys

The final list, with the names of the course leaders, can be found in the Announcements section of this edition of *The Survey Statistician* and will also be available on the web site.

The courses will run from 1 to 2½ days, depending on the topic. They will be held just before the Berlin Session, which takes place August 10-13, 2003. Each member may take up to three courses. The location is still under discussion with the Session's German organizers. All courses will be led by high-level international experts and will be designed for survey statisticians and specialists from all countries. As in previous years, support will be sought for statisticians from developing and transition countries.

Members are encouraged to send any comments they may have concerning these short courses to Scientific Secretary Seppo Laaksonen (Seppo.Laaksonen@ Stat.Fi).

Publications

After a few technical difficulties, the **Jubilee commemorative volume** entitled *Landmark Papers in Survey Statistics* was distributed to all of our members. On behalf of the entire Association, I would like to take this opportunity to reiterate my deepest appreciation to those who helped produce this volume: Gad Nathan and his committee, who selected the articles; the U.S. Census Bureau and Bureau of Labor Statistics, which worked on the layout; and the Australian Bureau of Statistics, which printed and distributed it (Australia's Chief Statistician, who was personally involved in this venture, is Dennis Trewin, also the current President of the ISI).

Volume 2, provisionally titled *Landmark Papers in Survey Methods*, is in preparation. The Ad Hoc Committee, chaired by Lars Lyberg, includes Barbara Bailar, Paul Biemer, Martin Collins, Mick Couper, Edith De Leeuw, and Denise Lievesley. I have no doubt that this second volume, on a theme closely related to that of volume 1, will be of equally high quality.

In the last issue of *The Survey Statistician*, I mentioned the plan to publish a selection of Leslie Kish's papers as a tribute to the former President of IASS who left us in October 2000. Graham Kalton, Steven Heeringa, and Colm O'Muircheartaigh are the editors for this volume and Leslie's widow, Rhea Kish, is providing editorial support. The volume will be co-published by IASS and John Wiley and Sons. With financial assistance from Mrs. Kish and her family, IASS is planning to distribute

copies of the volume to all IASS members at no cost to them. IASS is deeply indebted to Mrs. Kish and her family for their extremely generous support that makes this possible.

Preparation of the Proceedings of the Seoul session by David Binder, former Chair of the Programme Committee and now Vice-president of the Association, and Eric Rancourt is moving forward and we hope to see them soon on our desk.

Local Representatives

As I mentioned in the last issue of *The Survey Statistician*, I wrote to all the Local Representatives in October 2001, describing once again the role they were expected to play and asking them to confirm their willingness to do so. Of the 83 representatives contacted, only 22 replied, either confirming their commitment (14) or suggesting someone else to replace them in a task that, for various reasons, they were no longer able to take on (8). This poor showing is a great disappointment both to Vice-President Anders Christianson, whom I had asked to lead and coordinate the Local Representatives network, and to myself. We remain convinced that Local Representatives are an excellent way to recruit and keep new members and ensure that they participate in the Association's activities. A list of Local Representatives who confirmed their commitment or joined the network as a replacement for someone else is provided at the end of the note from the Vice President, Anders Christianson. I have attempted once again to contact nonrespondents to ask them to continue working for the Association, but at the time of writing, I had no results to share with you.

IAOS/IASS Joint Conference

As you know, the International Association for Official Statistics (IAOS), which, like our association, is affiliated with the International Statistical Institute, holds a conference every two years, in years when there is no ISI conference. Though it is not an official rule, every second such conference is organized jointly with the IASS. That was the case for the 1998 conference, held in Aguascalientes, Mexico, the theme of which was "Statistics for economic and social development." The 2002 conference was to take place in Abidjan, Côte d'Ivoire, on the theme of poverty (the exact title remains to be determined), but it had to be postponed until 2004 because of the political situation. Côte d'Ivoire confirmed its invitation for 2004 at the ISI conference in Seoul. I wrote to IAOS President Paul Cheung and asked him to confirm his commitment to organize the conference jointly, which he did.

A number of the conference's key organizers met in New York on March 5, on the margins of the United Nations Statistical Commission meeting. In attendance were Dennis Trewin, President of the ISI; Paul Cheung, President of the IAOS; Jean-Louis Bodin, former president of the ISI; Ibrahima Ba, Director General of the Institut National de la Statistique de Côte d'Ivoire; and Luigi Biggeri, President-Elect of the IASS. It was agreed that the conference's Programme Committee should be formed as quickly as possible. I hope to have more details for you in the next issue of *The Survey Statistician*.

Xavier Charoy

Note from Anders Christianson, Vice President of IASS

Local Representatives

In September of last year, Xavier Charoy sent out a message with "terms of reference" to all registered Local Representatives. In this letter, Xavier asked the representatives to confirm whether they wanted to continue and, if not, to suggest someone to replace them, and to send their answers to me. He also stressed the need to recruit new members to the Association and the important role of the Local Representatives in this endeavor. Eighty-three people were thus contacted by e-mail (36), fax (20), or surface mail (27).

New Representatives

In response to the request, a number of former representatives expressed their intention to resign and suggested replacements. Thus, eight new Local Representatives were identified. I thank them for their willingness to help the IASS and bid them a warm welcome.

Meager Response

The response to Xavier's request was very low. Not even one-third of the contacted representatives responded. There may be different reasons for this, of course. Some have reported difficulties such as government restrictions on the use of PCs and Internet connections for this purpose. In other countries, warlike situations may make working for the IASS a low priority project. One important reason for the low response is that the addresses we have are invalid because they have changed. Please notify the Secretariat whenever your address changes!

Recruiting New Members

In October of last year, I began soliciting for new members in Sweden and have approached Local Representatives, encouraging them to undertake similar campaigns in their countries. To my knowledge, recruiting campaigns have been performed in only a few countries, including Canada, Croatia, Spain, and Sweden. Prototype solicitation letters are now available in English, French, and Spanish (Thank you, John Kovar and Florentina Alvarez!). The letters may be used in any country with only minor changes, and I have distributed them to most country representatives. If you do not have one in an appropriate language, please let the Secretariat know!

It is, in my opinion, not fair to put the whole responsibility for recruiting new members on the Local Representatives. I think that the Council, and actually all members, should help by drawing potential members' interest to the IASS and encouraging them to enroll.

So, please, all Local Representatives, ask other members in your country or organization to help you in your important task of maintaining the membership and enlarging it.

Local Representatives

(in alphabetical order)

Nguyen Quoc Anh, Vietnam
Jairo Arrows, South Africa
Ouagadjio Bandoumal, Chad
Philippe Eichenberger, Switzerland
David Fitch, Guatemala
Ron Fresco, United States
Malka Kantorowitz, Israel
John Kovar, Canada *
Danute Krapavickaite, Lithuania
Janis Lapins, Latvia
Geoff Lee, Australia
Peter Linde, Denmark *
Peter Lundquist, Sweden *
Peter Lynn, United Kingdom *
Alicia Masutis, Argentina *
Laszlo Mihalyffy, Hungary *
Vitalis Muba, Tanzania
Benoît Riandey, France
Jaebok Ryu, Korea
Pedro Luis Do Nascimento Silva, Brazil *
Paavo Väisäinen, Finland *
Janusz Wyvial, Poland

* Replacing a former Local Representative

CHANGE OF ADDRESS

Members are encouraged to inform the IASS Secretariat of changes of address as soon as possible. Mailings of the forthcoming book of Leslie Kish's selected papers, proceedings of the IASS papers presented at the ISI sessions, and *The Survey Statistician* will be delayed and may be lost if the Secretariat does not have your correct address.

You may notify Ms. Claude Olivier of your change of address by completing and mailing the Change of Address form given at the end of this newsletter. Alternatively, you can provide the same information to Ms. Olivier by email to claude.olivier@insee.fr.

In Memorium

Tore Elon Dalenius 1917 - 2002

One of the founders of the IASS, Professor Tore Elon Dalenius, of Providence, Rhode Island, U.S.A., passed away at the age of 84 after a period of illness. His closest relatives are his second wife, Marjory, his son Eskil and family, and his brother Lars and sister Dagmar. Tore Dalenius was the Association's first Scientific Secretary from 1973 to 1977, the Chairman of the Program Committee for the 1975 session, and President from 1981 to 1983.

Tore Dalenius was born in 1917 in Jukkasjärvi in Northern Sweden and studied at the universities of Stockholm and Uppsala. His doctoral thesis, "Sampling in Sweden," was published in 1957. In Sweden, it was at the time considered a breakthrough for sample surveys based on a solid theoretical framework.

Tore's professional career included a number of positions and affiliations with agencies and institutions such as Cornell University, Bell Labs, IBM, the U.S. Department of Commerce, Statistics Sweden, and the U.S. Bureau of the Census. He ended his career as a Visiting Professor at Brown University in Providence, Rhode Island, U.S.A.

One of Tore's greatest achievements was the solution of the stratification problem, which was published in a series of articles in *Skandinavisk Aktuarietidsskrift* and *JASA* between 1952 and 1959 (some of them written with J.L. Hodges, Jr.). This was the big issue for sampling experts at the time when Neyman's and Tschuprow's solution to the allocation problem was well known. Tore showed how to determine the number of strata and also where to put the stratum boundaries. Applying the Neyman/Tschuprow rule to this solution meant that an equal number of sampling units should be allocated to each stratum. This was an important contribution to sampling theory and is still a very powerful planning device for sample surveys.

Back home in Sweden after study visits to the U.S., Tore used his profound knowledge of sampling theory, combined with his eminent sense for practical solutions, to build up the Survey Research Centre of Statistics Sweden. The purpose of this endeavor was to create an instrument to provide solutions to important ad hoc statistical problems at a time when official statistics was merely a series of long-term recurrent surveys, of which many were censuses. The Centre had to fund its own activities and became a non-profit government agency, and a very successful one. It was the first step toward a semi-commercial system that today is an important means of financing the production of official statistics in Sweden and in many other countries.

Although Tore was fully aware of the potential of sampling theory, he was also well aware of its limitations. As expressed by Tore and other prominent survey statisticians of the era, including P.C. Mahalanobis, W.E. Deming, and M.H. Hansen, sampling was a theory for only a restricted number of parameters. It was a theory for finite populations, not considering the processes that generate them, and it was a theory for true values, not including measurement errors. The concerns about those limitations led to the creation of the International Association of Survey Statisticians (IASS). IASS first appeared at the Vienna session of the International Statistical Institute in 1973, where Tore organized an invited paper session on how to balance different sources of errors in the design of surveys, an important issue that still needs a lot of attention.

As a Professor at Stockholm University, with an obligation to focus on official statistics problems, Tore initiated and ran two major research projects under the auspices of the Bank of Sweden Tercentenary Foundation. Both projects were extremely productive. The first project, "Errors in Surveys," focused on different sources of error in surveys and made fruitful attempts at gathering those errors under one survey model.

Tore Dalenius had a unique sense for interdisciplinary cooperation in research. Research was performed in fields such as medical diagnosis and experimental psychology to find statistical models that could be used in survey work. In the late 1960s, he had already cooperated with the Institute of Psychology at the University of Stockholm to describe the cognitive processes that

generate respondents' answers to interview and self-administered questionnaires and how these processes affect response quality. He even taught classes on this subject. Thus, he was many years ahead of his contemporaries. Today most distinguished statistical agencies have a cognitive laboratory.

Protecting the integrity of survey respondents was another major interest of Tore's, and this became the topic of his second major research project. Again he was far ahead of most of his contemporaries. He reformulated the basic effectiveness criterion for a good survey design, "To minimize the mean squared error at a given cost," by adding "and with maintained integrity for those who provide the data." Today, the law in Sweden and in most other countries protects respondents' integrity.

Tore had a strong understanding of the importance of international relations for the exchange of ideas and new research results. He was a frequent visitor to other countries, and during the early 1980s he was chair of the American Statistical Association's committee for international relations in statistics. He worked particularly hard to increase the opportunities for survey statisticians in developing countries to take part in international conferences and to have access to survey literature. He was a consultant and advisor to organizations such as the United Nations and the World Health Organization. In the early 1970s, he moved permanently to the U.S. when he married Marjory Ann Schmink in Providence, Rhode Island.

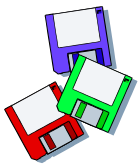
Tore was very active in enforcing the role of statistics in society and appeared frequently in the media, in Sweden and abroad. He was a straightforward critic of bad survey practice, and, in particular, he led a debate about the sloppy acceptance of large nonresponse rates in surveys. He also published a number of well-written popular science articles in different fields of statistics such as Monte-Carlo Sampling and Queuing Theory.

Having Tore as a teacher and mentor meant hard work but was extremely rewarding. While he was a Professor at Stockholm University, there was a constant flow of prominent survey statisticians visiting the Department of Statistics. His bird's eye view of the current status of survey methodology was enormous. He was a devoted survey statistician, normally working no less than 70 hours a week during his active professional life. He always delivered on time; many of his documents were finished on weekends and holidays. He was an excellent correspondent, always providing well-considered responses and interesting viewpoints.

Tore spent his last decades in Rhode Island, gradually slowing down his activities in the company of his wife and visiting old friends and colleagues. His favorite place was their summerhouse in Little Compton, right on the beach of the Atlantic Ocean. Although he suffered from health problems, it seems as if the last decade of his life was peaceful and enjoyable.

Looking at the current status of survey methodology, it is amazing how much it has been influenced by Tore. His main viewpoint, which he conveyed to his colleagues and students, was the importance of good data for society's decision making. We are proud and happy to have worked with one of the great minds during an era of very important survey developments.

Prepared by Lars Lyberg, President, IASS, 1993-1995, and Anders Christianson, Vice President, IASS, 2001-2003.



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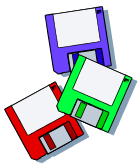

Bascula 4.0 for Weighting Sample Survey Data with Estimation of Variances

Nico Nieuwenbroek and Harm Jan Boonstra*
Statistics Netherlands

1. Introduction

A convenient way of presenting estimators based on a probability design is in the form of a sum of weighted sample observations. For instance, the population total of a variable y can be estimated by $\hat{t}_y = \sum_S w_k y_k$, where the summation concerns all elements in the sample S. The Horvitz-Thompson estimator is a well-known example. Here, the sampling weights (inclusion weights and design weights are frequently encountered synonyms) $d_k = 1/\pi_k$ are substitutes for the w_k, where π_k stands for the probability of inclusion. To improve the quality of weighting type estimators, it is common practice to include sensibly chosen auxiliary variables during the estimation process. Then the adjusted or final weights are equal to $w_k = d_k g_k$, with g_k being a correction weight due to the incorporation of auxiliary information. The weighting procedure merely induces a transformation $d_k \Rightarrow w_k$. The values of the auxiliary variables have to be available for each unit in the sample, with the corresponding aggregated population totals known from one or more sources (such as administrative registers). The more external sources that become available in time, the more variables are potential candidates. Using auxiliary information has several advantages:

- Estimates will be consistent with the known population totals with certainty;
- The precision of estimators often is improved; and
- A possible bias due to, for example, selective nonresponse or coverage errors might be reduced substantially.

At Statistics Netherlands, Bascula 4.0 for Windows has been developed especially as a user-friendly software tool for computing weights. Starting with the sampling weights (possibly corrected for the occurrence of nonresponse) and incorporating auxiliary information, the weighting package calculates one set of adjusted weights. It holds that the adjusted weights do not depend on y. Once these weights have been determined, they can be applied directly to an arbitrary set of study variables in order to obtain estimates for the unknown population parameters.

The weighting package offers various well-known weighting methods: poststratification, ratio estimation, linear weighting based on the general regression estimator, and multiplicative weighting based on iterative proportional fitting (see Section 2). For surveys based on cluster sampling, where all elements within a cluster are observed, it is possible, using linear weighting, to calculate element weights that are equal within clusters, as suggested by Lemaître and Dufour (1987). Here, all elements of a cluster are forced to have the same values for the auxiliary variables. In this way, inconsistencies between outcomes derived from element weighting and cluster weighting are avoided automatically.

In combination with linear weighting, a bounding algorithm based on Huang and Fuller (1978) is available. It may be used to restrict correction weights g within a certain pre-defined interval $[L, U]$, where $L<1<U$. This is a valuable option, especially to prevent at least the occurrence of negative weights. After Bascula has calculated final weights, the user can apply his or her own tabulation package to carry out the summations of weighted observations to obtain the required estimates. Of course, Bascula itself is very capable of estimating

population totals, with means and ratios (for subclasses) being just the customary types of outcomes of interest in official statistics.

Apart from the calculation of final weights, it is also possible to obtain the corresponding estimated variances for various sampling designs. Two methods of variance estimation are supported. First, balanced repeated replication (BRR) has been implemented. The second method is based on Taylor expansion associated with the general regression estimator. This method does not have the overhead of resampling, but it cannot be used in combination with multiplicative weighting. However, the variance as estimated by the regression method can still be used as an approximation because of asymptotical equivalence (see Deville and Särndal, 1992). The variance module is discussed in Section 3.

Bascula is a component of Blaise, which is a system for computer-assisted survey processing, also developed by Statistics Netherlands. Blaise is used worldwide by many types of survey organizations. Bascula is available as an interactive tool, built around a setup that contains the information needed to run a weighting session. A weighting session may be started from scratch by entering step by step all necessary information in an order that speaks for itself. New tab-sheets only appear in the main window after some minimal preliminary work has been done. Context-sensitive help is available. Of course, it is also possible to open an existing setup in Bascula for further processing.

Another possibility for carrying out a weighting session is by means of a Manipula setup. Manipula, another tool of the Blaise system, is a file-based system that can select, convert, rearrange, and sort data. It can combine data, derive new data, and perform complex computations through a set of instructions subdivided into sections. Weighting using Manipula requires at least Blaise version 4.6.

Finally, Bascula 4.0 is also available as a software component, referred to as Bascula's API (Application Programming Interface). The API can be used to automate weighting and estimation processes, to be called, for example, in the Visual Basic environment. Executing either Manipula or API can generate an appropriate setup for the interactive option. Section 4 provides an example of a weighting session using Manipula.

Many of Bascula's default settings can generally be left alone. For experienced users, they may be altered for better performance in particular situations. Furthermore, relevant information about the weighting session is stored in a log file. The package comes with a reference manual, which includes various examples.

2. Weighting with Bascula

For person and household surveys, categorical auxiliary variables are mainly used (e.g., sex, marital status, age, and region). Quantitative (or continuous) variables, such as VAT (value-added tax), are more commonly used for business surveys. The auxiliary information to be used is described by means of a weighting model, which consists of one or more weighting terms, mutually separated by the operator "+." A weighting term on its turn may consist of a single variable or a crossing of variables denoted by the operator "×." Each weighting term refers to a known population table derived from the auxiliary variables. For instance, with the model "Ageclass + Sex" (both categorical variables) the weighting procedure is such that the population tables for Ageclass and Sex are both reproduced. The crossing of categorical variables "Ageclass × Sex" corresponds to (complete) poststratification. A continuous variable can be incorporated easily; for example, "Ageclass × Income" refers to income for each separate category of Ageclass. A categorical variable is internally transformed into as many dummy variables as its number of categories. Only one dummy variable has 1 as value; the others have a value of 0. A weighting model often still leaves several ways of reproducing the population tables. In addition, the weighting method must be specified.

A common method is linear weighting based on the general regression estimator, where adjusted weights are expressed as a linear combination of auxiliary variables given the sample. This method produces the same weights as those derived using a particular calibration method (linear case) in Deville and Särndal (1992), where, given a distance measure, adjusted weights are as close as possible to sampling weights satisfying known population totals. A complication with general regression estimators is that many weighting models are based on incomplete poststratification. That is because a complete crossing would result in cells with too few or zero observations, giving rise to unstable or even undefined estimators. Another reason might be that population totals are not available for all cells, but only for specific margins. Then the adjustment is on these margins, inducing a design matrix that is not of full rank. Instead of the ordinary inverse, a generalized inverse matrix can be applied using a reduced matrix, which can be constructed by deleting redundant columns and properly adjusting population totals. Often, the redundancy can be recognized easily beforehand by the

specification of the terms in the weighting model. Although the reduced design matrix is not unique, it does not affect the final weights.

In special cases, however, redundancy is less obvious; for example, crossing between two categorical variables, denoted by "Ageclass × Sex," produces sample cell counts too small for poststratification. Then we may derive a new classification, Ageclass$^+$, by merging categories of the original defined variable, and define the more parsimonious scheme "Ageclass + (Ageclass$^+$ × Sex)." During the Cholesky LU-decomposition, diagonal values are traced, numerically very close to 0. The corresponding variables are viewed as redundant, as a result of which corresponding columns in the design matrix should be deleted. The justification of doing so in Bascula is given in Renssen and Martinus (2002), who also show under which conditions the regression estimator is invariant with respect to the choice of the generalized inverse.

Linear weighting provides a framework, with poststratification and ratio estimation (provided that the continuous variable is strictly positive) as special cases. Since these two estimation procedures are so familiar and are relatively easy to understand, they are treated as separate weighting methods. These cases also have been implemented more efficiently.

For incomplete stratification, multiplicative weighting is offered as an alternative, where adjusted weights are the result of multiplying factors connected to the appropriate model terms. This method can be considered as performing poststratification for each separate weighting term one after another, during an iterative process, in order to match known marginal population totals simultaneously until convergence is reached. This method corresponds with another distance measure (i.e., exponential case) also mentioned in Deville and Särndal (1992). Unlike the linear method, which has the advantage of having a closed form solution, the multiplicative method needs a numerical solution.

3. Variance Estimation

Apart from the determination of final weights, it is also possible to estimate variances for some sampling designs. However, this requires additional design identifiers in order to take into account the second-order probabilities of inclusion. The implemented designs up to now have been mainly based on practical considerations. That is, either the second-order probabilities of inclusion can be derived directly from first-order inclusion probabilities in combination with the primary (possibly also secondary) sampling fractions, or they might not be relevant at all, as in the with-replacement case. Depending on the sampling design, we need the specification of stratum, primary sampling unit (PSU), secondary sampling unit (SSU), and possibly the sampling fraction for the PSU as identifiers. Strictly speaking, the variance can be estimated for the following three situations:

- Stratified one-stage (cluster) design with simple random sampling without replacement per stratum;
- Stratified two-stage (cluster) sampling with simple random sampling (without replacement) at both stages per stratum; and
- Stratified multistage (cluster) sampling, where PSUs are selected with (possibly) unequal probabilities with replacement and (to a certain extent) with arbitrary sampling designs for second and further stages. This situation includes stratified one-stage (cluster) sampling, where the units are drawn with replacement.

For sampling designs that are not supported, it may often be reasonable to apply one of these three cases as an approximation. In principle, two methods for estimating variances are available. Actually, Bascula shows the standard error, being the square root of the variance.

3.1 Balanced Repeated Replication (BRR)

BRR was originally defined for stratified multistage designs with two PSUs to be drawn with replacement per stratum in the first stage. From this parent sample, half-samples are formed, each of them consisting of one PSU per stratum. For a broader utilization of Bascula, it has been extended to designs in which more than two PSUs are drawn in some or all strata. It is approximated by a design for which the basic two-per-stratum procedure can be applied, for example, by randomly forming two groups of PSUs or by randomly forming artificial strata each with two (groups of) PSUs. In these cases, BRR is applied to the groups. We have also modified BRR for stratified two-stage sampling with simple random sampling at both stages, by randomly dividing SSUs within a PSU into two groups of SSUs. For simple random sampling without replacement, an appropriate correction for finiteness is taken into account. More details can be found in Renssen et al. (1997).

Bascula internally builds up, for example, *R* balanced half-samples or replicates using Hadamard matrices. For each replicate, resampling weights d_k^{α} are first calculated, based on randomly subsampling the parent sample. The weighting module is called *R*+1 times to calculate *R*+1 sets of final resampling weights (i.e., for the parent sample and for each of the replicates), resulting in just as many estimates for the variables under study. Actually, it implies the transformation $d_k^{\alpha} \Rightarrow w_k^{\alpha}$.

Let $\hat{T}^{\alpha}$ be the αth replicate estimator for the population parameter *T*, and let $\hat{T}$ be the estimate based on the parent sample. The BRR variance estimator of the parent-sample-based $\hat{T}$ uses the variability among the replicate estimators and is defined as

$$\hat{v}_{\text{Fbrr}}(\hat{T}) = \frac{1}{\phi^2 R} \sum_{\alpha=1}^{R} (\hat{T}^{\alpha} - \hat{T})^2 .$$

The factor ϕ ($0 < \phi \leq 1$) rests on an idea of Fay (1989), by which less unstable results are to be expected. For $\phi = 1$, the traditional BRR variance is obtained; that is, only the units that are allocated to the half-sample contribute to $\hat{T}^{\alpha}$. For $\phi < 1$, all units of the parent sample contribute, although the units outside a half-sample receive relatively less (resampling) weight. The estimator for the population of *y* based on replicate α is denoted by $\hat{T}^{\alpha} = \hat{t}_y^{\alpha} = \sum_{k \in S} w_k^{\alpha} y_k$.

Following the concept of estimating totals of arbitrary study variables (i.e., by weighting), the corresponding variances can also be derived by means of adjusted replicate weighting. Hence, the replicate weights have to be calculated only once, without knowledge of the study variables beforehand. The variances might possibly be obtained outside Bascula, since the set of replicate weights is written to an external file. All information about the original sampling design, auxiliaries, and weighting method is reflected in the replicate weights in some way.

3.2 Taylor Variance

The second way to estimate variances is based on the (first-order) Taylor expansion method associated with the general regression estimator. Let $\hat{t}_{yR}$ denote the regression estimator of the population total of variable *y*. For simple random sampling without replacement, let *H* be the number of strata, n_h the number of observed PSUs in stratum *h*, and $f_{1h} = n_h / N_h$ the PSU sampling fraction. For two-stage designs with simple random sampling at both stages, we add m_{hi} as the number of observed SSUs within the *I* th PSU of stratum *h* and $f_{2hi} = m_{hi} / M_{hi}$ as the SSU sampling fraction. Then, the variance estimator is given by

$$\hat{v}\left(\hat{t}_{yR}\right) = \sum_{h=1}^{H} \left\{ n_h \left(1 - \lambda f_{1h}\right) s_{1h}^2 + \lambda f_{1h} \sum_{i=1}^{n_h} m_{hi} \left(1 - f_{2hi}\right) s_{2hi}^2 \right\}, \text{ where}$$

$$s_{1h}^2 = \frac{1}{n_h - 1} \left\{ \sum_{i=1}^{n_h} \left(\hat{t}_{ehi}\right)^2 - \frac{1}{n_h} \left(\sum_{i=1}^{n_h} \hat{t}_{ehi} \right)^2 \right\} \text{ and } s_{2hi}^2 = \frac{1}{m_{hi} - 1} \left\{ \sum_{k=1}^{m_{hi}} \left(w_k e_k\right)^2 - \frac{1}{m_{hi}} \left(\hat{t}_{ehi}\right)^2 \right\}.$$

Here, the symbol λ denotes whether sampling is with (λ=0) or without (λ=1) replacement, and the expression $\hat{t}_{ehi} = \sum_{k=1}^{m_{hi}} w_k e_k$ stands for the weighted sum of the regression residuals. For a single-stage design, the second term within the curly brackets of the variance expression vanishes. The formula also applies for designs with replacement in the first stage by setting λ= 0, whether or not the PSUs are drawn with unequal probabilities. Contrary to the BRR method, where one simple formula suffices for the variance for totals, means, and ratios, with the Taylor method the expression for the variance depends on the type of parameter under investigation.

4. A Simple Application

A complete weighting session includes the following main tasks:

- Specification of the sample data file. Possibly a meta file for an ASCII file can be created using the built-in text file wizard.
- Selection of variables and assignment of functions to them, depending on the part they will play in the weighting session. Variables to be used in the weighting model (and in population tables) must be assigned to the function “auxiliary.”
- Outlining of population information in the form of tables, followed by entering the corresponding population data.
- Specification of the weighting model denoting which set of variables act as auxiliaries. A weighting term follows the same notation as for a population table.
- Selection of the weighting method. In some cases, the weighting method is already determined by the weighting model.
- Specification of additional sampling design information if variances are desired.
- Denoting the type of population parameters (totals, means, or ratios) and the associated variables for which estimates have to be made, also in the form of tables.

Let us give an illustration based on a simple example, referring to a population with province as stratum. From each stratum, a simple random sample of persons has been drawn without replacement, with data being gathered into the sample file Samplon.sam in ASCII format. Meta information is contained in the file samplon.bmi. The population table “Ageclass × Sex” has been prepared in the file samplon.pop. Linear weighting based on the weighting model “Sex + Ageclass” is applied. Note that Bascula can retrieve the two required subtables according to the weighting terms from the more detailed population table. Additionally, the minimal cell filling in the sample is set to 5. If this demand is not satisfied, the weighting model will be reduced automatically to the nearest more parsimonious model. Interest concerns estimates for totals of Income and the table “Empstat × Income,” with standard errors based on the Taylor method. Correction weights and final weights must be written back to the sample data file. The outcomes in two decimals must be written to the file samplon.btf. The setup for Manipula is as follows, with cross-classification denoted by the operator “*” and weighting terms mutually separated by a comma.

```
PROCESS ProcessName
USES
    SamplonMeta 'Samplon.bmi'
INPUTFILE SampleFile:SamplonMeta ('samplon.sam', Ascii)
WEIGHT Session1
    WEIGHTINPUTFILE 'Firstsamplonsetup.wif'
    VARFUNCTIONS
            AUXILIARY = recnr, province, sex, age, ageclass, empstat, income
            INCLWEIGHT = incweight
            CORRWEIGHT = corrweight
            FINALWEIGHT = finweight
    ENDVARFUNCTIONS
    POPULATION
            INPOPFILE = 'samplon.pop'
            DATASET
                    TABLE = ageclass*sex
            ENDDATASET
    ENDPOPULATION
    WEIGHTSETTINGS
            MODEL =  sex,ageclass
            METHOD = LIN
            MINCELLCOUNT = 5
    ENDWEIGHTSETTINGS
    VARIANCE
        DESIGNID
            STRATUM = province
            PSU = recnr
            SAMPLINGDESIGN =
            SINGLESTAGESRSWOR
        ENDDESIGNID
        TAYLORVAR = YES
    ENDVARIANCE
    ESTIMATES
```

```
        TOTAL = income, empstat*income
        OUTESTFILE = 'session1.btf'
        DECIMALS = 2
    ENDESTIMATES
ENDWEIGHT
MANIPULATE
```

5. Delivery of the Software

The software is part of the installation of the Blaise package. For conditions of delivery, please, contact Blaise support at Statistics Netherlands: E-mail: blaise@cbs.nl.

For more specific information on the methodology used for Bascula, please contact:

Nico Nieuwenbroek or Harm Jan Boonstra
Statistics Netherlands
P.O. Box 4481
6401 CZ Heerlen
The Netherlands
E-mail: nnwk@cbs.nl or hbta@cbs.nl.

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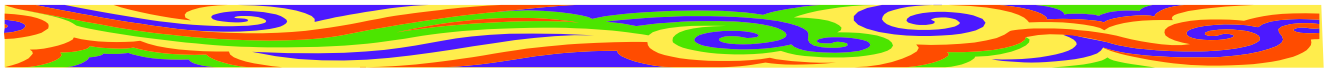

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Country Reports

AUSTRALIA

from Geoff Lee

The Australian Bureau of Statistics (ABS) is developing statistical concepts for a **Survey of Venture Capital.** Venture capital financing as an identifiable, organized economic activity is relatively new. The activity involves harnessing available capital for short-term investment in high-risk but potentially high-reward business opportunities, often involving new and innovative companies. The ABS has conducted two annual surveys of this activity in Australia. New statistical concepts, classifications, and nomenclatures were developed with the valuable assistance of industry peak organizations and private sector survey managers, highlighting the need for close cooperation and partnerships in the development of surveys in new and rapidly developing fields. For more information on the survey, please see ABS publication *Venture Capital, Australia* (Cat. no. 5678.0), available on the ABS web site at www.abs.gov.au. Other reputable data sources on Australian venture capital include the Australian Venture Capital Association Limited (www.avcal.com.au), Venture Economics (www.ventureeconomics.com), and the Australian Venture Capital Journal (www.vcjournal.com.au). For further detail on the development of venture capital statistical concepts, please contact Glyn Prichard at glyn.prichard@abs.gov.au.

CANADA

from John Kovar

Decision-makers seek an up-to-date and in-depth understanding of Canadian society to help them not only respond to today's needs but anticipate tomorrow's as well. This requirement was underlined by a growing demand for analytical output from the rich source of data collected by Statistics Canada. The **Research Data Centres (RDCs)** program is part of an initiative by Statistics Canada, the Social Sciences and Humanities Research Council, and university consortiums to help strengthen Canada's social research capacity and to support the policy research community.

RDCs provide researchers with access, in a secure university setting, to microdata from individual and household surveys. All results leaving the RDC must be reviewed to ensure that no risk exists of disclosing information about individuals (through either identity disclosure or attribute disclosure). Statistics Canada's methodologists are instrumental in developing the "rules" that govern the disclosure risk avoidance process.

The research conducted in the centres typically involves the analysis of complex household and individual survey data, such as Statistics Canada's longitudinal surveys (e.g., the National Population Health Survey and the Survey of Labour and Income Dynamics). These complex survey designs have direct implications for the methods that are needed to analyze the data. Statistics Canada's community of methodologists plays a central role in providing analytical advice to the researchers working in the RDCs, so that complex survey design is taken into account. For further information on the program, contact Gustave Goldmann (rdc-cdr@statcan.ca; 613-951-1472), Program Manager, RDC Program, Statistics Canada, Ottawa, Ontario, K1A 0T6.

The **General Social Survey (GSS)** is an annual survey designed to provide timely information on topics of relevance to social policy issues of current or emerging interest. Since 1985, 15 cycles have been collected using random digit dialing. The GSS is recognized for its regular collection of cross-sectional data, allowing trend analysis, and its capacity to test and develop new concepts that address emerging issues. Thus, time use data collected in 1998 can be compared with similar data from 1986 and 1992, and comparisons can be conducted between criminal victimization data collected in 1987, 1993, and 1999. In 2000, cycle 14 collected data on individuals' use of information and communications technology, including computers and the Internet. These data will provide greater detail on Canadians' access to, and use of, information and communications technology than is provided by the Household Internet Use Survey, an annual Labour Force Survey supplement. In 2001, data were collected for cycle 15 of the GSS, which concentrated on family history. Similar data were collected in 1990 and 1995.

The GSS uses administrative files to construct a list-assisted frame that covers virtually all residential telephone numbers, but also includes a large number of out-of-service and nonresidential

numbers. Samples of telephone numbers selected from this frame are about 44 percent residential and 56 percent business or not in service. Rates of telephone ownership are very high in the 10 provinces, more than 98 percent. The target responding sample size was 10,000 until 1999, when it was increased to 25,000 to allow for much more detailed provincial analysis. The stratification is geographic, with separate strata for each province and for each of the larger Census Metropolitan Areas (CMAs). The smaller CMAs in each province as a group form a stratum. The sample is divided into 12 equal subsamples, and each month data are collected from one of the subsamples as an independent survey. When a household is contacted, a roster of its members is collected and an individual aged 15 or older is selected at random to be interviewed. Since 1993, computer-assisted telephone interviewing (CATI) has been used. With the CATI system, the individual to be interviewed is automatically selected. Public-use microdata (anonymized) are released for each cycle, usually 6 to 9 months after the end of data collection.

Data are being collected during 2002 for cycle 16, which concentrates on social support (help given and help received) and retirement issues. Similar data on help given and received were collected in 1996 using the usual GSS design, yielding a general population survey of those aged 15 and older. The 2002 target population is more restricted, including only those aged 45 and older, with separate samples being selected for the age groups 45-54, 55-64, 65-74, and 75 and older. For this reason, random digit dialing sample selection was replaced by a sample selected from past respondents to the Canadian Community Health Survey (described in the previous country report). For more information, contact Rosemary Bender (rosemary.bender@statcan.ca; 613-951-0387), Housing, Family, and Social Statistics Division, or David Paton (paton@statcan.ca; 613-951-1467), Household Survey Methods Division, Statistics Canada, Ottawa, Ontario, K1A 0T6.

CHINA

from Huang Langhui

The National Bureau of Statistics of China (NBS) conducts a number of household surveys. The **Urban and Rural Household Surveys** are core surveys designed to measure household income, expenditures, and living conditions. Separate units within NBS—the Urban Survey Organization (USO) and the Rural Survey Organization (RSO)—manage the two surveys. These surveys provide the basic data for the estimation of poverty, for weighting consumer price indices, and for measuring aggregate household consumption in the context of the national accounts. Although the sampling procedures, content, underlying concepts, and scope of the two surveys have been refined by the NBS in recent years, the changes have not been sufficient to meet the needs of economic reforms. The two surveys are also deficient in terms of demographic coverage since they exclude the so-called "floating population," representing about 100 million people, who have migrated between areas of the country. NBS and Statistics Canada recognized in December 2000 that the improvement and integration of the urban and rural household surveys in China is an important aspect of China's statistical reform and development strategy.

Both statistical organizations agreed that the first major step toward this goal is a pilot income and expenditure survey, to be carried out in Hangzhou (the city and its constituent counties), the capital of Zhejiang province, from July 2002 to March 2003. This pilot will allow both the USO and the RSO to develop, while respecting unique organizational needs, the same methodological approaches in terms of sample design, questionnaire design, data collection, and data processing for the integration of core data from the two surveys. In preparation for the pilot survey, best practices used at Statistics Canada have been shared with NBS. Workshops on sample design, content and data collection methods, data processing, and data collection processes and data quality measures took place in April 2001, June 2001, December 2001, and March 2002, respectively. During the workshops, Statistics Canada shared its experience, methods, and technologies with NBS, with a view to developing methods, questionnaires, procedures, and systems best suited to the pilot survey's objectives and the Chinese context and environment. Following each workshop, NBS, with the support of Statistics Canada, is responsible for the development of each detailed pilot operation (i.e., sample design, content, data collection, and data processing). All aspects of the pilot survey should be developed and implemented in such a way that the implementation of the pilot-type survey on a national basis will be feasible from a cost and operational point of view, since full implementation of a new integrated survey will require a major commitment of financial and other resources by NBS. A decision on the future orientation of the Household Surveys on a national basis will be made in July 2003. For further information on the Sino-Canadian Household Survey Project, contact Huang Langhui (huanglh@stats.gov.cn), Director-General, Urban Survey Organization, National Bureau of Statistics of China, or Louis Rouillard (rouilou@statcan.ca; 613-951-5895), International

Relations Division, Statistics Canada, Ottawa, Ontario, K1A 0T6.

NEW ZEALAND

from Robert Templeton

Statistics New Zealand is running a **Cultural Experiences Survey** for the Ministry for Culture and Heritage. It is designed to produce statistical information that will assist cultural policy work in New Zealand. The objectives of the survey are (1) to determine who consumes cultural goods and services generally in New Zealand, the types that are consumed, the means used, the level of consumption, and whether there are significant differences between population groups; (2) to determine the typical characteristics associated with particular patterns of cultural consumption (including age, sex, ethnicity, labor force status, income, education, and location); and (3) to identify barriers to the consumption of cultural products. Fieldwork is being conducted in the first quarter of 2002 (January to March), and the first results from the survey are due out at the end of June 2002. For additional information, please feel free to contact Anne Spellerberg (anne_spellerberg@stats.govt.nz; 64-4-496-4600, ext. 5220) or Ronwen Bowker (ronwen_bowker@stats.govt.nz; 64-4-496-4600, ext. 5211).

Quarterly statistics on the financial performance of New Zealand manufacturers were published in December from a completely redesigned **Quarterly Manufacturing Survey.** The new survey replaced one that has been operating since 1992. Several features of the survey design will help improve data accuracy. These include an updated sample to better reflect the current industry structure; use of a more up-to-date classification of industrial activity in designing the industry estimates; use of Goods and Services Tax (GST)-based sales data as a benchmark factor in the design, which is a better "proxy" for financial performance than the employment numbers used in the 1992 design; and provision for the quarterly adjustment of the survey to take account of the changing size of individual firms over time. With the new survey, some 1,200 businesses that were in the old survey are no longer obliged to provide quarterly returns. Also, because of the use of GST-based sales data in place of postal questionnaires for small firms, the new survey has approximately 450 fewer respondents (24 percent) than the old survey. For additional information contact Andrew Hunter (andrew_hunter@stats.govt.nz; 64-4-496-4600, ext. 8555).

A report outlining the feasibility of a **Longitudinal Survey of Income, Employment, and Family Dynamics** has been completed. Extensive consultation revealed that the highest priority was for information on short- to medium-term income dynamics and the factors affecting income, such as family status changes, labor market participation, education and training experience, job characteristics, and other demographic variables. Proposed methodology was developed and tested through a pilot survey that simulated the first two waves of a longitudinal survey. The feasibility study confirmed that a longitudinal survey covering these topics could be successful in New Zealand. Subsequently, funding was allocated to Statistics New Zealand over 10 years to run a Longitudinal Survey of Income, Employment, and Family Dynamics. Development work on this new survey is currently being completed, and the survey will enter the field for its first wave of data collection in 2002. Information provided by this survey, which will be available beginning in 2004, will significantly increase our understanding of New Zealand society and the economy. For additional information, contact Diane Ramsay (diane_ramsay@stats.govt.nz; 64-4-496-4600, ext. 4240).

The **Household Savings Survey** was sponsored by the Retirement Commission to collect information on the level, composition, distribution, and accumulation of net worth in the population. The results will be used by the government to assist in the formulation of retirement income and associated policies and to feed into public debate and education. The survey, which asks respondents about the type and value of their assets and liabilities, is the first of its type to be carried out in New Zealand. Interviewing was conducted in late 2001, using an electronic questionnaire on a laptop to record the information. In addition to the main sample, a Maori booster was included to improve the accuracy of results for this ethnic group. A response rate of 75 percent was achieved. First results will be released in May 2002, with the main report published in July 2002. For additional information, contact Tanya Randall (tanya_randall@stats.govt.nz; 64-4-496-4600, ext. 4906).

PHILIPPINES

from Gervacio G. Selda, Jr.

The Statistical Research and Training Center (SRTC) recently hosted the **Seventh Course/Workshop on Sample Design for Household and Establishment Surveys,** a regular training program of the United Nations Statistical Institute for Asia and the Pacific. The

training program was conducted from March 18 to April 12, 2002, at the AIM Training Center in Makati City, Philippines. The 4-week course/workshop was undertaken in response to the need to continuously improve the capabilities of national statistical offices in the developing countries of Asia and the Pacific region to devise appropriate sample designs for their surveys. The training program was attended by middle- and senior-level statisticians from the national statistical offices of various countries in the region who are involved in the development and/or improvement of statistical data collection through sample surveys. Twenty-six representatives from 16 countries attended the workshop.

The SRTC is currently implementing a project entitled **Statistical Manpower Development Program for the Regions** for the purpose of improving the products and services provided by the Philippine statistical system. The target beneficiaries of this undertaking are the statistical personnel of local government units and national government agencies operating in the regions. The project is under the human resource development component of the Re-engineering the Government Statistical Services Project-Phase II of the National Statistical Coordination Board (NSCB). Specifically, the project aims to develop a modular type of program that will cater to the training needs of various types of statistical workers in the government. The expected outputs of the project are (1) the design of the training program; (2) training manuals and materials that will support the delivery of the training program; (3) pilot testing of the developed training program and materials; and (4) a specific implementation plan and strategies to ensure the institutionalization of the training program. For more details on the above activities, contact Gervacio G. Selda, Jr., Executive Director of SRTC (srtcoed@srtc.gov.ph or http://www.srtc.gov.ph/).

The NSCB is conducting a **Poverty Mapping Study** to develop a methodology for locating poor families, identifying and/or describing their characteristics and conditions, prioritizing areas for assistance using the selected indicators, and determining the types of interventions that should be given to identified poor families. The project is currently being undertaken in two provinces, Laguna and Albay. Data from the local government units disaggregated by municipality are used in this study. These include indicators on nutrition, health, water and sanitation, peace and order, basic education, and people's participation. From these indicators, a composite poverty index will be derived. Using GIS software, the derived indicators will be used as a basis for identifying the intensity of the "deprivation" in the municipalities. The project also aims to develop a methodology that will enable users to compare the performance of the provinces against a national average using the same set of indicators.

The NSCB Executive Board recently approved amendments to the **1994 Philippine Standard Industrial Classification (PSIC)** to ensure that it reflects the country's current economic situation and to make it more responsive to the needs of users**.** The updating of the PSIC was also undertaken to ensure the uniformity and comparability of statistics on economic activities compiled in the Philippines. First published in 1994, the PSIC was based on the International Standard Industrial Classification, Rev. 3, issued by the United Nations Statistical Office in 1990. Since that time, significant changes have occurred in various economic activities of the country with the introduction of new technologies and the emergence and growing importance of new industries, especially in information and communication technology and related industries. In light of these changes in the economic activities of the country, the new amendments to the 1994 PSIC will enhance the consistency and usefulness of various statistics relating to economic activities.

The NSCB is also developing the **National Education Expenditure Accounts for the Philippines.** This activity is envisioned to improve the understanding of the educational system by providing a comprehensive and comparable set of information on funding sources and uses for education. This information will allow a coherent analysis of education spending as input to education planning, policymaking, and resource allocation. The development of the accounts is actually the first attempt to establish a comprehensive system for the collection of data on education expenditures. This project involves a set of interrelated activities: (1) development of a framework for the estimation of the national education expenditure accounts; (2) identification and assessment of data sources; (3) identification and design of supplementary data collection activities; (4) estimation and documentation of the national education accounts for the period 1991 to 1998; and (5) preparation of an institutionalization plan for the development and maintenance of the national education accounts.

For more details on the Poverty Mapping Study, enhancements to the PSIC, or the National Education Expenditure Accounts, contact Dr. Romulo A. Virola, Secretary General of the NSCB (ncs@nscb.gov.ph or http://www.nscb.gov/ph/ncs).

The National Statistics Office (NSO), the country's primary data-gathering agency, is set to conduct

the **2002 Monthly Survey of Production (MSP) Pilot Survey**. The MSP is a new undertaking designed to improve the production indices being generated from the Monthly Integrated Survey of Selected Industries (MISSI). Since 1998, the NSO has been conducting the MISSI, covering 20 major manufacturing sectors. The MISSI generates and disseminates industrial indices derived from production value data. The MSP, on the other hand, will cover 24 manufacturing subsectors/sectors by monitoring the prime commodities they produce, which will enable the production of direct measures of production volume. The 2002 MSP Pilot Survey aims to determine the adequacy of the survey instruments and the applicability of the methods and procedures prior to the survey's full implementation. Questionnaires for the 2002 MSP Pilot Survey will be distributed by the NSO to 432 sample establishments beginning in April of this year and in every month thereafter. The specific outputs of the survey are monthly data on production volume, sales, and inventory of target commodities in each manufacturing sector at the national level and monthly volume indices of production, sales, and inventory of commodity by sector and total manufacturing.

The **2002 Survey of Information and Communication Technology (ICT) of Philippine Business and Industry** is a new survey that will be undertaken in close collaboration with the Information Technology and E-Commerce Council of the Office of the President. The survey aims to collect and generate benchmark information on the availability, distribution, and utilization of ICT among Philippine businesses and industries. It will cover all establishments classified as ICT producers and service providers and include, among others, hardware and software consultants, publishers, and suppliers; data processors; research and development services; telecommunication services; tri-media production and broadcasting; and educational institutions in Manila, Cebu, Davao, and export processing zone authorities (EPZAs). All other industries that are perceived to be ICT users will be included in the survey.

Also this year, international consultants and NSO counterparts are set to form a team to evaluate the various aspects of the **Family Income and Expenditure Survey (FIES)** and the **Annual Poverty Indicator Survey (APIS),** two major sources of poverty indicators in the Philippines. The FIES has been undertaken every 3 years by NSO since 1985 and is a major source of data for official poverty estimates. On the other hand, the APIS was started in 1998 to supplement poverty monitoring, with support from the World Bank and the United Nations Development Programme. To further improve these surveys, the Philippine Government, through the NSO, requested technical assistance from the Asian Development Bank in December 1999. One aspect of the technical assistance is the establishment of a research and development unit in the NSO that will be responsible for sustained enhancement of survey sampling and operations. In line with these tasks, a team of international consultants and NSO counterparts will be created to, among other tasks, investigate the questionnaire design, field operations, and data processing of the 1994 and 1997 FIES and the 1998 and 1999 APIS and to determine the possibility of linking the two surveys for more in-depth poverty analysis and research. Moreover, the team aims to develop better survey strategies to improve the efficiency and cost-effectiveness of conducting other household surveys and to develop recommendations to minimize nonsampling errors.

For more information on the MSP Pilot Survey, the ICT survey, or the evaluation of the FIES/APIS, contact Carmelita N. Ericta, Administrator, National Statistics Office (C.Ericta@mail.census.gov.ph).

POLAND

from Janusz Wywial

The **Conference on Multivariate Statistical Analysis** was held November 4-6, 2001, in Lodz, Poland. It was organized by the Department of Statistical Methods of the University of Lodz. The chairman of the conference was C. Domanski (czedoman@krysia.uni.lodz.pl). The conference is held every year. Among several multivariate problems, survey sampling topics were considered, in particular, the estimation of a vector parameter in a fixed population. Also considered was a related problem of optimal allocation of samples to strata under the fixed accuracy of estimation of at least two population averages. The problem of nonsampling errors in multipurpose survey sampling was analyzed. Some coefficients of intracluster homogeneity for the distribution of multivariate variables were proposed. The results of this analysis were applied to improving the estimation of a population mean vector on the basis of a cluster sample.

The **Second International Conference on Quality of Life Research** will take place in Wroclaw, on September 18-20, 2002. It is being organized by the Department of Statistics (http://statystyka.ae.wroc.pl/qol2002/index.html) of the University of Economics in Wroclaw. The chairman of the conference is W. Ostasiewocz (biskupd@manager.ae.wroc.pl). Quality of life

problems have been intensively studied for the past decades. However, researchers from different disciplines, including statisticians, seem to be studying similar kinds of problems, often rediscovering results already discovered and making very few cross-references. The QOL 2002 Conference aims not only to provide a forum for scientists to exchange up-to-date knowledge, but also to set goals for future research. All aspects of quality of life will be considered, ranging from the observation and description of real data to fundamental methodological questions. The topics of the conference include, among others, measuring quality of life, social indicators (indexes), social insurance, environmental impacts on quality of life, inequality, poverty and equity, evaluation of costs associated with the safety of human life, welfare and well-being, and health economics.

SPAIN

from Rosa Marie Bermudez Gomez

At the time of the seventh wave of the **European Union Household Panel** in the second quarter of 2000, the Spanish Statistical Office (INE) carried out a complementary survey to provide some data on the Autonomous Communities. The sample size was 12,000 households distributed over 1,500 census sections. To achieve a joint processing of both samples, the main sampling design characteristics remained the same as those of the panel sample. The results are expected to become available soon.

In June 2002, a **Survey on Information Technology** will be conducted in collaboration with the National Commission for the Telecommunications Market. The purpose of this survey is to know to what extent information technologies are being introduced into households. The survey will use a subsample of 20,000 households from the Labour Force Survey (LFS). These households have been interviewed in the LFS during six consecutive quarters, and in the first and second quarters of 2002 they will be out of the LFS sample. Information on the household will be collected by telephone, whereas data on Internet use by household members will be obtained by a personal interview. The results of the survey will be available by the end of the year.

To analyze the quality of the 2001 population censuses, a project is being carried out that is based on the methodology developed by Hansen, Hurwitz, and Bershad. It consists of matching, for the 60,000-household LFS sample, the information yielded by the survey and by census questionnaires. This comparison will make it possible to look at some population coverage errors as well as other errors regarding the main census characteristics.

A new time use survey is currently in preparation and will be conducted for the first time in the last quarter of 2002. Next year, INE will conduct a **National Health Survey** and a new design will be implemented for the European Household Panel **(EU-SILC).**

UNITED KINGDOM

from Peter Lynn

The **British Crime Survey (BCS)** is the U.K. government's main source of crime victimization data. The BCS has recently undergone some major changes in methodology. It had previously been carried out once every 2 years with a sample size of around 15,000 adults, though this increased to 23,000 in 2000. In 2001, fieldwork became continuous and the sample size was increased to 40,000 per year. Interviews were previously carried out in the first few months of the calendar year, with victimization rates estimated on the basis of crimes reported to have taken place during the previous calendar year. Since 2001, respondents have been asked about crimes in the 12 calendar months up to and including the previous month. To allow investigation of any impacts of the change in design, the old and new methodologies were run in parallel for the first 6 months of 2001. Other innovations in the BCS include the introduction of calibration weighting, the use of multi-level modeling to assess the contribution of individual and area effects on crime levels, and the introduction of a rotating panel design at the primary sampling unit level. Also, a special self-completion module on interpersonal violence (domestic violence, sexual assault, and stalking) was included in the 2001 BCS. Information about the survey is available on the BCS web site (http://www.homeoffice.gov.uk/rds/bcs1.html) or by email to bcsinfo.rds@homeoffice.gsi.gov.uk.

The first government-sponsored **Time Use Survey** in the U.K. was carried out in 2000-01, using the harmonized European time use survey scheme. First release of the main findings is scheduled for April 2002. Further information, including all survey documents, can be found at http://www.statistics.gov.uk/themes/social_finances/timeusesurvey/ or by contacting Alison Langham (alison.langham@ons.gov.uk).

The **British Household Panel Survey (BHPS)** has been extended to Northern Ireland, with the first round of fieldwork in the province taking place in autumn 2001. Annual data collection waves are envisaged, with a sample size of around 2,000

households. The BHPS collects information on income, wealth, employment, health, family circumstances, attitudes, and a range of other topics. Data will be made available to researchers through the U.K. Data Archive. Further information is available at http://www.iser.essex.ac.uk/bhps/ or from John Brice (bricj@essex.ac.uk).

The UK National Statistician is developing a wide-ranging **Code of Practice for National Statistics,** based on principles of openness and transparency. A public consultation exercise has been undertaken, including a well-attended meeting at the Royal Statistical Society in January 2002. The draft code can be viewed on the National Statistics web site (http://www.statistics.gov.uk/about_ns/consultations.asp). Future progress will be documented there, or interested parties can also email codeofpractice@statistics.gov.uk.

To All Members

The IASS needs your contribution. Please do not forget to renew your membership. As of January 2002, French Francs are no longer accepted. As a consequence, the payment of dues and subscriptions must be made in either Euros or US dollars.

Systematic Quality Work
Experiences from Statistics Sweden and Other European Statistical Institutes

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In 1993, systematic quality work was started at Statistics Sweden. We had, of course, always worked to improve the quality of our products. But the work was not systematic. It was largely aimed at improving reliability alone, and it was, on the whole, left in the hands of experts; the majority of the staff were not involved. So we felt that we could do better, and we decided that it was worth a try to study the methods that had been developed for the manufacturing industry and that then had spread into the service sector.

We studied those ideas and methods—known as Total Quality Management (TQM)—and came to the conclusion that this was what we needed. That was 8 years ago. A lot of time and effort have been spent on the work, a lot of good results have been produced, and still there is much more to be done.

There are a lot of approaches to systematic quality improvement work that go by different names, but in their content they are only marginally different. On the whole, they are based on the same ideas. I call these approaches TQM. In the following paragraphs, I will try to concentrate on what I see as some key factors in the implementation of that way of work. But first it is necessary to summarize the most important aspects of the TQM concept.

The first is customer orientation. Quality demands on any product—including any statistical product—must be based on how the product is intended to be used. The users must have a major influence on the content, relevance, reliability, and accessibility of the statistics. Yet this does not mean that the producer can relinquish responsibility for the quality of the product. It is his or her task to set minimum standards. But at the same time, he or she must work systematically with different customers, discussing how the customers' information needs can be satisfied.

The second important thing in the TQM concept is focusing on the work process rather than on the product alone. A high standard of quality in the products is, of course, the ultimate goal, but the road toward this end is through more efficient work processes. Better processes can allow us to produce statistics faster and less expensively without endangering reliability. TQM can improve response rates and allow us to better capture response errors in the editing process.

The third basic principle in our interpretation of the TQM concept is that the quality improvement work must embrace everything and everyone. Every process within our sphere of operations can be improved. Every employee should feel responsibility for and participate in the quality improvement work. And suppliers and customers should be included as well.

So we interpreted the basic elements of TQM as follows:

- Customer orientation;
- Focus on processes; and
- The inclusion of everything and everyone.

There are other elements of TQM that one could choose to highlight, for instance, the need to be systematic when setting priorities or in one's approach to a specific problem. Another aspect often underlined in TQM literature is that decisions should always be based on facts. And there are other elements. But the important thing is for every organization to define its own mix of ingredients in a quality improvement system, depending on its own specific conditions—the character of the production, the organizational structure, the staff, the demands on the organization.

Anyone who decides to start to work ambitiously with systematic quality improvement along the TQM lines should be prepared for resistance from the organization. The strength of the resistance, as well as its endurance, can be considerable. At Statistics Sweden, we came up against a good deal of skepticism as well as opposition within the organization, and it has cost us time and effort to overcome it.

One argument we had to meet was that TQM was really intended for manufacturing industries. It could not work in services, and certainly not in the public sector. We had a hard time convincing

people that even if not every little detail in the TQM concept could be applied in our line of work, the overwhelming majority of ideas and instruments were useful. We also had to convince them that instead of putting a lot of effort into trying to identify the things that could not be used, it would be more productive to try to find the useful parts.

Another dissenting point of view was that TQM was just more words and that any useful content was, in any case, just common sense. There is a nucleus of truth in that. TQM is in a way common sense. But—as someone put it at a conference I once took part in—the problem with common sense is that it is not common. Perhaps you could say that TQM is systematized common sense and some tools to help you to use it.

A third objection was that TQM was nothing new. People said, "This quality approach is the same as what we have been doing all along!" And many employees viewed the TQM initiative as just another short-lived gimmick that management had become inordinately enthusiastic about and that would soon fade away. They said, "Sit tight and it will blow over."

When systematic quality improvement work is introduced in an organization—and throughout a good part of the implementation process—education of and communication with the staff must be a central concern.

At Statistic Sweden, we realized that the executive officers were the key persons in the implementation process. If there are doubts about the value of the initiative at the top of the organization, very little will happen. And the only way of convincing people is through knowledge. We identified a key group of about 20 persons, who studied the literature, held discussions, took part in international conferences, etc., on quality improvement. I would say that this was essential to truly convince them—or at least sufficiently convince them—that TQM was worth an effort.

This involvement among the executive officers was good. But what was not good was that we paid too little attention to the next step in the hierarchy—the middle managers and the heads of programs, who are the ones in daily contact with the staff. The programs consist of 10 to 40 employees, mostly statisticians, and the heads of programs in fact make a lot of important decisions, for instance, about the use of resources. So when many of the heads of programs decided that improvement projects had to be postponed—other things having a higher priority—the implementation of the entire quality improvement program was slowed down.

That was what happened at Statistics Sweden, because we had not, from the very beginning, done enough to educate the heads of programs in the TQM area. We corrected that later, but we would have gained momentum if we had realized the need from the beginning.

If you are going to launch a demanding initiative like this, it is important that you have a part of your staff who can support the training of the rest of the employees and can put the improvement projects on the right track. We created such a group from the beginning by giving about 20 statisticians an extended training, to make them able to assist others in the improvement work and to be bearers of the TQM philosophy within the organization. The next year we trained 20 more, and this has continued. We have called them TQM pilots, and we have had a lot of good use for them over the years. They keep their regular jobs in their respective programs and serve as part-time consultants to different improvement projects—preferably in other programs. They have shaped a network to support each other in the task of helping the rest of the organization.

Communication with the entire staff is, of course, vital—as the ultimate goal is to gain the participation of all employees in the improvement work. This must be seen in a long-term perspective. We have arranged informative gatherings, where the basic ideas and the most commonly used tools of TQM have been described. Gradually, we have also been able to present results from our own improvement projects.

One way of communicating with the staff is by presenting each year a quality award to the best improvement project at Statistics Sweden. At the award ceremony, the project group gets a chance to present the project before all personnel. Everybody then gets information about how the group has worked and what has been achieved. And, at the same time, management gets an opportunity to mark the importance it gives to quality improvement work.

It is important to remember that ideas and theoretical descriptions are good and necessary, but presentations of practical results are much more convincing. And most convincing is that you yourself have taken part in a project and seen a positive result. The efficient way of informing all employees about the TQM work is to make them practice it.

At Statistics Sweden, we also got help from private consultants to inform the staff about TQM. What we realized—after initially having made a serious mistake that created some suspicion within the

organization—was that you must be very careful when choosing the consultant. Ultimately, we found a consultant who had mastered both TQM and statistics, and we have had a very useful cooperation since. The consultant has helped us in training new TQM pilots, advised the projects, and served as a discussion partner for management.

I said before that if you want to convince people that TQM methods are useful, you have to present practical results from the projects. What type of results were we then able to present to our employees?

A step normally taken in the beginning phase of a TQM project is making flowcharts—a quite detailed mapping of the work process that is to be improved. On the basis of the description of the process, the project group then studies and discusses the possibilities to simplify it. Quite often, you can already, at this early stage, identify parts of the process that are unnecessary and can be eliminated.

In the earlier stages of our TQM program, these kinds of quick and simple results often came out of the projects. It used to be called "picking the low hanging fruits." There were those within Statistics Sweden who were pleasantly surprised by the quick, positive results and had to be persuaded not to be content with this but to go on looking for less easily obtained results.

Many of our projects led to simpler processes and shorter production times, which is entirely in line with user demands, above all in economic statistics. The recent Swedish investigation concerning demand for improvements in economic statistics reveals that improved timeliness in short-term economic indicators is a remaining major concern for users not only in Sweden but in the European Union as a whole.

For many products, we have also been able to reduce production costs. For the Swedish public sector, the 1990s meant a period of decreased funding. Government agencies had to develop their efficiency to keep up production. Now the financial situation has improved, but increased efficiency is, of course, still welcome.

Another experience that we often have is that members of the work group dealing with a process gain a better overview of the process as a whole, what other members of the group do, and where their own work fits in. This improves efficiency, and often the feeling within the group as well. And I would say that this is particularly important when you have a high turnover of personnel.

I would especially like to point out a type of project that we have found particularly valuable. This is the type of project where—for a work process found in many parts of the organization—we can identify and spread what we call "current best methods." We have had several such projects. For example, we have had a project regarding the treatment of nonresponse, another regarding editing, yet another about shortfall compensation, and even one to be used when users of statistics order a statistical investigation.

Systematic quality improvement consists not only of projects, and it is not limited to the production processes—in our case, the production of statistics. It may also concern, for instance, the printing works or the personnel department. But naturally you cannot do everything at once and simultaneously. You have to prioritize. And in this situation you might have use for a performance excellence model.

There are several models for performance excellence tied to some kind of award. They are all very similar and based on the same ideas.

As a judge for the national Swedish award, I have learned that many conditions are the same in different organizations. The problems for management are, to a great extent, the same in government agencies as in manufacturing industries.

As a Director General, I learned that if you scrutinize your agency with the help of an excellence model, you get a lot of information that you can use for setting priorities and making other kinds of decisions. But one must not let oneself be demoralized by the many shortcomings that are bound to turn up.

Top management plays a vital role in systematic quality work. You may as well realize from the beginning that if you are not committed and prepared to spend time and energy at the work, you might as well do some of the other important things that compete for your time.

There are many examples of TQM programs that have failed—that have faded away and led to nothing—because top management thought that this was something that could be delegated to a quality department. In all kinds of activities, you can see that organizations that have succeeded are the ones with a top management that is prepared to take the lead. I have seen it in the Swedish manufacturing industry, and according to the TQM literature the same is true all over the world. And of course this goes for the service sector as well. Top management must be visible as leaders of the

venture. This is not the only precondition for successful quality work. Many other ingredients are needed. You might describe the involvement of top management as a necessary but not sufficient condition for success.

How then can a top manager contribute in practice? He or she can do a lot of things. The manager can see to it that the staff get training and information. He or she can take an active part in identifying areas where improvement projects should be started. The manager can follow the work of project teams, read their reports, and make use of their suggestions. He or she can use the TQM tools in his or her own work. The top manager can ask questions, make proposals, and demonstrate that the improvement work is important.

Over the years—right from the middle of the 1990s—we at Statistics Sweden have continuously reported on our TQM work to our partners within the European Union. It would be too much to say that our presentations met with applause from the beginning. Rather, the opposition was much the same that we had met from our own staff when we introduced the TQM ideas within Statistics Sweden.

Gradually, this attitude has changed, even if many countries still have a long way to go. In 1998, when we started discussions about a common European effort to focus on quality improvement, obviously the time was ripe. In 1999, we outlined a proposal for what is called a LEG—a leadership group—on quality. It is a kind of working group within the European Statistical System chaired by one country—in this case, Sweden—and with a limited number of National Statistical Institutes (NSIs) as members.

Two issues were specifically mentioned in our initial proposal: TQM philosophies and current best methods (CBMs). The work within the LEG has not been limited to these areas. Many different quality issues have been discussed. The group drafted a final report, which was presented and discussed at a meeting in Stockholm in May of this year.

The group put forward 24 recommendations—a bit too many to be presented or commented on here. Some of the proposals are, of course, more for internal use within the European Statistical System (ESS), but I would like to highlight a few of the recommendations.

The first I would like to mention states that "all organisations within the ESS should adopt a systematic approach to quality involving the whole organisation." Another recommendation says that the European Foundation for Quality Management (EFQM) excellence model is to be used as a basis for improvement work. Other recommendations deal with the use of customer satisfaction surveys and other customer contracts as well as staff opinion surveys. The report also contains a recommendation stating that all staff should be trained in quality work. Put together, all of these recommendations very vividly advocate a TQM approach within the European NSIs.

The report also focuses on the lack of work process measurements even among statistics producers. The recommendation says, "Process measurements are vital for all improvement work. A handbook on identification of key process variables, their measurement, and analysis of the measurements should be developed."

Another proposal says that "NSIs should develop CBMs for their most common processes. The processes eligible for such development include not only statistical processes but also administrative ones. A handbook for developing CBMs covering construction, dissemination, implementation and revision of CBMs should be developed. Already existing and relevant CBMs should be assembled and distributed within the European Statistical System."

I believe that the ESS quality program can be of interest to you in two ways: First, because it is, in the long run, going to influence statistical standards and statistical production methods far outside Europe. Second, because the work will result in handbooks, work practices—all kinds of material—that you may make use of in your own work.

Statistical problems are, after all, quite similar all over the world—and all of us should, for our own sake, be prepared to listen to and learn from other members of the Global Statistical Society.

The statistical problems are after all quite similar all over the world—and all of us should for our own sake be prepared to listen to and learn from other members of the Global Statistical Society.

A Revisit of Design Effects Under Unequal Probability Sampling

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1. Introduction

The design effect is widely used in survey sampling (e.g., in planning a sample design) and routinely calculated by computer software packages for complex surveys (e.g., WesVar, SUDAAN). It was originally intended and defined for an estimator of the population mean (Kish, 1995, p. 56). However, the same concept that measures the effect of a complex design on a particular statistic with respect to a simple random sample (SRS) of the same size has been applied and used for other statistics, often with success but at times with confusion and misunderstanding. The latter situation occurs particularly when simple but useful results derived under a relatively simple sample design are applied to more complex problems. In this paper we want to clarify some of the misconceptions surrounding design effects, especially under unequal probability sampling.

2. Kish's Formulae

Let $\theta = \theta(y)$ denote a parameter of interest pertaining to a study variable y. Then the design effect, Deft^2, for its estimator $\hat{\theta}$ under a sample design P is defined by

$$\text{Deft}_P^2(\hat{\theta}) = \text{Var}_P(\hat{\theta}) / \text{Var}_{srswr}(\hat{\theta}'), \qquad (1)$$

where $\hat{\theta}'$ is the usual form of the estimator for θ under SRS with replacement (*srswr*). Here, we use the SRS with replacement scheme as the reference sample design, following Kish (1995), rather than the SRS without replacement scheme. Kish (1995) gave four reasons why (1) is preferable to the traditional definition, one of which is that the without-replacement sampling feature is a part of the sample design.

For the population mean $\theta = \bar{Y}$, we have $\hat{\theta}' = y/n = \bar{y}$ and $\text{Var}_{srswr}(\bar{y}) = S_y^2/n$, where $y = \sum_s y_k$. Under P with haphazard or random weights, Kish (1965, p. 430; 1987; 1992, p. 191; 1995, p. 71) proposed the following approximate Deft^2 estimation formula for $\hat{\theta} = \hat{\bar{Y}}$:

$$\text{deft}_P^2(\hat{\bar{Y}}) = 1 + \text{cv}_w^2, \qquad (2)$$

where cv_w^2 is the relative variance of the sampling weights, w_k. For *epsem* (equal probability of selection) samples selected from unequal clusters, Kish (1965) also gave the following approximate formula for $\hat{\theta} = \hat{\bar{Y}}$:

$$\text{deft}_P^2(\hat{\bar{Y}}) = 1 + \rho(\bar{m} - 1), \qquad (3)$$

where ρ is the intracluster correlation and $\bar{m}$ is the average cluster sample size. (See also Hansen, Hurwitz, and Madow, 1953, p. 259). Combining the above two approximate formulae, Kish (1987) further proposed $\text{deft}_P^2(\hat{\bar{Y}}) \cong \{1 + \rho(\bar{m} - 1)\}\left\{1 + \text{cv}_w^2\right\}$ for P with both clustering and unequal sampling weights. Gabler, Haeder, and Lahiri (1999) provided a justification for this formula using a model-based argument.

Formula (2) depends only on the relative variation of the sampling weights. Formula (3) contains two factors, the within-cluster homogeneity measure ρ and the average cluster sample size $\bar{m}$. Formulae (2) and (3) are in the form that Kish (1995) described in the following quote: "Deft are used to express the effects of sample design beyond the elementary variability (S_y^2/n), removing both the units of measurement and sample size as nuisance parameters. With the removal of S_y, the units, and the sample size n, the design effects on the sampling errors are made generalizable (transferable) to other statistics and to other surveys."

Probably because of this kind of statement, one often thinks that this concept can be generalized beyond the mean estimator $\hat{\bar{Y}}$, and this is where misunderstanding and misconception arise. First of all, formulae (2) and (3) do not hold even for a total estimator of the form $\hat{Y} = \sum_s w_k y_k = \hat{N}\hat{\bar{Y}}$, a weighted sum of sampled y values, which is one

of the basic estimators, where $\hat{N} = \sum_s w_k$ is an estimator of the population size. Kish (1987) himself pointed out this fact by saying that "this formula (3) does not hold well generally for the simple expansion or unbiased estimator $\hat{Y} = y / f$." Note that $\hat{N}\hat{\bar{Y}}$ reduces to y/f for multi-stage *epsem* samples, where y is the sample total, $f = n/N$ is the overall sampling fraction, and N is the population size. Särndal, Swensson, and Wretman (1992, p. 318) warned that the design effect can be much larger for $\hat{Y}$ than for $\hat{\bar{Y}}$ under one-stage cluster sampling with unequal clusters. Hansen et al. (1953, Chapter 8) also recognized a similar problem for two-stage *epsem* samples. Nonetheless, there are some instances where the design effect for $\hat{Y}$ is considered equivalent to that for $\hat{\bar{Y}}$ (e.g., Spencer, 2000; Thomsen, Tesfu, and Binder, 1986).

Secondly, the design effect may not be free of the unit measurement. It is so only when

$$\mathrm{Var}_P(\hat{\theta}) \cong L_P \cdot \mathrm{Var}_{srswr}(\hat{\theta}'), \qquad (4)$$

where L_P is a factor independent of the unit of measurement.

In the next section, we discuss these points in detail under unequal probability sampling.

3. Comparison of the Design Effects of the Mean and Total Estimators

Using Taylor approximation, we can write $(\hat{\bar{Y}} - \bar{Y}) \cong N^{-1}\sum_s w_k \left(y_k - \bar{Y}\right)$ and, thus, two design effects can be written as

$$\mathrm{Deft}_P^2(\hat{\bar{Y}}) \cong \frac{\mathrm{Var}_P\left[\sum_s w_k (y_k - \bar{Y})\right]}{N^2 \mathrm{Var}_{srswr}(\bar{y})}$$

and

$$\mathrm{Deft}_P^2(\hat{Y}) = \frac{\mathrm{Var}_P\left(\sum_s w_k y_k\right)}{\mathrm{Var}_{srswr}(N\bar{y})}.$$

Note that the denominators are the same, since $\mathrm{Var}_{srswr}(N\bar{y}) = N^2 \mathrm{Var}_{srswr}(\bar{y})$ and $\hat{\theta}' = N\bar{y}$ for $\theta = Y$. The two design effects were compared for one-stage probability proportional to size (pps) sampling with replacement by Park and Lee (2001), who also extended the result for cluster sampling. The difference of the two design effects is additive rather than multiplicative under the scheme, so that we can write

$$\mathrm{Deft}_P^2(\hat{Y}) \cong \mathrm{Deft}_P^2(\hat{\bar{Y}}) + \Delta_{y,P}, \qquad (5)$$

where $\Delta_{y,P}$ is a quantity depending on the distribution of the y-variable and/or the sample design P. Thus, we have

$$\mathrm{Deft}_P^2(\hat{Y}) \geq \mathrm{Deft}_P^2(\hat{\bar{Y}}) \text{ iff } \Delta_{y,P} \geq 0.$$

A brief sketch of this discussion follows.

3.1 One-Stage PPS Sampling with Replacement

In parallel with Spencer (2000), Park and Lee (2001) derived the design effect of $\hat{Y}$, which is given as

$$\left(1 + \mathrm{CV}_w^2\right)\left(1 - R_{yp}^2\right) + \mathrm{CV}_w^2 \left(\frac{R_{yp}}{\mathrm{CV}_p} - \frac{1}{\mathrm{CV}_y}\right)^2, \qquad (6)$$

where CV_y and CV_p denote the population coefficients of variation for y_k and selection probability p_k, respectively, and R_{yp} denotes the population correlation coefficient between y_k and p_k. For $\hat{\bar{Y}}$, the $1/\mathrm{CV}_y$ term drops out from the above formula and the corresponding quantity $\Delta_{y,P}$ in the comparative expression (5) can be easily obtained, from which the following inequality results:

$$\mathrm{Deft}_P^2(\hat{Y}) \geq \mathrm{Deft}_P^2(\hat{\bar{Y}}) \text{ iff } 2R_{yp} \leq \mathrm{CV}_p / \mathrm{CV}_y.$$

This shows that $\hat{Y}$ has a larger design effect than $\hat{\bar{Y}}$ if selection probabilities (and thus sampling weights, defined as $w_k = 1/np_k$) are not correlated with the y-values. On the other hand, $\hat{Y}$ can have a smaller design effect than $\hat{\bar{Y}}$ if the correlation is positive and strong. From this, we see that another factor, R_{yp}, plays an important role in evaluating the design effect.

An important special case is obtained by letting $R_{yp} = 0$. In this case, $\hat{Y}$ has a larger design effect than $\hat{\bar{Y}}$, since expression (6) reduces to

$$1 + \mathrm{CV}_w^2 + \mathrm{CV}_w^2 / \mathrm{CV}_y^2,$$

while its counterpart for $\hat{\bar{Y}}$ reduces to $1 + \mathrm{CV}_w^2$, which is the population equivalent to Kish's formula (2). Spencer (2000) derived the above approximate

formula for $\hat{Y}$ and compared it directly to Kish's formula (2) for $\hat{\bar{Y}}$ with a conclusion that they are equivalent under some special situations. However, this equivalency cannot be achieved unless $CV_w = 0$. In fact, Kish's formula (2) was derived with an implicit assumption of no correlation between y_k and w_k, which is similar to the condition that $R_{yp} \cong 0$.

For some numerical examples, see Park and Lee (2001).

3.2 Cluster Sampling

If an SRS of unequal clusters is selected, we can show under a certain condition that

$$\Delta_{y,P} \cong \bar{m}\frac{CV_M^2}{CV_y^2},$$

where CV_M^2 is the relative variance of cluster sizes. (See Särndal et al., 1992, pp. 315-318, for similar results.) This shows that $\hat{Y}$ has a larger design effect than $\hat{\bar{Y}}$ in general. A special case many sampling textbooks (e.g., Cochran, 1977, p. 242) include is the case where clusters are equal in size. In this case, $\Delta_{y,P} = 0$ since $CV_M^2 = 0$, and the two estimators have the same design effects.

Under pps sampling of unequal clusters with selection probabilities of clusters proportional to the actual cluster sizes, we can show that $\Delta_{y,P} = 0$. For the same sampling method but with outdated cluster size measures, Thomsen et al. (1986) derived

$$Var_P(\hat{Y}) \cong \phi_P Var_{srswr}(N\bar{y}) + \Phi_P(M_i, \bar{Y}_i, \sigma_i^2)$$

where ϕ_{p_s} is a quantity similar to Kish's formula (3). $\Phi_P(M_i, \bar{Y}_i, \sigma_i^2)$ is a function that depends on the difference between the actual cluster size M_i and the outdated cluster size used in pps sampling, and cluster means ($\bar{Y}_i$) and variances (σ_i^2) of y_k. Thomsen et al. compared the above result to Kish's formula (3) for $\hat{\bar{Y}}$. However, remembering the argument given in the beginning of this section, Kish's formula (3) for $\hat{\bar{Y}}$ should have been compared with the following expression rather than the one above:

$$Var_P(\hat{\bar{Y}}) \cong \phi_P Var_{srswr}(\bar{y}) + N^{-2}\Phi_P(M_i, \bar{D}_i, \sigma_i^2),$$

where Φ_P has the same form but with $\bar{Y}_i$ replaced by $\bar{D}_i$, the cluster means of deviances $y_k - \bar{Y}$, and N is the sum of M_i's. Note that both variances for $\hat{Y}$ and $\hat{\bar{Y}}$ are not of the form (4). Thus, the design effects in this case are not free of the unit of measurement.

4. Conclusion

Kish's well-known approximate formulae for the design effect of (ratio type) mean estimators are not easily generalized in their form and concept to more general problems, especially total estimators, contrary to what many people perceive. In fact, two estimators $\hat{Y} = \sum_s w_k y_k$ and $\hat{\bar{Y}} = \sum_s w_k y_k / \sum_s w_k$ can have very different design effects. In addition, the design effect is in general not free of the distribution of the study variable even for the mean estimator, let alone the total estimator. Furthermore, the correlation of the study variable with the sampling weights can influence the design effect. Therefore, apart from its original intention, the design effect measures not only the effect of a complex sample design on a particular statistic but also the effects of the distribution of the selected study variable and of its relation to the sample design.

A more detailed discussion of the issues presented here is under preparation for submission to a journal.

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Special Articles: Censuses Conducted Around the World

2002 Census in Chad

A General Census of the Population Is an Act of Sovereignty: Proposals to Reduce Census Costs, Mobilize Local Resources, and Ensure the Continuity of Census Operations

Because census projects are very expensive, they are hindered by the cash flow difficulties that more and more characterize the countries south of the Sahara and which constitute a constraint for meeting the 10-year timeline of their organization as foreseen by the United Nations. Therefore, we will have to give some consideration to strategies for reducing their cost, mobilizing resources, and, finally, ensuring the continuity of these operations.

Political Arrangements

From the political point of view, there is a need to involve politicians firmly in determining general objectives, in training, in creating awareness, and, especially, in supervising and mobilizing financial, human, and material resources for the census. This involvement will preclude unnecessary disputes that the structures responsible for organizing such operations frequently face after each census.

Given their function, their role, and their status, general population censuses must be constitutionalized, in other words, written into countries' constitutions. The census is an act of sovereignty; it is an activity of the State and, as such, should be financed primarily by the State. Results from censuses are used to determine broad political and economic orientation; given this importance, the census should be written into the constitution, which will have the force of law and will demand respect for its financing and its organizational schedule.

The census must be institutionalized. By institution, we mean the aggregate of provisions that would make the census permanent and stable. This means basic documentation that must be fairly attractive to guarantee the stability of census bureau structures and resources. Such provisions would prevent personnel mobility and the rapid recycling of census equipment which happen at the end of each census.

As for the financing of census operations, a strategy based on the annual or monthly establishment of appropriations should be given preferential treatment. For example, for census operations that would cost $5.5 million (3.5 billion FCPA), which is Chad's case for the second census planned for 2003, we should provide annually a sum of $550,000 (350 million FCPA) as of 1995, which is the date of the release of results from the first census. This would be a little less than $46,000 (approximately 30 million FCPA) per month. At the end of 10 years, this sum will allow us to put together the budget necessary to finance this census without having to call on external resources.

Economic Arrangements

Financing based on projects—There is a very close relationship between census data and the conduct and continuation of development projects. Whether these are development projects or private or public undertakings, socioeconomic statistics that result primarily from census operations form, in large part, an important base. These data are used either to institute these programs or to continue them. As such, budgets representing 5 to 10 percent of project and associated costs should be provided for at this level to meet financing needs not only for census operations but also for financing surveys and other studies.

Mapping—Mapping work is a basic activity of census operations. In most cases, mapping represents 35 to 50 percent of census budgets. In the context of very limited financial resources, cartography will have to be tailored differently to make a census project saleable. It is simply a matter of placing mapping into a new integrated approach. In other words, it will be necessary to collect cartographic information that is not only of interest to the census project but that could be of interest to other sectors of national life.

This strategy has the advantage of being of interest to several sectors horizontally, for example, the poverty reduction project, for the study of the poverty profile of localities; the livestock project, for water provision and the subsequent mobility and itinerary of livestock; and the development of the map of schools or the map of health services. Such an approach would make the census project saleable. This presupposes that, at the time of planning the census, there will be serious thinking

on the use of mapping materials in a much broader manner.

The analysis and tabulation plan—The analysis and tabulation plan is the aggregate of measures or technical procedures that are taken to transform the information collected during enumeration into concrete results that correspond to census objectives. The primary object of such a plan is to draw the broad lines that will orient and facilitate the work of computer specialists and of analysts. However, within the context of economic difficulties, an analysis and tabulation plan should also facilitate the allocation of funds.

Not many people can grasp the use of the census when they see the project document or forms (the questionnaire, etc.). The value of a census operation becomes much more evident in many cases with the analysis and tabulation plan, which precisely contains the list of socioeconomic and demographic indicators.

This approach would allow politicians, the international community, non-government organizations, commercial corporations, and, in a general way, data users to know ahead of time the information that is of interest to users and that will result from the operation. Such a strategy would be more attractive to funding organisations.

The development of an analysis and tabulation plan would also allow funding organisations to avoid double counting in the financing of certain studies if one is certain that the maximum number of indicators will be obtained from the census operation. These documents must be developed in time, within the framework of an early project, if possible, and should serve as basic documentation at the census financing roundtable.

This strategy will force those responsible for the census to develop the analysis and tabulation plan at the time that the project is developed. In most cases, tabulation and analysis plans are only developed at the time of data collection or later.

This article is drawn from the presentation of the Chad Delegate, Mr. Bandoumal Ouagadjio, Demographer, Director of the Central Bureau of Census (Central Census Bureau), at a meeting of the International Group of Experts on the mechanisms for ensuring the continuity of organizing the census every 10 years and strategies to reduce census costs, held November 26-29, 2001, in Pretoria (South Africa).

Population and Housing Census in Hungary

Hungary's population census has been conducted since the establishment of the Hungarian Statistical Services. The 14th population census was executed in 2001. Preparation for the census started in 1996 and took into account 130 years of experience as well as new data needs and international recommendations. As a result of professional preparation, the proper execution of the fieldwork, and the up-to-date technology used in questionnaire processing, preliminary data from the census were published as early as June 2001 and more detailed figures were available in December of the same year.

The census date was midnight between January 31 and February 1, 2001. The actual data collection was carried out between February 1 and February 21, 2001; although residents could respond until February 28, 2001 (at the municipal offices, in the case of persons who were omitted from the normal data collection).

The data were collected with the help of questionnaires, filled in by a trained staff of around 55,000 interviewers and supervisors. Due to the changing political environment, the census was performed for the first time in anonymity. This was necessary because of legal requirements on ethnic minorities, as well as those on personal data protection. The so-called sensitive questions—ethnic and religious characteristics as well as the issue of handicaps—could have been asked only with restrictions; therefore, these questions were exempted from the overall compulsory character of the census.

In the processing of the data, the latest methods were used. Data entry from the completed and pre-coded questionnaires was carried out using optical reading technology (developed in co-operation with the French Bull company).

As a result of professional preparation, the proper execution of the fieldwork, and the technology applied to questionnaire processing, in December 2001 it was possible to publish detailed preliminary figures on the main topics (demography, occupation, households, families, housing) on the country level, as well as a less detailed description of the 174 individual parliamentary electoral districts. (The purpose of the latter information was to provide a guide for the candidates in the 2002 election.)

The preliminary data listed below are based on a representative sample, with an average selection rate of 12 percent.

Changes in the Size of the Population

In 1870, the population in the present territory of Hungary numbered 5,110,000. Until 1980, every census but the one in 1949 reported a growth in the population size; the largest population was registered immediately after the 1980 census, in 1981. On February 1, 2001, the population numbered nearly 10,198,000, a decline of 1.7 percent compared to 1990. In the 1990s, the surplus of women continued to rise. The surplus of women today (1,096 females per 1,000 males) exceeds even the high surplus of the after-war period.

Population Density and Regional Characteristics of the Changes in Population Size

The population density of the country is 109.6 persons per square kilometer. The population density is the highest in Central Hungary, as determined by the high density (3,378 persons per square kilometer) in Budapest. Nevertheless, as in the previous census, the largest population decline among the administrative regions (from more than 2 million to 1.774 million people) was registered in Budapest, reflecting a decline of its population density by 500 people per square kilometer.

Age Structure

Compared to 1990, the most significant population decline was registered in the younger adult cohorts, particularly those 35-39 years of age. Today, there are one-quarter fewer people in this category than in 1990. The cohorts born in the 1950s are at present 45-54 years old; that is, they contribute to the higher number of the older adult population. The children of this cohort are mainly 20-29 years old; thus, compared to 1990 the latter age group shows a significant growth as well. Due to the decrease in the number of births, there was a decline in every cohort under 20 years of age during the last decade. During the last 100 years, the average age of the population rose by 12 years (from 26.9 years to 39.1 years).

Marital status

The decline in the proportion of married persons within the population over 15 years of age is a long-term tendency. This is reflected in the higher rate of never-married, divorced, and widowed persons of both sexes.

Live-Born Children

The extremely rapid decline in fertility slowed down in the 1980s, and by the end of the second millennium it seems to have stopped. The number of live-born children per 100 married women in 1920 amounted to 362; this value had dropped to 201 in 1970 and to 189 by 1980, while the value of this indicator was 188 in both 1990 and 2001.

Educational Attainment

According to the 2001 census, 90 percent of the population aged 15 years and over had finished at least the 8th grade of general (primary) school. In the last decade, the proportion of persons having completed at least the 12th grade—i.e., secondary school graduates—rose from 29.2 percent to 39.5 percent.

Religion

Although the answer to the religion question was not compulsory, the readiness of the population to answer it was greater than expected: only slightly more than 10 percent of the population did not want to give any information on the subject. Three-quarters of the population indicated that they belonged to some church, denomination, or religious organisation, while 14 percent of the population did not report any religious affiliation. Among those in the first group, 69 percent declared themselves as Roman Catholics (i.e. 52 percent of the total population), 21 percent as Calvinists (14 percent of the total), and 4 percent as Lutherans (3 percent of the total). The remaining fraction of the population (5 percent of those expressing a religious affiliation and 4 percent of the total population) were distributed among 100-200 religions, churches, and denominations.

Economic Activity of the Population

The shift in the socio-economic system has generated changes in the structure of economic activity.

In 2001, the size of the employed population amounted to 3.7 million people, a figure 7 percentage points lower than in 1990. Consequently, the number of inactive persons per 100 employed persons rose from 129 in 1990 to 176 in 2001.

The main consequence of the fall in the employment level was the dramatic increase in the number of unemployed people, representing 400,000 persons—a threefold increase since 1990. Another substantial consequence of the socio-economic transformation of the 1990s is the 8 percent increase in the proportion of inactive earners; they represent one-third of the population, compared to one-quarter in 1990.

Major Occupational Groups

In the previous decades, a transformation occurred in the structure of employment by major

occupational groups. The main issue is the gradual increase in the proportion of people in the professional, intellectual, and other non-manual occupational groups. While in 1990 one-third of the employed performed non-manual activity, by 2001 this figure had increased to 41 percent of the employed population. A significant increase in the share of persons carrying out service activities—as well as the decline in those working in agricultural, forestry, industrial and construction occupations—confirms the structural changes from the standpoint of the occupations as well.

Size and Composition of Households

During the last 11 years, there has been almost no modification in household structure. The decline in the number of households with at least one family stopped, while the growth of single-person households slowed substantially. One-quarter of households consist of one person. One-family and one-person households together account for 94 percent of all households; that is, multigenerational cohabitation has become uncommon.

In the period between the last two censuses, the slow disintegration of households basically stopped and the composition and average size of households became stable.

Age Composition of Households

There was a steady change in the age composition of households in the previous decades. In the 1990s, this trend continued to some degree: a further decline was registered in the share of households containing only young people. Young and middle-aged people made up thirty seven percent of all households, and this proportion did not change significantly in the 2001 census.

Household Dwellings

In the 1990s, there was a significant improvement in the housing conditions of households in regard to both size and level of comfort of the dwellings. During the last 11 years, the percentage of households living in one-room and two-room dwellings dropped by four and three percentage points respectively, while the share of those living in dwellings with three rooms rose by two percentage points. The largest increase—four percentage points—was found in the group of the households living in dwellings with four or more rooms: their share has exceeded 16 percent.

Compared to the previous census, there was a rise in the proportion of households living in dwellings with all conveniences, while the portion of households living in dwellings with principal conveniences became stable.

Family Composition and Number of Children

There was a long-term increase in the number of families until 1980. During the next ten years, the number of families dropped by 130,000 and an additional decline of 11,000 families was measured in the period after 1990. At present, there are 8,444,000 persons (83 percent of the population) living in 2,884,000 families. The growing tendency of cohabitation without marriage is shown by the fact that their share of such households within the total number of couple-type families rose from 5 percent in 1990 to 11 percent in 2001.

The drop in the share of married couple families means that at the same time, there was a further increase in the number of single-parent families. Presently, somewhat more than 16 percent of families consist of a single mother or father living with child(ren).

Since 1990, the structure of families by number of children has shown a peculiar picture: it is only the proportion of two-children families that has declined, while a remarkable rise has been seen in the proportion of three-children families (reaching the level of 1970). In 2001, there were 109 children per 100 families.

Number of Dwellings

The number of occupied dwellings and occupied vacation homes (regarded as occupied dwellings) was 3,678,000, a figure 10,000 fewer than the relevant figure from the previous census.

Since 1990, the percentage distribution of occupied dwellings by number of rooms did not change significantly. Despite the decline in the number and proportion of one- and two-room dwellings, the latter still account for the largest proportion of dwellings (41%); that is, this category of dwellings can be regarded as typical.

The average floor-space of dwellings is 75 square meters and almost two thirds (64%) of dwellings have a total floor-space exceeding 60 square meters.

Equipment and Level of Comfort of Dwellings

Since the previous census, there has been further improvement in the equipment and supply of public utilities of occupied dwellings, although the pace of development had slowed. The equipment level in 2001 was around 90 percent for all items, with the exception of piped gas (68%). The largest value was registered for piped water (92%), of which the local water supply accounted for only two percent. Sewage treatment was reported in 91 percent of occupied dwellings, hot water in 90 percent of

dwellings, and a flush toilet in 87 percent of dwellings.

Despite improvements in equipment and access to public utilities, there are still deficiencies in supply. Around 8 percent of dwellings (308,000 dwellings) are supplied with neither public nor local piped water; 315,000 dwellings have not been canalized.

Number of Household Occupants

The grouping of occupied dwellings according to the number of occupants shows that dwellings occupied by two persons are the most common (28%). Their proportion of such dwellings had not changed since the previous census, while the proportion of dwellings occupied by one person increased from 19 to 23 percent (i.e., nearly every fourth dwelling is occupied by a single person). 20 percent of dwellings are occupied by three persons and 24 percent by four to five persons.

Publications containing more information on the above topics are available from the Marketing Department of the HCSO in printed form or on CD, as well as on the web site, www.nepszamlalas2001.hu.

2001 Census in Lithuania

1. Introduction

Lithuania carried out its Population Census in April 2001. It was the first population census since the restoration of Lithuania's independence. The last census in independent Lithuania was conducted in 1923. Over the soviet period, four censuses took place, the last one organized in 1989.

The census methodology was prepared taking into account international recommendations, the experience of neighboring countries, expert advice, and factors specific to Lithuania. Demographers, sociologists, and economists also provided input.

The census questionnaire, containing questions to be answered by the population, was prepared following the United Nations and Eurostat recommendations for the 2000 Censuses of Population and Housing in the Economic Commission for Europe (ECE) region. These recommendations were analyzed and adjusted to national needs in co-operation with Lithuanian institutions (replies received from all interested parties), demographers, and other specialists. Thus, comparability with other countries was envisaged.

2. Goals of the Census

The collected information provides opportunities to determine the demographic, social, and economic characteristics of the population, such as composition by sex, age, and family status, the number of employed and unemployed, etc.

The employed will be grouped by economic activity and occupation. This will lead to structural changes in the country's economy.

During the census, people were asked about their command of foreign languages, religious beliefs, and disabilities. This information will allow the grouping of the population by language knowledge, religion, and social characteristics of disabled persons.

The census also collected data about dwellings and their quality, housing, and period of building construction.

The Population and Housing Census did not aim at collecting all information about agriculture. This will be done during the Agricultural Census. However, Statistics Lithuania took the opportunity to collect data about the land owned or rented by households. These data will allow the grouping of households by land area owned, social and demographic characteristics of land users, and their distribution by administrative territorial division.

3. Organization of the Census

To ensure the exhaustiveness of the census, urban and rural areas were divided on the basis of schematic plans and maps (prepared by the State Land and Real Estate Cadastre and Register and similar institutions). Lists of residential dwellings and buildings used for habitation were prepared. Cartographic material was repeatedly revised prior to the Census.

About 15,000 people were employed as census managers, supervisors, and enumerators to carry out the enumeration of the population. In most territories, the census was completed in 8 days, and the remaining ones in 10 days. Persons who were not enumerated for certain reasons were given the opportunity to be enumerated later.

Census data were received on Lithuanian citizens, as well as their family members, working in Lithuania's embassies, other institutions, and international organizations abroad. All opportunities for self-enumeration were offered to the population of Lithuania.

4. Data Processing

The processing of the census data began after all questionnaires had been collected in the central office. Optical character recognition technology was used for the data entry; that is, the census questionnaires were scanned, data recognition was implemented, and unrecognized symbols were corrected. Data correction and editing were performed by data entry operators. Data correction covered not only the entry of unrecognized characters but also some aspects of logical editing (full logical editing was done in an Oracle environment). The aim was to transfer information from the questionnaires into the database as precisely as possible. For example, when an error was detected, the operator updated the recognized information using the data from the questionnaire.

After loading the data into the Oracle environment and setting the relationship between pages, logical editing and adjustment were carried out. The main objective of this stage was to remove logical data errors. Special software was developed on the basis of logical editing rules prepared in advance, which helped in detecting logical data errors. Data coding was performed both automatically and through a combination of automatic and manual methods. Automatic data coding procedures coded information that entirely coincided with information available in prepared manuals and dictionaries. Information that had no equivalent in the dictionary was saved into temporary storage for coding by the operators. During the mixed coding stage (i.e., when the operators coded unique non-coded information), coded information was saved in dictionaries according to which all remaining information was later coded automatically. For the mixed data coding, software was developed with a special user-friendly system of supply and search; that is, the software suggested possible (similar) variants. If the suggestion was correct, the operator had only to press the button to approve the selection. If the program had nothing to suggest, the operator could create requests and code information according to the results of the requests.

Organized (i.e., coded and logically irreproachable) data was transferred into the final database. Some person-level data (person identification number, name, surname, date of birth, and address) were compared with data from the Population Register.

The initial results of the Population Census were announced by Statistics Lithuania in October 2001. They show that, as of April 6, 2001, Lithuania's total population was 3,490,800 usual residents, of whom 2,344,700 and 1,146,100 lived, respectively, in urban and rural areas. Compared to the data of the Population Census of 1989, the population had decreased by 184,000, or 5 percent.

5. Post-Enumeration Survey

In order to measure the coverage and data quality of the census, a post-enumeration survey (PES) was carried out 1 week after the enumeration of the population. The main objectives of the PES were to measure census coverage error and the content error in the census data for major socio-demographic indicators.

A cluster sample was used in the Lithuanian PES. The smallest areas for which verifiable boundaries existed on maps were the enumeration areas. Therefore, all 11,481 enumeration areas were selected as a sampling frame. Enumeration areas covering institutions (hospitals, prisons, etc.) were excluded from the frame. Before a sample of enumeration areas was selected, the population was divided into three strata: large urban (4,158 areas), urban (2,596 areas), and rural (4,727 areas). The available resources allowed the questioning of approximately 1 percent of the whole population; that is, 109 enumeration areas were selected into the sample. The simple random sample of areas was carried out in each stratum. Allocation of the sample into strata was proportionate to the estimated population size. Thus, 41 large urban, 22 urban and 46 rural areas were selected into the sample. All people living in selected areas were asked a subset of questions from the census questionnaire.

A separate study on the quality of the census data will be prepared and released.

6. Results Expected and Data Dissemination

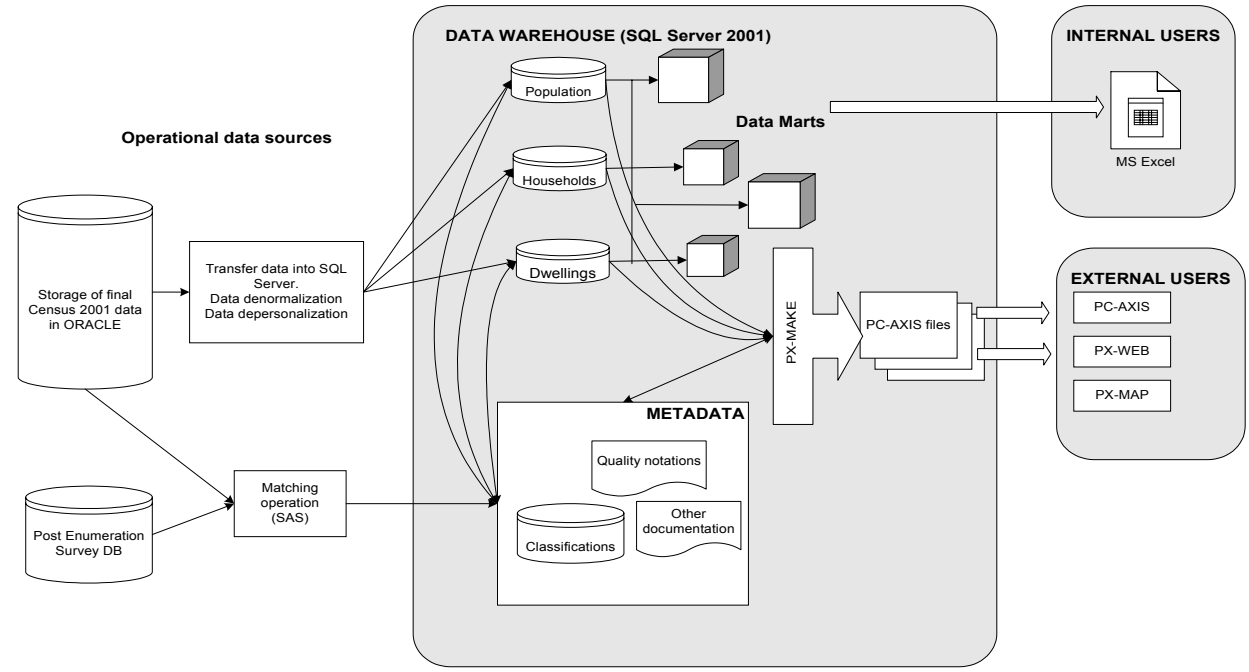
The final data of the Population Census will be released in 2002-2003 in the following sequence: population by sex and age, demographic behavior (migration trends, family formation, births, etc.), ethnocultural conditions (nationality, knowledge of foreign languages, religion, etc.), employed population by economic activity, occupation, number and structure of households, sources of livelihood (three sources could be specified), dwellings and their conditions, families and single persons living in dwellings, data on disabled people, etc. Data about the achievement level of the population (i.e., education, knowledge of languages, employment by promising economic activity, occupation, etc.) will be interesting from the scientific point of view. It was decided to recalculate the population totals for 1989 through 2001 because the preliminary census counts show the population totals to be less than those in 1989 through 2001 (this is mainly due to residents leaving the country undeclared).

The census data will be released in a variety of forms and formats to satisfy various user needs. The data will be presented in the following

breakdowns: total for the country, by territorial administrative area (county, municipality), cities, and other settlements. Depending on user requests, data may also be released by certain districts, settlements, and small administrative areas to form multiple groups. In addition to printed publications, Statistics Lithuania will provide a full range of census products and services designed to satisfy the needs of the majority of users. Census data will be provided via the Internet and on CD-ROMs in an appropriate format so that it may be presented in combination with other statistical data. To achieve this objective, an applied system, Census Data Dissemination and Analysis, has been developed. The main idea of this system is to connect the operational data sources, staging area, data warehouse, GIS technology, and OLAP Client programs. The figure below shows the organizational structure of the system. The data warehouse will be created as a virtual union of several data marts with integrated information that is shared across them. The basic structure has been developed in the SQL Server environment, and MS Analysis Services will be used to produce aggregated cubes for fast access via local area networks. The cubes produced by MS Analysis Services can be browsed and processed in third-party software packages.

As a tool for data dissemination via the Internet and on CD-ROMs, Statistics Lithuania will use PC-Axis, the family of software packages developed originally by Statistics Sweden for data dissemination.

Information systems architecture for census data dissemination



Discussion Corner

Editor's Note: *The following is an article from Anders Christianson, Vice President of the IASS, about imputation. Two discussants have provided their points of view on this topic. We encourage other members to get involved in this discussion. Send a brief description of your approach in dealing with nonresponse and imputation. We like to know how different organizations in countries around the world deal with the challenges that nonresponse imposes on surveys.*

Avoid the Need to Impute!

by Anders Christianson

Those were the words by which Éric Rancourt finalized his excellent presentation "Edit and Imputation: From Suspicious to Scientific Techniques" during the session *IPM 76: Edit and Imputation Techniques,* organized by John Kovar at the Seoul meeting in August 2001. This was one of the best sessions that I attended during the whole ISI meeting, with excellent presentations also by Antonia Manzari and Ray Chambers, and a refreshing discussion introduced by the invited discussant, Graham Kalton.

During the floor discussion, Paul Biemer posed the question, "Isn't there a limit for the degree to which we are prepared to impute?" Paul meant, obviously, that somewhere there is a limit for the nonresponse rate, beyond which we should not publish the results of a survey at all, in order not to mislead users. Graham responded to this, that we should do the best possible with the data available, and referred to an analysis made by Wayne Fuller on a data set with high nonresponse rates.

With due respect to Graham and Wayne, who have both done so much good for survey methodology, I cannot fully agree with this statement, even though I do not remember the actual nonresponse rates. I think that we should be a little more hard-headed on this issue. Generally speaking, there must be a limit beyond which we no longer can consider the remaining sample after nonresponse as a probability sample. Discarding the data set may then be the best possible action we can take, better than basing our inference on very heavy assumptions about the mechanisms that generated the unit and item nonresponse.

However, there seems to be a reluctance around the world today to impose minimum performance standards, such as those presented in Hansen et al. (1967). Committing oneself not to publish survey results when they do not meet the minimum performance standard seems to be a disgusting thought. Nevertheless, such a practice may have its virtues.

For the Swedish television audience surveys (I worked on them for 17 years), we introduced minimum performance standards in 1973 (see Christianson, 1991). Daily tables and diagrams were not to be published if the nonresponse rate exceeded 17 percent; if it exceeded 15 but not 17 percent, only totals were published, not domain estimates. There were two important advantages associated with this strategy. First, it guaranteed a certain minimum quality of survey results. It should have decreased the number of wrong decisions made due to poor survey quality. Second, the minimum performance standards gave the telephone interviewers the message that we were serious when we talked about nonresponse as a problem. The standard was used to stop publication of daily tables and diagrams only twice during the period 1973-85. The damage was thus relatively small, and I am convinced (without being able to prove this statement) that the standard was helpful in keeping nonresponse rates at an acceptable level.

In my opinion, keeping nonresponse rates down is the best way to avoid imputation, so I am supporting Éric Rancourt. There is a risk that less knowledgeable survey staff, imagining that imputation, modelling, nonresponse adjustment, or whatever you call it, "solves" the nonresponse problem, will not expend enough effort to keep the nonresponse rates down. In my opinion, the main borderline exists not between good and bad guesses, but between guesses and observations.

I am aware, however, that there are different opinions about this, and I encourage other members to express their views. Let us have a refreshing discussion on this topic!

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Comments
by Graham Kalton

I think that Anders has raised a good topic for discussion in *The Survey Statistician*. I should like to broaden it to the following question: Should survey estimates that fall below an "acceptable" level of accuracy be suppressed? Anders focuses on high nonresponse rates as an indicator of accuracy, whereas I am extending the issue to all dimensions of accuracy. There are clearly differences in views and practices as to whether estimates of low accuracy should be suppressed, differences that I suspect are related to the different circumstances and types of surveys involved. For this reason I do not think there is a simple universal answer to the question. In general I am opposed to suppression, but there are circumstances where it can be justified.

In essence, my argument is that estimates of any quality add to the information available to users. Rather than protecting users from themselves by suppressing estimates that producers judge to be of inadequate quality, I believe that producers should provide users with the estimates together with the information that is needed for users to assess the accuracy for themselves. It is for the users to decide whether the estimates are fit for use for their particular purpose. In doing so, users should of course consider alternative sources of information that may contribute to meeting their needs, and make use of the current estimates in the light of that information. If good alternative data are available, a user may choose to ignore the current inaccurate estimates, suppressing them for him- or herself. However, if there are no other reasonably closely related alternative data available, then the user may prefer to rely on the inaccurate estimates, rather than operating without statistical data. Users who need to make policy decisions or allocate funds based on statistical evidence must take some action. Even though the estimates may be highly inaccurate, they may nevertheless provide the best information available (see the example in Kalton, 2001).

My argument relies, of course, on users being able to make informed judgements. There are two aspects to this. First, users need to have access to the information necessary to assess the accuracy of estimates. Producers need to provide that information to users, after carrying out whatever studies are needed to compile the information. Second, users need to have the skills necessary to make an informed judgement. The case is often made that users lack those skills and will misuse the estimates if they are not suppressed. I acknowledge that this may often be the case, but I think that the solution lies in extensive efforts to educate users to understand measures of accuracy and to be concerned about them.

One widely used form of suppression is to suppress estimates with coefficients of variation (CVs) of greater than, say, 30 percent. Here, the level of inaccuracy (i.e., the standard error) can be measured and presented straightforwardly to the user. Thus, the case for suppression appears to be the concern that users will ignore the standard error. They need to be educated not to do so.

The situation with high total or item nonresponse rates is different in that these rates serve only as indicators of a potential for inaccuracy (i.e., nonresponse bias), but no direct measure of inaccuracy can be provided. Furthermore, attempts can be made to reduce nonresponse bias by means of weighting adjustments for total nonresponse and imputation for item nonresponse. The effectiveness of these compensation procedures cannot be assessed. My general view in this situation is that the survey data (in the case of a high total nonresponse rate) or a particular item (in the case of a high overall item nonresponse rate) should not be suppressed, but that users be given clear warnings about the risk of bias in the survey estimates.

To the extent that nonresponse bias studies can be conducted, they should be, and the results presented to users. Also, I argue that considerable efforts should be made to compensate as effectively as possible for high levels of missing data, either in weighting adjustments or through imputation. It was in this context that I referred in the ISI session to the paper by Wayne Fuller, Marie Loughlin and Harold Baker (1994), in which the authors applied extensive regression weighting adjustments to try to compensate for potential

nonresponse bias in a survey that achieved a response rate of only 37 percent.

Another issue with suppression in the case of nonresponse is determining the threshold for the response rate below which the survey data are to be suppressed. Anders reports that the threshold was set at 83 percent in the minimum performance standards established for the Swedish TV surveys in 1973. If that threshold were applied now, the data from most surveys in most countries would be suppressed! How should the threshold be set in a meaningful way? I do not know how to answer that question. Furthermore, I think that the likely effectiveness of the nonresponse compensation procedures needs to be factored into a decision about suppression. In the case of item nonresponse, for example, if highly predictive auxiliary variables are used in imputing for an item with a high nonresponse rate, then the case for suppression is much reduced.

Having given my arguments against suppression on the grounds of high nonresponse, let me consider those for suppression. Anders suggests that one is that the threat of suppression makes the data collectors aware of the importance of high response rates, and hence keeps them on their toes. I can see that suppression may be effective for this purpose in surveys repeated at short intervals, but this would not seem to readily generalize. Also, I feel that there should be other methods for achieving this objective that do not involve jettisoning data.

A second argument for suppression relates mainly to surveys conducted by national statistical offices (NSOs). The concern here is that an NSO should not provide estimates of low accuracy because such estimates will tarnish the reputation of all the estimates the NSO provides. Given the great importance of maintaining the credibility of the information that an NSO provides (see Fellegi, 2001), this is an important point. However, note that it rests on an assumption that users fail to distinguish between estimates of low and high accuracy. If they were educated to do so, that should overcome this concern. Many users may not be able to make the distinction at this time, but the aim for the future should be to educate them to do so.

I should note that the above comments relate to suppression of estimates of low accuracy only. Suppression is also used to avoid data disclosure. That is a separate topic.

Finally, I should like to add my support to the position taken by Anders and Eric Rancourt that the best solution to missing data is to avoid the problem. The naïve view that nonresponse weighting adjustments and imputation, however well performed, can remedy the problem is fallacious and needs to be firmly refuted. In general, we should strive for accuracy along all dimensions. In addition, we should devote resources to measuring accuracy and to reporting it fully to users. Then we need to work towards educating users to understand and to take account of the accuracy measures we provide. If users fully absorb the importance of accuracy, they will also appreciate the value of designing high-quality surveys and will accept the often increased costs needed to produce a quality product.

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Kalton, G. (2001). How Important is Accuracy? *Proceedings of Statistics Canada Symposium 2001, Achieving Data Quality in a Statistical Agency: a Methodological Perspective*.

Comments
by Marilyn McMillan

I must start off by saying that there is truth on both sides of this debate. Perhaps the answer rests in the intended use of the data. Certainly in the case of "official statistics" issued by government agencies, it is desirable, if not imperative, to have response rates that are as high as possible. After all, if data are to be presented to the public and policymakers as official data to serve as a basis for both personal and policy decisions, they must be of the highest quality possible.

On the other hand, if the data are to be used in a more analytic, exploratory manner, there are likely to be cases where the cost and level of effort required to attain even a low response rate yield data that otherwise might not be available. Take, for example, a health survey that asks respondents not only to complete a questionnaire, but also to submit to a physical examination and medical tests;

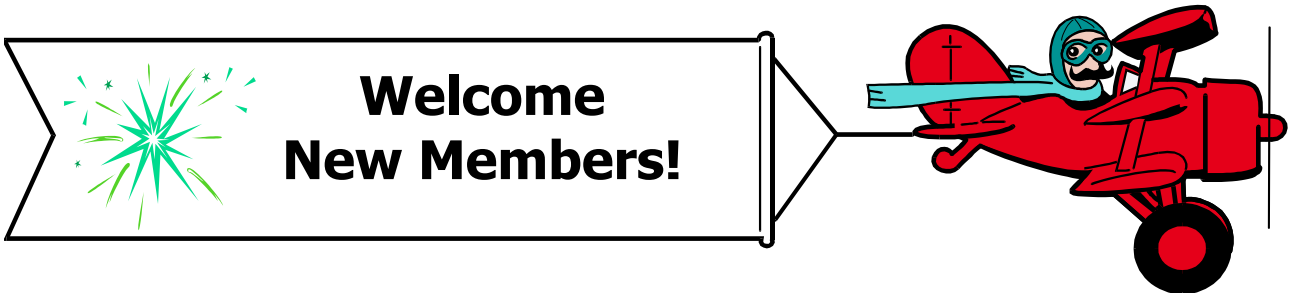
the more complicated and invasive the test, the lower the response rate is likely to be. If the end result is a data set with blood sugar levels or cholesterol levels for thousands of people who account for only 50 to 60 percent of the sampled cases, should these data be discarded, or should all the information possible be extracted from these data, within the limitations imposed by probable nonresponse bias? I must vote for proceeding with the latter approach, with caution and appropriate caveats.

That said, given the importance of "official statistics" in modern life, I would like to focus primarily on the importance and significance of attaining high response rates. Why? Because even the best weighting adjustments or imputation procedures are limited by the distributions of the reported or known variables that are used in these methods. If additional covariates are related to the missing data in question but are not used in these methods, the weighting adjustments and imputation procedures may not accurately reflect the "true" distribution of the missing data.

Several things can be done to increase the likelihood of attaining high response rates. This effort begins at the survey design phase, where it is important to design data collections with the goal of reaching target response rates that are at least consistent with historical response rates from similar surveys that were conducted with best practices. Because many studies differ in the number of stages required to complete a data collection, at the design phase it is perhaps best to think about survey response rates at the unit level. This allows the opportunity to take into account anticipated differences in response rates for different stages. For example, in the case of the first-stage school response rates of longitudinal surveys, in which serious time investments are requested, target response rates of 70 percent are realistic; but target response rates for subsequent stages and for longitudinal followups should be at least 90 percent. However, in the case of a cross-sectional sample survey of schools, administrators, and/or teachers, target unit response rates of 90 percent at each stage are desirable. Target item response rates must also be planned in the design stage; here, target rates of at least 85 percent are reasonable.

It is also important to identify and incorporate data collection procedures that encourage high response rates. This includes, for example, choosing a data collection mode that is appropriate for the target population and the objective of the data collection, clearly describing to respondents the purpose of the data collection, providing assurances of confidentiality to respondents, making efforts to minimize respondent burden, monitoring response rates during data collection, and implementing nonresponse followup strategies that are appropriate for the type of data collection and the level of nonresponse.

This brings me to Paul Biemer's question. Having done everything possible to ensure high response rates during the design and data collection phases, the survey manager sometimes must face the question of how much missing data is too much. The first step in answering this question is a nonresponse bias analysis to quantify any potential nonresponse bias that might be present. Here, it is important to keep two things in mind. First, the amount of bias measured, particularly in the case of unit nonresponse, is tied to the variables available for the analysis. Thus, if the distribution of the missing cases on some untested dimension is not strongly correlated with the distribution of one of the variables used in the analysis, the bias for that dimension could be higher or lower than the measured nonresponse bias. Second, the level of effort that goes into a nonresponse bias analysis should be a function of the amount of nonresponse. For example, in the extreme, a initial response rate in the initial stage of a longitudinal survey of schools and students might call for the administration of a separate short survey to nonresponding schools. This would provide the basis for a more extensive bias analysis than would be possible with a less extensive analysis based on a comparison of the distribution of respondent characteristics with the distribution of those same characteristics on the sampling frame. The second step in answering this question involves a consideration of the results of the bias analysis, the prospective uses of the data, and the importance or significance of the data.



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Announcements

IASS Programme for the 54th ISI Session, Berlin 2003

By Danny Pfeffermann, Chair of IASS Programme Committee

As with previous ISI meetings, we started planning the programme for Berlin four years in advance, soon after the Helsinki meeting in 1999. The first step was to establish a programme committee, which consisted this time of 29 members from virtually all over the world, representing a wide range of statistical organizations and academic departments. Members of the committee proposed well over 100 topics, covering basically every aspect of our profession. These topics provided the basis for the formation—and, later on, the ranking—of the invited paper meetings.

During the Seoul meetings, I met with representatives of other ISI sections and committees to explore the possibilities of organizing joint invited paper meetings. I also assembled the members of our programme committee who were present in Seoul to discuss the progress made with our programme and other related issues. The net result of our joint efforts is that in Berlin the IASS will be involved in the organization of 13 invited paper meetings, the same number we had in Seoul. The IASS will be the sole organizer of nine meetings and the principal (responsible) organizer of two joint meetings, with the other participating parties being the IAOS and the Committee on Professional Ethics. The two remaining joint meetings will be the responsibility of the IAOS and the ISI Committee for the Promotion of Statistics in the Life Sciences, although two of our members will be assisting in the organization of these meetings.

The complete list of invited paper meetings sponsored by the IASS and the names of the respective organizers are shown below. As I hope the list indicates, we were successful in having a good balance of organizers in terms of geography and type of affiliation.

While in Seoul, I made a strong case for the IASS to organize the tutorial session in Berlin. As I learned this week, our efforts have been fruitful and the IASS will indeed present the tutorial (or one of two tutorials) to be given in Berlin. I believe that this will give us a unique opportunity to expose our work to statisticians from other disciplines, and we will make every effort to do this in the best possible way. The topic I proposed for the tutorial (after consultations with members of our programme committee who were present in Seoul) is, "Statistical Analysis from Complex Survey Data, with Application to the Social, Biological, and Health Sciences." An abstract that I wrote when proposing the tutorial to the ISI Programme Committee is provided below. I am open to suggestions on content, presenters, and mode of presentation.

I take this opportunity to thank all the members of our programme committee for their wonderful help and dedication. I would also like to thank David Binder, who chaired the Seoul Programme Committee, for his assistance and good advice. The IASS Programme Chair for the 2005 meetings in Sydney is Pedro Silva from the IGBS, who was a member of the last two programme committees. We all wish him big success in this job.

Invited Paper Meetings Sponsored by IASS

A. IASS as sole organizer

1. IASS as sole organizer
2. New challenges with future tele-surveys. Organizer: *Oztas Ayhan* (Turkey)
3. Data fusion, imputation, and nonresponse. Organizer: *Seppo Laaksonen* (Finland)
4. Surveys in transition and developing countries. Organizer: *Nanjamma Chinappa* (India)
5. Measuring survey quality. Organizer: *Peter Lynn* (United Kingdom)
6. Estimation and analysis from complex surveys using auxiliary information. Organizer: *Jelke Bethlehem* (Netherlands)
7. Design and analysis of evaluation studies. Organizer: *Dan Kaspryzk* (U.S.A.)
8. Small area design and estimation. Organizer: *Jan Kordos* (Poland)
9. Surveys of special populations. Organizer: *Malati Pochun* (Mauritius)
10. Multinational surveys. Organizer: *Peter Wingfield Digby* (Thailand)

B. Joint meetings with IAOS

1. New approaches to population censuses; a meeting in memory of Leslie Kish. *Under the responsibility of IASS,* Organizer: *T M.F. Smith* (United Kingdom)
2. Use of administrative data for business statistics. *Under the responsibility of IAOS*,

Organizer: *Geoff Lee* (Australia). Mike Hidiroglou (Canada) from IASS will assist in the organization of this session.

C. Joint meeting with ISI Committee on Professional Ethics

- Ethical issues in surveys and how they affect our society. *Under the Responsibility of IASS,* Organizer: *T M.F. Smith* (United Kingdom)

D. Joint meeting with ISI Committee for the Promotion of Statistics in the Life Sciences

- Emerging methods in longitudinal data analysis. *Under the responsibility of the ISI committee*, Organizer: *Marie Davidian* (U.S.A.). Gad Nathan (Israel) from IASS will assist in the organization of this session.

Proposal for the Tutorial Meeting in Berlin
Statistical Analysis from Complex Survey Data, with Application to the Social, Biological, and Health Sciences.

Abstract
Until about two decades ago, the use of complex survey data was mostly for descriptive purposes such as the estimation of means or proportions. The methods used were almost purely "design based," employing sample selection probabilities, and hence were considered as being outside "mainstream statistics."

The last two decades saw a big change in the work of survey statisticians. On the one hand, there has been an increasing emphasis on all kinds of data analysis and inference. On the other hand, new methods have been developed that modify and extend existing methods in "general statistics" so as to account for the special features and complexities of survey data.

The purpose of this tutorial is to highlight the new advancements in statistical modeling and analysis of complex survey data, with special emphasis on new inference opportunities that they open in the social, biological, and health sciences.

Possible applications for illustration include:

- Structural Modeling of Time Series Data;
- Mixed Linear and Nonlinear Models (Random Effects Models);
- Survival Analysis;
- Contingency Table Analysis; and
- Latent Variables Models.

IASS Short Courses at the 54th ISI Session, Berlin 2003

By Seppo Laaksonen,
Scientific Secretary of IASS

The list of short courses includes the following:

- Workshop on Survey Sampling—Graham Kalton, Colm O'Muircheartaigh, 2½ days;
- Variance Estimation in Complex Surveys—Wayne Fuller, Kirk Wolter, 2 days;
- Small Area Estimation—J. N.K. Rao, 1½ days;
- Editing and Imputation of Survey Data—John Kovar, Eric Rancourt, 1½ days;
- Business Survey Methods—David Binder, Mike Hidiroglou, 2 days; and
- Designing Surveys—Edith de Leeuw, Don A. Dillman, 2 days.
  - Introduction to Questionnaire Design; and
  - Mail and Internet Surveys.

The final list may be changed. The list of courses and the names of the course leaders will again be available in the next IASS newsletter and also on the IASS website. As in previous years, support for students from developing and transition countries will be attempted. The courses will be arranged just before the ISI session, that is, August 10-13. The location is under discussion with our German organizers. It will be possible to choose one to three courses per person, and the participation fee will be reasonable. The lecturers are the highest level experts on each topic. The Scientific Secretary of the IASS, Dr. Seppo Laaksonen, welcomes statisticians and survey researchers from all countries to participate in these courses. For further questions and comments, please contact: Seppo.Laaksonen@Stat.Fi.

Cochran-Hansen Prize 2003: Competition for Young Survey Statisticians from Developing and Transition Countries

In celebration of its 25th anniversary, the IASS established the Cochran-Hansen Prize to be awarded to the best paper on survey research methods submitted by a young statistician from a Developing or Transition Country.

The next paper will be presented at the 54th Session of the International Statistical Institute, to be held in Berlin, Germany from August 13-20, 2003.

Participation in the competition for the Cochran-Hansen Prize is open to nationals of Developing or Transition Countries who are living in such countries and who were born in 1963 or later. Winners of an ISI Jan Tinbergen Award are not eligible for the competition.

Papers submitted must be unpublished original works. They may include materials from the participant's university thesis. They should be in either English or French. The papers should be submitted to the IASS Secretariat at the address below, to arrive by December 31, 2002. Each submission should be accompanied by a cover letter that gives the participant's year of birth, nationality, and country of residence.

The papers submitted will be examined by the Cochran-Hansen Prize Committee. The decision of the Committee is final.

The author of the winning paper will receive the Cochran-Hansen Prize in the form of books and journal subscriptions to the value of about 500 EUROS and will be invited to present the paper at the Berlin Session of the ISI with all expenses paid (i.e., round trip airfare between place of residence and Berlin and a lump sum to cover living expenses).

For further information, please write to:

Madame Claude OLIVIER, IASS Secretariat
International Association of Survey Statisticians
CEFIL-INSEE
3 rue de la Cité, 33500 Libourne, France
Tel: +33 5 57 55 56 17 Fax: +33 5 57 55 56 20
E-mail: Claude.olivier@insee.fr

Future Meeting Announcements

- The International Conference on Improving Surveys (ICIS 2002), Copenhagen, 25-28 August 2002 (www.icis.dk).
- The Third Francophone Seminar on Sampling, Grenoble, 17-18 October 2002 (http://sondages2002.upmf-grenoble.fr).
- The International Conference on Questionnaire Development, Evaluation and Testing (QDET), Charleston, 14-17 November 2002 (www.jpsm.umd.edu/qdet).
- The first Baltic-Nordic Conference on Survey Sampling will be held August 17-23, 2002 in the beautiful mountain village Ammarnäs in Lapland, Sweden. It is organized by the Survey Section of the Swedish Statistical Association together with the Finnish and Baltic Networks on Survey Sampling. Participation is open to statisticians from all countries, and the working language is English. The program will cover survey sampling in a wide sense. The main speakers Danny Pfeffermann, Jon N. K. Rao and Carl-Erik Särndal will give series of lectures, and nine additional speakers from Baltic and Nordic countries will give invited lectures. All participants are invited to present a contributed paper. The deadline for abstract submission is May 15. Gunnar Kulldorff is Chair of the Organizing Committee and the Scientific Program Committee. More information can be found on the web site: www.matstat.umu.se/banocoss.
- Islamic Society of Statistical Sciences (ISOSS) is holding the Eighth Islamic Countries Conference on Statistical Sciences (ICCS-VIII) at The University of Bahrain on December 21-24, 2002. Interested persons are requested to present technical paper and also participate in the Conference discussions and deliberations. For additional information please contact Dr. A. M. Chaudry (akrammoh@internic.uob.bh) or Prof. Akhlaq Ahmad (drmunir@brain.net.pk).

XIX International Methodology Symposium
Modelling Survey Data for Social and Economic Research

Organised by Statistics Canada

Fairmont Chateau Laurier
November 6 to 8, 2002
Ottawa, Canada

Background:

The Statistics Canada Methodology Symposium series started in 1984 as an international event addressing issues of statistical methodology that are relevant to the work of a government statistical agency aiming at exposure to a broader statistical community including universities, industry, and other government organisations.

This year, we plan to bring together statistical methodologists and analysts working in a variety of domains where survey data are used for analysis and inference. The subject areas of interest include national statistical accounts, public health, education, environmental protection, evaluation of social programs, transportation, travel and leisure, income and wealth distribution, labour dynamics, and demography.

Topics:

Applications will include: casual modelling, modelling of transitions and duration data, structural data, structural equation modelling, multilevel modelling, event history analysis, cohort analysis, analysis of trends, etc. The emphasis will be on the use of survey data with complex structure (correlated, hierarchical, longitudinal, from multiple frames, etc), with an appropriate accounting for sampling design.

Invited and contributed papers will be presented and discussed over the two days of the conference, preceded by a day of workshops. Proceedings from the conference will be published and disseminated.

Further Information:

Visit our website at: http://www.statcan.ca/english/services/smnrs.htm

Or send us an email at: symposium2002@statcan.ca.

Or by regular mail to:

SYMPOSIUM 2002
Attention Mary March
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Hope to see you in Ottawa!

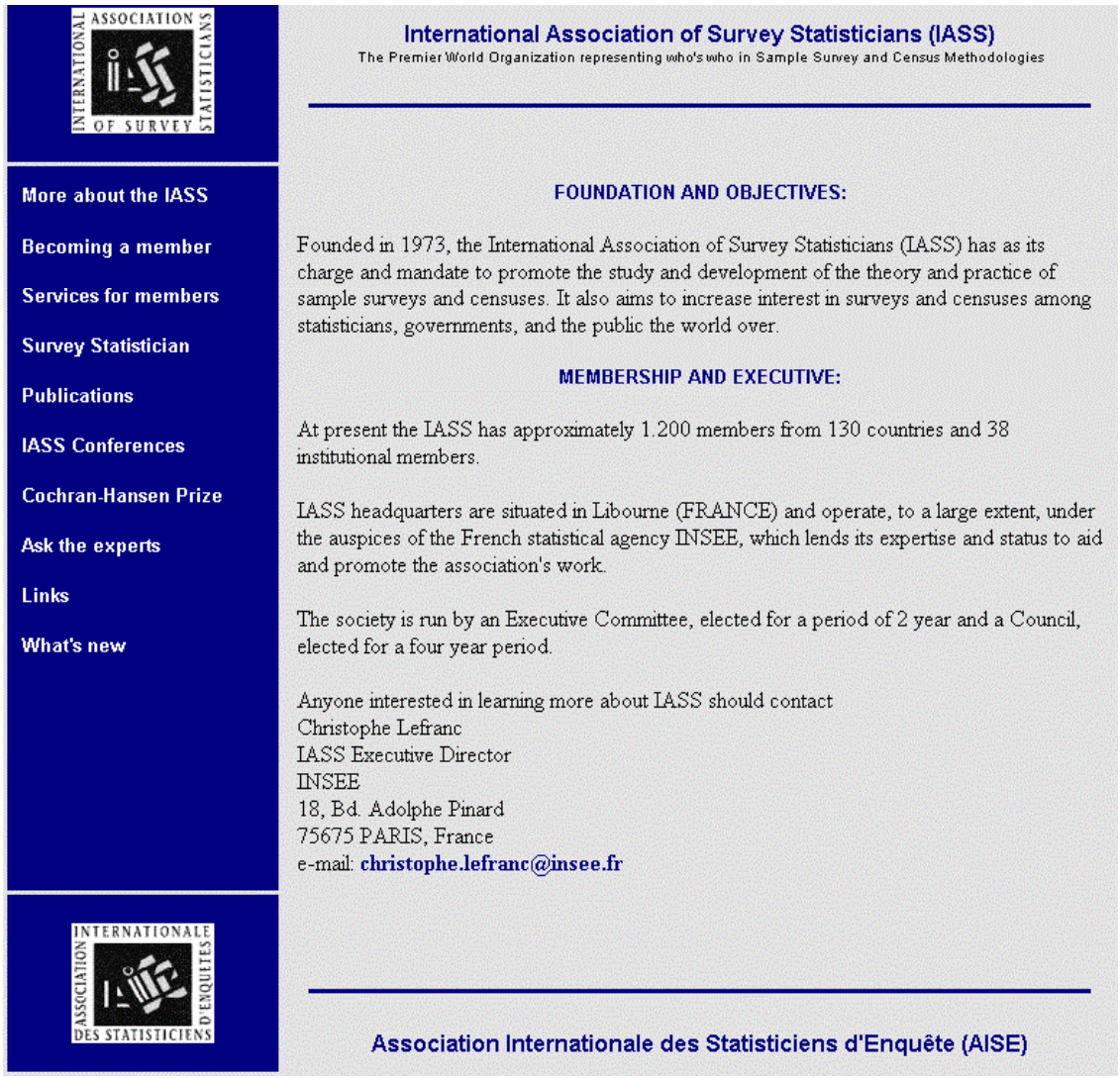
Note that the beginning of November is still very pleasant in Ottawa: dry, sunny and mild.

Statistics Canada Statistique Canada

Canada

Visit the new and improved IASS web site and read *The Survey Statistician* on line!

www.isi-iass.org



Important Notices

- Since a PDF file of the newsletter is available on the IASS web site, some members no longer wish to receive the hard copy, but would prefer simply to be notified of the posting of a new issue. Please send an e-mail to LeylaMohadjer@Westat.com if you would like to take advantage of this possibility.
- Members are encouraged to view the IASS website (www.isi-iass.org) and provide comments or suggestions to Fred_Vogel@nass.usda.gov.

In Other Journals

Survey Methodology

Journal Published by Statistics Canada

Contents Volume 27, Number 2, December 2001

Journal of Official Statistics

An International Review Published by Statistics Sweden

Contents Volume 18, Number 1, 2002

JOS is a scholarly quarterly that specializes in statistical methodology and applications. Survey methodology and other issues pertinent to the production of statistics at national offices and other statistical organizations are emphasized. All manuscripts are rigorously reviewed by independent referees and members of the Editorial Board.

All inquires about submissions and subscriptions should be directed to jos@scb.se.

Statistics in Transition

Journal of the Polish Statistical Association

Contents Volume 5, Number 3, December 2001

Statistics in Transition

Journal of the Polish Statistical Association

Contents Volume 5, Number 3, December 2001 (cont.)

Other Articles

Report

Announcement

INTERNATIONAL ASSOCIATION OF SURVEY STATISTICIANS

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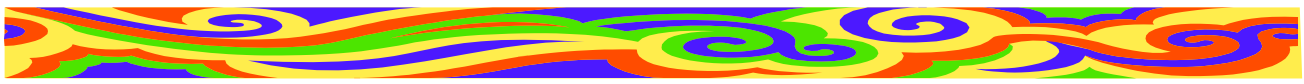

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