

INTERNATIONAL ASSOCIATION
OF SURVEY STATISTICIANS



International Statistical Institute

THE SURVEY STATISTICIAN

INTERNATIONALE
ASSOCIATION
DES STATISTICIENS
D'ENQUETES



L'Institut International De Statistique

**No. 38
June 1998**

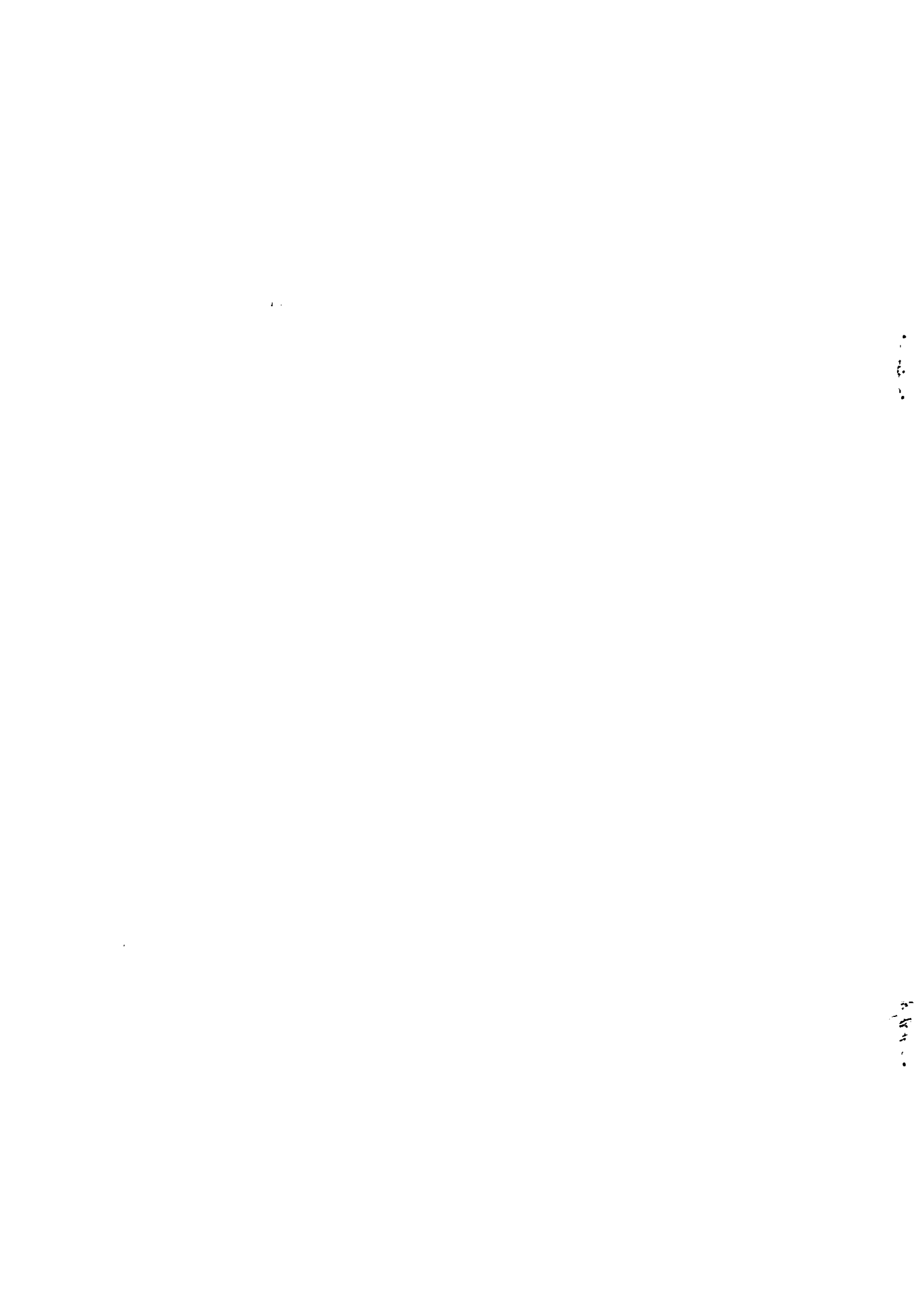
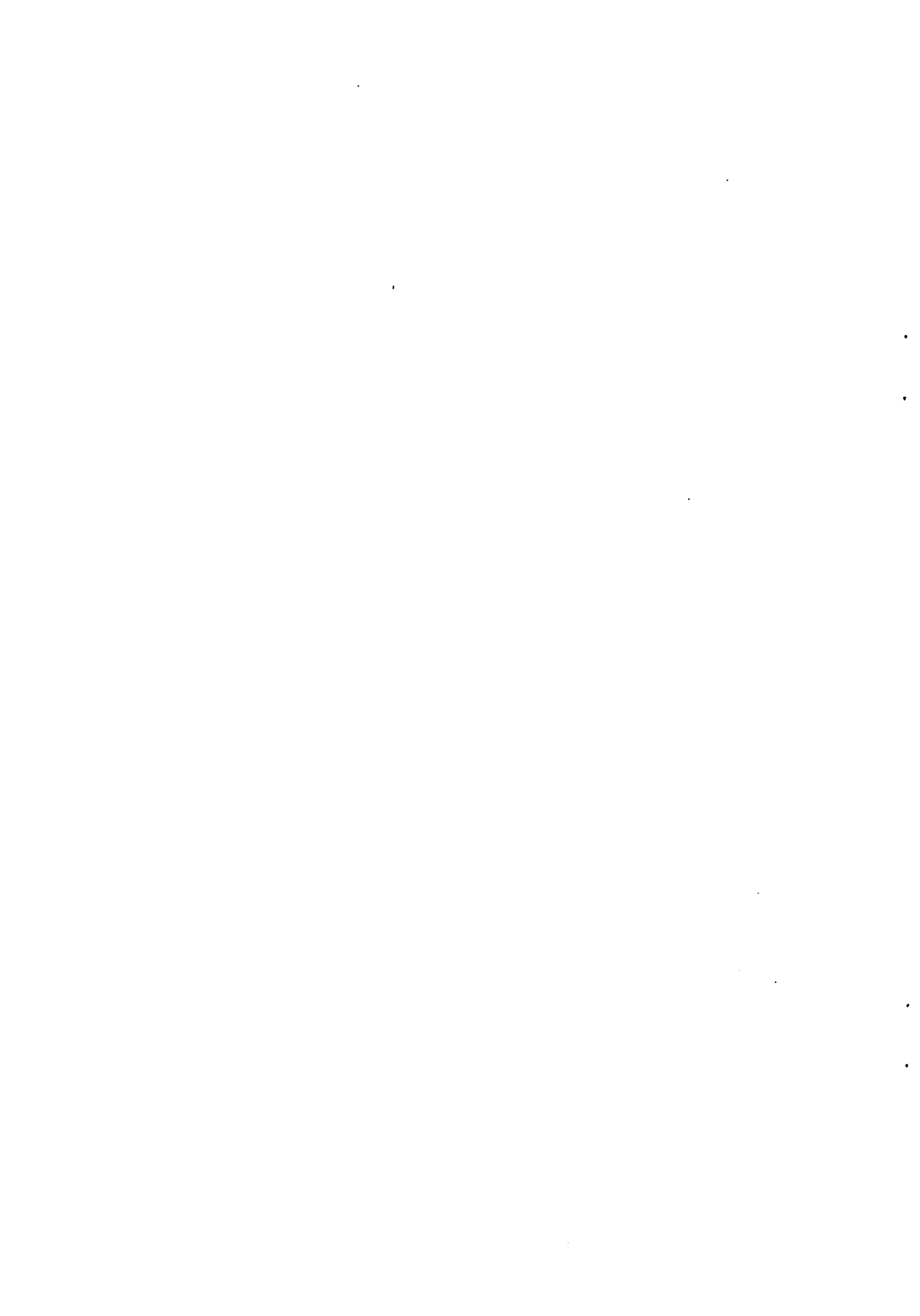


Table of Contents

Letter From the President	1
Special Articles	
"The Effects of Incentives on Response Rates in Interviewer-Mediated Surveys" – Eleanor Singer.....	6
Economic Statistics and Surveys in South Africa: Shoring up Democracy With Reliable and Relevant Statistics – Jairo Arrow	9
Software Review	
"SUDAAN, Software for the Statistical Analysis of Survey and Correlated Data" – Rick Williams and Gayle Bieler	11
Question/Answer	14
Country Reports.....	17
Announcements	
IASS Satellite Conference on Small Area Estimation.....	25
Recent Trends in the Methodology for Social and Business Surveys.....	26
Istanbul 1997 Booklet to Appear by Midyear.....	27
Barcelona GIE Seminar	27
Benefits of Membership in the International Association of Survey Statisticians (IASS).....	27
The Survey Statistician Contact Information	28
In Other Journals	
Journal of Official Statistics – An International Review Published by Statistics Sweden	29
Survey Methodology – A Journal Published by Statistics Canada.....	29
Statistics in Transition – Journal of the Polish Statistical Association	30



Letter From the President

Dear IASS members:

There is an inevitable time lag – about 3 months, more if you get *The Survey Statistician* by mail like I do – between when I write my letter for *The Survey Statistician* and when you get to see it. I realize therefore that you may not yet have had the time to read and react to my letter in the December 1997 issue. In this my second letter, I will give an update on the activities noted in my first letter, and information on new events and new ideas that are currently being discussed. I will use the same numbering system as in my first letter for ease of reference.

I am hoping that some of the ideas in both these letters would be of interest or concern to you and that you will send me your reactions and ideas to help further the goals of the IASS. I look forward to your comments. But first, I have two announcements:

IASS Silver Jubilee:

The IASS is 25 years old this year – it was set up in 1973 at the Vienna session of the ISI and had its first meeting in 1975. We plan to celebrate the silver jubilee of the IASS during the ISI session in Helsinki in 1999. Some events may have to wait till the ISI session in Seoul in 2001. In discussing this with the IASS council and past presidents of the IASS, four ideas have emerged on how we could celebrate:

1. Institute a prize for the best paper on Survey Research Methods by a young statistician from a developing/transition country. The prize, to be awarded during the ISI session in Helsinki, would be an expense paid trip to the ISI meeting and the opportunity to present the prize winning paper there (see item 3m in my first letter). There is a lot of support for this idea and we plan to announce it soon.
2. An informal celebration after the IASS General Assembly in Helsinki with perhaps a small memento for members.
3. A special commemorative lecture in Helsinki on an appropriate topic such as a review of the

developments in survey sampling in the last 25 years; a look at the future of survey sampling; or a discussion of the role and impact of survey sampling methods. This idea too has strong support. I have consulted the President of the ISI and he has gladly agreed that this will be one of the lectures at Helsinki by special invitation of the President.

4. A commemorative session in Seoul (for lack of a time-slot and time to plan this in Helsinki). The following topics have been suggested for this session: those listed under item 3 above; the history of the IASS; review of the goals of the IASS and a discussion of what we would like to achieve in the next 10 to 25 years; the role of National Statistical Agencies in the next 10 years. A commemorative volume bringing together the papers and discussions at this session as well as the lecture in Helsinki to be sent to all members as well as to all national Statistical Agencies and Associations. This suggestion has been sent to David Binder, chair of the IASS Program Committee for Seoul.

Vice President of the IASS:

Clyde Charre de Trabuchi of Argentina has kindly agreed to be a Vice President of IASS, replacing Carmen Arribas who resigned from the position because of personal circumstances.

I welcome Clyde and look forward to working with her especially in 1998 that has turned out to be the Latin American year for IASS with two sponsored meetings, one in Buenos Aires in June and one in Aguascalientes in September (please see items 1d and 1r).

1. Core Activities and Services to our Members
 - a. The program of IASS invited papers to be presented at the 52nd ISI session to be held in Helsinki, Finland, 11 - 18 August 1999 has been finalized by the IASS Program Committee chaired by Susan Linacre. The list of topics are:
 - Improving and communicating quality of survey based statistics (with ISI and IAOS). Organizer: Dan Kasprzyk.

- Design, estimation and analysis issues in sampling from imperfect business registers (with ISI and IAOS). Organizer: I.B. Thomsen.
- Coordination of surveys and managing respondent burden. Organizer: Esbjorn Ohlsson.
- Design of surveys for measuring change over time. Organizer: Gad Nathan.
- Issues in weighting household and business surveys. Organizer: Pedro Nascimento Silva.
- Surveying and estimating for the informal sector (with IAOS). Organizer: Ralf Hussmanns.
- Analysis of data from complex surveys. Organizer: Ray Chambers.
- Evaluation of shortcut procedures, such as limited coverage and non-probability sampling in survey design. Organizer: Warren Mitofsky.
- Improving the effectiveness of data collection through innovative technology (with IASC). Organizer: Wouter Keller.
- Issues related to use of censuses of population, agriculture and enterprises in subsequent surveys in developing countries. Organizer: I.P. David.
- Use of surveys in strengthening statistical systems in transition countries with emphasis on Asian transition countries and comparison with European experience. Organizer: Bengt Perrson.

b. The satellite Conference on Small Area Estimation is being planned to be held in Riga, Latvia, 20 - 21 August 1999, following the Helsinki session of the ISI. Jan Kordos chairs the Program Committee which has the following members:

Jan Kordos (Poland), Ö. Éltető (Hungary), W. Fuller (USA), J. Kovar (Canada), J. Krumins (Latvia), J. Lapins (Latvia), D. Pfeffermann (Israel), R. Platek (Canada), J.N.K. RAO (Canada), C-E. Särndal (Canada), D. Trewin (Australia) and J. Wywiał (Poland).

Danny Pfeffermann will deliver the keynote address on New Developments in Small Area Estimation. A one-day short course, Introduction to Small Area Estimation, to precede the conference (see item 1c) will be given by Prof. J.N.K. Rao. An announcement and Bulletin # 1 on the conference will soon be ready for distribution.

c. The short courses planned to be held in conjunction with the Helsinki session of the ISI in August 1999 are the following:

Courses to be held before the ISI meeting in conjunction with the Workshop on Recent Trends in the Methodology for Business and Social Surveys in Jyväskylä, Finland:

- A Workshop on Survey Sampling in Developing Countries - G. Kalton and C. O'Muircheartaigh.
- Variance Estimation in Complex Surveys - W. Fuller, K. Wolter and F. J. Breidt.
- Methods for Business Surveys - by M. Hidiroglou and D. Binder.

Course to be held in Riga, Latvia, after the ISI meeting, in conjunction with the satellite conference on Small Area Estimation:

- Introduction to Small Area Estimation - by J.N.K. Rao.

Courses to be held in Riga, Latvia, after the satellite conference:

- Continuous Quality Improvement in Sample Surveys - D. Marker and D. Morganstein.
- Analysis of Survey Data - R. Lehtonen and K. Djerf.

More information on the short courses will be available soon. We are also trying for funds from several donor agencies to help finance participants from developing and transition countries to attend the courses.

d. The conference on Statistics for Economic and Social Development being organized jointly by the IASS and IAOS will be held 1 - 4 September 1998, in Aguascalientes, Mexico. Geoff Hole is the Program Chair for this Conference. Some information about the conference is posted at the IASS Web Site. More up-to-date information on the conference is available at the following web sites:

- English: <http://www.statcan.ca/english/Conferences/mexico98/>
- Français: <http://www.statcan.ca/francais/Conferences/mexico98/>
- Español: <http://www.inegi.gob.mx/homepara/eventos/conferencia98/esp/archivo2.html>

Forms to request further information about the conference are available for immediate reply at the web sites. The Program and Local Organizing Committees hope this conference will attract wide interest and that many members of the IASS will attend it.

- e. Three short courses in Spanish will be given, either immediately before or after the conference at Aguascalientes. They are aimed particularly at younger Latin American statisticians. The three courses are:

- Poverty – the collection and analysis of data to measure poverty in a policy relevant environment,
- Integrating geographical and statistical information, and
- Conducting high quality surveys.

For more information about these courses and to register for them, please contact: INEGI (Instituto Nacional de Estadística, Geografía e Informática), Centro de Capacitación, Ave. Prolongación Héroe de Nacoazari, No. 2301 Sur Fracc., Jardines del Parque, C.P. 20270, Aguascalientes, Ags., México; Tel: (49) 166637, or (49) 105463, or (49) 105462; Fax: (49) 181280; E-mail: galcolea@cap.inegi.gob.mx, jmartinez@cap.inegi.gob.mx, gbernandez@cap.inegi.gob.mx.

- f. David Binder chairs the Program Committee for the IASS sponsored meetings at the 53rd session of the ISI to be held in Seoul, South Korea in 2001. Its work will be conducted mostly by E-mail. Anyone interested in helping with the committee should contact David Binder at binddav@statcan.ca. If you have some ideas for the program, do not hesitate to contact David. The program committee strives to ensure good representation, both geographically as well as among developing countries.
- g. The nominations committee for the next election of IASS officers consists of: Jan Kordos (Poland) chair of the committee,

Clyde Charre de Trabuchi (Argentina), Cathryn Dipppo (USA), K.T. de Graft-Johnson (Ghana), Claudio Quintano (Italy), Vaclav Cermak (Czech Republic) and Romeo Recide (Philippines).

- h. The IASS did not organize a session at the ASA meetings in August 1998 because of lack of time.
- i. The workshop on Labor Force Surveys in Libourne, France is likely to be held in 1999.
- j. The article on benefits of membership in the IASS and the contents of the latest issues of the *Journal of Official Statistics*, *Survey Methodology*, and of *Statistics in Transition* will be published in every issue of *The Survey Statistician*.

In the Question and Answer section of the last issue of *The Survey Statistician*, Vijay Verma has listed a number of questions, most of which have been asked by colleagues from developing/transition countries. He welcomes responses to these questions from any member who has the expertise in the area to which the question relates.

Members, especially those from developing and transition countries, are encouraged to submit news items, and suggestions for articles to Mike Brick, editor of *The Survey Statistician* at brickm1@westat.com.

- k. The booklet of IASS Invited papers from the 1997 ISI session at Istanbul compiled by Anders Christianson is being printed by the Australian Bureau of Statistics. It will be distributed to all members. For many of the papers the authors have provided full length papers. For the rest, the 4 page versions that were published in the volume of papers distributed at the ISI meeting in Istanbul will be included. We are grateful to the ABS for their help in printing this booklet.
- m. Good articles reviewing new developments in survey statistics are sought for the International Statistical review (ISR). Authors with tentative ideas for articles are welcome to contact the IASS Associate editor of the ISR, Chris Skinner, at cjs@soton.ac.uk.
- o. Benoit Riandey, Executive Director of the IASS, has sent a letter to all members asking for their permission to include their E-mail addresses in the directory of

members that is being put up on the home page. In order to provide confidentiality it is being ensured that a members E-mail address can only be seen when a message is being sent to that member. A member may choose to remove his/her E-mail address from the directory at any time.

We apologize for the error in the IASS home page address given in the last issue of *The Survey Statistician*. The correct address is <http://www.cbs.nl/isi/iass.htm>. The latest issue of *The Survey Statistician* is available on the home page.

Comments and new material for the home page may be sent to its editor, Fred Vogel, at fvogel@nass.usda.gov or faxed to him at 202-690-1311. He plans to initiate feature articles on statistical organizations in different countries on the home page.

- p. Annual dues to the IASS can be paid by the following credit cards: Visa Card, MasterCard, American Express Card and EuroCard. This has been a popular move, and many members are now using credit cards to pay their dues.
- r. The IASS is supporting a meeting on Household Surveys: Redesign of the Current Household Survey of Argentina to be held 3 - 5 June 1998 in Buenos Aires, Argentina. It is being organized jointly by the Inter-American Statistical Institute (IASI) and the National Institute of Statistics and Censuses of Argentina (INDEC), under the auspices of the ISI. The objectives of the meeting are to contribute to the improvement of the technical capabilities of National Statistical Offices in the region, to facilitate communication between official statisticians and users of data from household surveys, and to share experiences with official statisticians in other countries. A panel of international experts will discuss the Redesign of the Current Household Survey in Argentina and there will be a program of invited and contributed papers. For more information on the meeting, please contact Evelio Fabbroni at efabb@indec.mecon.ar.
- s. The IASS along with the IASC is sponsoring a conference on New Methods in Survey Research to be held in Southampton, UK, 21-22 August 1998.

The conference is aimed at survey professionals working in the commercial or public sector. It presents relatively new methods which are widely used in specialist areas but are not commonly used in survey research or analysis. The topics cover Computer Assisted data collection, and Using Data. There will be related workshops on the 20th of August. Information on the conference will be posted at <http://www.asc.org.uk/asc>. You may also get information by sending an E-mail to asc@essex.ac.uk.

- t. The IASS along with the 9th Jyväskylä International Summer School is supporting a Workshop on Recent Trends in the Methodology for Business and Social Surveys to be held at the University of Jyväskylä, Finland, 5 - 9 August 1999, before the Helsinki session of the ISI. The workshop will include invited papers, contributed papers by postgraduate students and others, and a panel discussion. Three short courses are being planned as part of the workshop: Survey Sampling in Developing Countries, Variance Estimation in Complex Surveys, and Methods for Business Surveys. (See item 1c.)
- u. It is felt that members who do not attend the ISI meetings do not see tangible benefits from their membership in the IASS although they do receive a lot of information, publications and the opportunity to send their questions to experts (refer to the IASS brochure and the article on benefits of IASS membership). To address this it has been suggested that we hold more national and regional meetings, such as the satellite meetings to the ISI meetings (in Jerusalem in 1997, and planned in Riga in 1999) and in years when there is no ISI meeting (such as the one in Aguascalientes in 1998). We could also encourage setting up regional and national sections of the IASS that could organize their own activities (see IASS Statute # 9).

2. Increasing our Membership

Benoit Riandey deserves much credit for the efforts in this section.

- a. The IASS brochure, which contains a membership application form, is now

- available in both English and French. Francisco Munoz has just translated the brochure into Spanish. It will be sent to our colleagues in Latin America and Spain. We are also looking for volunteers to translate it into other major languages such as Chinese, Russian and Arabic to promote the IASS in regions where we have few members. If you would like to volunteer for this task, please contact Benoit Riandey at riandey@ined.fr.
- b. Copies of the brochure have been sent to all our country representatives encouraging them to use them to inform non-members and attract more members to the IASS.
 - c. A letter will be sent to the heads of all National Statistical Agencies informing them about the goals and activities of the IASS and some of our important new initiatives. In countries with no national representative, the head of the agency will be asked to suggest someone who can take this role.
 - d. Copies of the brochure will be sent to all National Statistical Agencies and associations along with a letter asking that their employees and members be made aware of the IASS.
 - e. Copies of the brochure will be displayed at all conferences, workshops, seminars, meetings, and courses that the IASS is organizing or sponsoring. If you are involved with a similar event where you expect the attendance of other survey statisticians, please ask Benoit Riandey for a copy of the brochure in each of the languages you need (English, French and Spanish) so that you can make the required number of copies for display and distribution at the event.
 - f. We are looking for volunteers to prepare attractive posters on the IASS for display at meetings, conferences, workshops and seminars. Please contact me if you have any ideas for this.
 - g. Statistics Canada has found a volunteer who will send copies of our brochure to authors and referees of *Survey Methodology* encouraging those among them who are not members of the IASS to become members. We are looking for volunteers to take on this role for other journals such as the *JOS*, *JASA* and *Statistics in Transition*.
 - h. Recently, we have enrolled two new Institutional members: Institut National d'Etudes Demographiques (INED) of France and Universidad Nacional de Tres de Febrero of Argentina. A letter will be sent to other potential members informing them of the benefits of becoming institutional members of the IASS. Please let me know if you have suggestions for the names of organizations to whom this letter should be sent. If you can convince the organization yourself that would be even better.
 - i. Participants at courses or workshops sponsored by the IASS who are not members of the IASS will be offered membership for a year with their course fees including the membership fee for the year.
 - k. Copies of the brochure have been sent to every IASS member with the request that it may be copied and given to survey statisticians who are not yet members of IASS. Please do so – they may be your colleagues, students, attendees at conferences that you are involved with, authors, referees and subscribers to a journal or review that you are associated with, etc. You may also publish the text of the brochure in any of your local journals or newsletters that are read by survey statisticians.
 - l. At present, 27 percent of IASS members are women. I have no idea as to whether this is a fair representation of the number of women in our profession. I suspect that it is not. Please let me know if you can find the most recent figures for the proportion of women among survey statisticians in your country.
 - m. It has been suggested that, in order to encourage young survey statisticians to join the IASS, we offer a 50 percent reduction in membership fees to students for the first two years (i.e., a 2-year membership for 130 FF for those from developed countries, and for 65 FF for those from developing/transition countries) as an introductory offer. This will be discussed with the IASS Council.
 - n. We plan to set up a desk/booth at meetings, conferences, workshops and seminars sponsored by the IASS to inform participants about the IASS.

- o. We are looking into the pros and cons of establishing life-membership in the IASS.
3. Serving the Needs of Developing and Transition Countries
- b. We are sponsoring the conference on Statistics for Economic and Social Development to be held in Aguascalientes, Mexico, 1 - 4 September 1998 (see item 1d) and supporting the meeting on Household Surveys: Redesign of the Current Household Survey of Argentina to be held in Buenos Aires, Argentina, 3 - 5 June 1998 (see item 1h). Both of these expect a large turn out from Latin American countries and will help the development and use of better survey methods in that region.
- c - i. I have started a discussion on these ideas with members of the IASS council and other members who write to me about these issues from time to time. I hope you, too, will join in with your comments and ideas. I will report on this in a future letter.
- m. It is planned to institute a prize for the best paper on Survey Research Methods by a young statistician from a developing/transition country as part of our silver jubilee celebrations during the Helsinki ISI. (See the first item under Silver Jubilee of the ISI at the beginning of this letter.)
- n. We are looking at ways to fund participants from developing/transition countries at our short courses and conferences. Often, even authors of invited papers from these countries cannot attend our conferences. The IASS seeks funds for these purposes from a number of agencies such as the UNSO, Eurostat, World Bank etc. and a lot of effort goes into the search for funds each time we conduct short courses. One problem we face is that some donor agencies will only give funds if the courses are held in developing/transition countries. It would be good if we could set up a permanent fund for this purpose. Many ideas for this have been suggested and are being discussed. Your ideas are welcome. I will report on decisions regarding this in a future letter.

With my very best wishes to all of you for the summer,

Nanjamma Chinnappa



The Effects of Incentives on Response Rates in Interviewer-Mediated Surveys¹

Eleanor Singer

Survey Research Center, Institute for Social Research, University of Michigan

Monetary as well as nonmonetary incentives have long been used effectively in mail surveys to increase response rates. From a meta analysis of the effect of incentives on mail survey response rates (Church, 1993) we know that prepaid incentives yield higher response rates than promised incentives; prepaid monetary incentives yield higher response rates than gifts; response rates increase with increasing amounts of money, although not all studies find a linear relationship; and incentives promised after return of the questionnaire do not significantly increase response. Incentives are also increasingly being used in face-to-face and telephone surveys, but we know much less about their effectiveness in such surveys. In this note, I review what my colleagues and I have learned so far about the effects of incentives in interviewer-mediated surveys. By "incentives" we refer, for purposes of this analysis, to a monetary or nonmonetary gift or payment offered to all respondents at the outset of a survey. An article reporting our findings in greater detail appears in a forthcoming issue of the *Journal of Official Statistics* (see Singer, et al forthcoming).

Nancy Gebler, Trivellore Raghunathan, John Van Hoewyk, Katherine McGonagle and I brought together and quantitatively analyzed all the experimental studies we could locate (as of late 1997) which used incentives in face-to-face and telephone surveys--37 studies in all--each containing two, and sometimes more, experimental conditions (Singer et al., forthcoming). The reason for limiting the analysis to controlled experiments, a procedure also followed by Church (1993) and by Yu and Cooper (1983), is to restrict extraneous

¹ The support of the Survey Research Center is gratefully acknowledged.

variation associated with different incentives. Such variation is especially troublesome when the number of possible confounding factors is large relative to the number of studies available for analysis, as it is in this case.

Most studies in the analysis were carried out face to face (68%); 32 percent were done by telephone. Twelve of the studies included a self-administered component in addition to an interviewer-mediated contact. Most of the studies are fairly recent (27% of the studies were done in the 1970's, 19% in the 1980's, 51% in the 1990's, and only one study dates from the sixties). Most of the experiments (86%) used probability samples, but a few used list, convenience, or other types of samples. In terms of location, the studies are split between national samples (41%) and local or regional samples (59%). Many of the local samples were actually pilot studies for large national surveys, mounted to try to identify the best incentive amount or method of payment. The experimental conditions ranged in size from 23 to 20,034, with a median size of 303 respondents per experimental condition; as noted below, response rates are weighted by sample size in the analysis. Nonprofit, nongovernmental organizations carried out 38 percent of the experiments; government organizations conducted 22 percent; and 40 percent were done by for-profit organizations.

The incentive amounts varied from \$1 to \$100 in U.S. dollars, but 60 percent were relatively small (less than \$10). The mean value of the incentive paid in this study, among conditions in which any monetary incentive was paid, was \$11.39 (\$13.39 in constant 1983 dollars, in which the analysis was run). A variety of nonmonetary incentives (pens, diaries, calendars) were offered; as in other studies, the value of nonmonetary incentives was less than that of monetary incentives. The average response rate of the lowest-incentive conditions in the 37 studies was 64 percent, with a range from 16 to 93 percent.

In our analysis we attempted to answer four basic questions:

- Do incentives improve response rates in telephone and face-to-face surveys? By how much?
- Are prepaid incentives more effective than promised incentives?
- Is money more effective than a gift?

■ What is the effect of burden?

For each experimental condition in each of the 37 studies, we coded the amount of incentive; the type of incentive (gift or money); the timing of the incentive (paid before interview taken, or promised); and the burden (coded as high if the interview was longer than an hour or if any of the following were present: diary, test, sensitive questions, panel study; otherwise coded as low).

The dependent variable in the analysis was the difference in response rates between the lowest incentive condition and each higher incentive condition in the same experiment. So, for example, if a study had three experimental conditions--a zero-incentive condition, a \$5 incentive, and a \$10 incentive--we computed two dependent variables for that experiment: the difference in response rate between the zero-incentive and the \$5 condition, and the difference between the zero-incentive and the \$10 condition. These differences were weighted by the inverse of the variance of the response rate difference in the analysis.

In order to eliminate confounding due to differential cooperation tendencies, we introduced a dummy variable into the analysis which controls for whether the subjects in the experiment were new respondents, nonrespondents to the current or a prior wave, or respondents to a prior wave. We also included mode of administration as a control variable. Because these variables were not significant, we did not include them in the final model.

The results of the analysis are shown in Table 1. The model shown in Table 1 controls for type of incentive, timing of incentive, amount of incentive, and burden. As can be seen, paying an incentive has a significant positive effect with these other variables controlled. As in the study by Yu and Cooper (1983) and Church (1993), the effects of incentives are linear; a term for the square of the incentive difference, introduced to test for curvilinearity, was not significant. Within the limits of incentives and response rates occurring in these experiments, more money results in higher response rates.

The difference in response rates produced by prepayment vs. promised payment is significant and positive in this model--i.e., prepayment is more effective than promised payment. However, unlike

Church (1993) but like Yu and Cooper (1983), we found a significant improvement in response rates with promised as well as prepaid incentives (data not shown).

Like Church (1993), we found that gifts are significantly less effective in eliciting response, even controlling for the value of the incentive. Increasing the burden of the interview significantly increased the difference in response rates between the lowest incentive and a higher incentive condition. The interaction between burden and the size of the incentive was not significant, however.

Do incentives have a significant effect on response rates in low-burden interviews, or only when burden is high? Restricting the analysis above to low-burden conditions, we found that the effect of incentives remains significant ($\beta=0.5865$, $S.E=0.2144$; $p<.05$). Not surprisingly, incentives have a smaller effect when response rates in the control condition are high.

As far as we can tell, incentives do not appear to exact a price in quality, as measured by item

nonresponse or number of words in response to open-ended questions. Paying an incentive may alter the composition of the sample, however, by inducing participation among groups that might otherwise tend to be underrepresented in sample surveys (e.g., in typical U.S. surveys low income or nonwhite race).

These findings are useful first approximations of answers to some questions about the effects of incentives in interviewer-mediated surveys, but they clearly leave many other questions unanswered. For example, what are the relative effects of smaller initial incentives to all respondents vs. larger refusal conversion payments? Under what conditions are incentives likely to bias answers to questions? To what extent do incentives influence respondents directly, and to what extent are their effects mediated by interviewer expectations? Under what conditions are incentives cost-effective? Does paying incentives create expectation effects, either among respondents or among interviewers? Research to answer some of these questions is currently under way.

Table 1
Effects of Incentive Amount, Time of Payment,
Type of Incentive and Burden on Differences in Response Rate

	Smallest vs. Larger Incentive Conditions		
	Beta	Standard Error	P-value
Intercept	1.4492	1.2785	<.01
Incentive difference/dollar*	0.1443	0.0481	
Prepayment	2.4462	1.5066	.11
Gift	-7.1428	1.4257	<.01
Burden	3.9550	1.2289	<.01
Adj. R^2	.41		
n	(59)		

* "Incentive difference" refers to the difference between the smallest (or zero) incentive and larger incentive amounts paid. Incentive amounts are modeled in constant 1983 U.S. dollars.

References

Church, A. H. (1993). Estimating the Effect of Incentives on Mail Survey Response Rates: A Meta-Analysis. *Public Opinion Quarterly* 57: 62-79.

Singer, E., Gebler, N., Raghunathan, T., Van Hoewyk, J., and McGonagle, K. (forthcoming). The Effects of Incentives on Response Rates in

Face-to-Face and Telephone Surveys. *Journal of Official Statistics*.

Yu, J. and H. Cooper (1983). A Quantitative Review of Research Design Effects on Response Rates to Questionnaires. *Journal of Marketing Research* 20: 36-44.



**Economic Statistics and Surveys in South
Africa: Shoring up Democracy With Reliable
and Relevant Statistics
Jairo Arrow, Central Statistical Service**

This paper outlines current initiatives of the South African Central Statistical Service (CSS), the national statistical agency, to re-engineer its economic collections. Currently there are approximately 120 such collections. The aim of the re-engineering process is to enable the CSS to produce reliable and relevant statistics, which can meet user needs in a timely fashion. User concerns around quality assurance of the statistical products are being addressed. These concerns are mainly with respect to the sampling frame and the non-availability of quality indicators about published economic and labor statistics. The current business address register, maintained by the CSS and from which its many samples are drawn, is poor with respect to coverage of certain sectors of the South African economy. In its current statistical releases the CSS does not publish quality indicators such as non-response rates or variance estimates of key estimates. The labor statistics have, in recent years, been the subject of public debate, sometimes a very acrimonious one, with serious doubts being expressed about their reliability. All this is bound to change soon, as the new CSS leadership, has set itself the mission of producing "reliable, relevant, responsive and representative" statistics for South Africa. The CSS is receiving critical support in the re-engineering process from both the Australian Bureau of Statistics (ABS) and Statistics Sweden.

The Business Address Register

A key emphasis of the re-engineering process is on the business address register, which serves as a sampling frame for the CSS economic collections. The generally accepted view among advanced national statistical agencies is that a comprehensive, regularly updated business register (BR) is the centerpiece of their data collection strategy. Ideally the BR should be comprehensive in its industry scope and should be updated regularly for births and deaths. The BR should provide relevant information for an adequate analysis of the economy and its institutional sectors and industries.

Currently, the business address register is being updated only for the agricultural, mining, manufacturing, electricity and construction sectors on a regular basis. The main sources for such updates are tax authority, the South African Revenue Service and the Department of Labor Workmen's Compensation Commissioner. These sources do not provide any measure of size (turnover or number of employees). Hence any size indicators the BR might contain pertain only to periodic censuses. However, the information from some of these censuses is likely to be obsolete and inaccurate, as the relevant reference years are situated prior to the time of the economic and political integration of the former Bantustans into the Republic of South Africa.

There are two major concerns that need to be addressed here. The first is the lack of a reliable size indicator; this places severe constraints on sample designs, where such a parameter is required as a stratification variable. The CSS has recently succeeded in convincing the tax authority about the need of amending the relevant clauses of its legislation on confidentiality to give the CSS access to size indicators and any other information the CSS requires to adequately meet its national as well as its international reporting obligations. Since both agencies have recently modernized their computing environment, such changes will place the CSS in a position to effectively and efficiently maintain its BR on a more frequent basis.

A second concern is that since only businesses exceeding a certain threshold value-added tax (VAT), are required to register with the tax authority, the frame will consistently exclude businesses below this threshold. Currently the threshold is approximately equivalent to US\$ 30000 per annum. This issue can be partially resolved by using the records from the Department of Labor, with which all businesses with at least one employee are supposed to register.

The above strategies provide comparatively cheap and reliable sources from which the CSS can maintain a reasonably good BR in future. But the usefulness and expediency of this approach depends on the speed with which the necessary legislative amendments get through parliament.

Given this element of uncertainty, the CSS is presently planning to conduct a national census of

formal non-agricultural businesses in 1998. The main objective of the proposed business register census is to address the current shortcomings of the business register. The results of the census will enable the CSS to compile a comprehensive list of businesses/organizations providing goods and services in all industrial sectors of the South African economy. The census will furnish up-to-date information on size indicators needed to reliably estimate major economic indicators.

Labor Statistics

Major economic indicators typically include labor statistics, which should inform policy making at the macro-level. Doubts over the reliability of official labor statistics have generated a great deal of debate in recent years. Most controversial have been the unemployment statistics, which are estimated annually from a survey of households. The business-based survey estimates of employment levels have also had their share of criticism. The available CSS employment figures are consistently showing downward trends, particularly in the major sectors of the economy (manufacturing, mining, electricity, building and construction). This trend is causing alarm among policy makers, as this runs contrary to the expectation of the official government keystone macro-economic strategy of "Growth, Employment and Re-distribution (GEAR)". Some critics have expressed the suspicion that the trends are a statistical artifact, being the result of a deficient BR.

The apparent lack of confidence in the official statistics had led to a plethora of market research surveys, which instead of bringing some clarity have led to more confusion, particularly with respect to unemployment figures. Rather than get into the merits of such a debate here, I want to outline what the CSS is doing to lay down a sound basis for future labor statistics.

Up until now, the CSS has run 17 discrete monthly and quarterly, and one annual labor surveys. These have been replaced with four new surveys, each addressing a particular but integrated aspect of the labor market. One of the new series, the Survey of Total Employment and Earnings (STEE), was fielded in the third quarter of 1997. It is a quarterly, establishment-based survey, aimed at providing information on current indicators of

employment and on the contribution of wages and salaries to the Gross Domestic Product (GDP) needed for compiling the National Accounts of South Africa. A second collection, the Survey of Average Monthly Earnings (AME), also a quarterly survey, will serve as a vehicle for monitoring current indicators of the South African economy. This survey has been designed and its first data collection will take place in the first quarter of 1998. The output from this collection is important for both economists and policy-makers.

The past policies of the apartheid state created distortions in the South African labor market. The new political dispensation, committed to corrective measures, requires a relevant database for adequate policy formulation. Trends in employment and structural changes with respect to gender, race and occupation are being addressed in an economy wide annual survey, "The Survey of Employment by Occupation, Gender and Race (SEOGR)". This survey, like the AME, will also "go live" in 1998. The fourth collection, "The Labor Force Survey (LFS)", for which groundwork is still being laid, will be a quarterly household-based collection. It will provide basic information on employment/unemployment from a sample of South African households. It will be a welcome supplement to the existing annual collection, the October Household Survey. It will be less detailed but will provide more timely key information.

Quality Assurance and Quality Indicators

Poor questionnaire design and the lack of close consultation with important providers of statistical information were some of the major factors which adversely affected response rates. A distinctive and innovative aspect of our re-engineering processes has been the involvement of key stakeholders. Consultations with users are mainly in the form of advisory committees, consisting of external as well as internal experts in the respective areas. Redesigned questionnaires are extensively discussed in such committees before being sent out to respondents. The CSS deems that specialist intervention at early stages of planning the surveys is an indispensable tool towards quality assurance of its products.

The computation of variances or standard errors for sample estimates is a key indicator in the quality

assessment of survey estimates. Standard statistical practice requires that sample estimates be given together with their corresponding variances or approximations. One outcome of the re-engineering exercise is that new samples are being drawn for those sectors of the economy for which the business address register is good. This task is being guided by a resident consultant, a top specialist in survey methodology. All estimates for reporting domains will, in the future, be accompanied by variance estimates. Although the statistical production software is SAS, variance estimation will be based on specialist software, such as WesVarPC, which are appropriate for variance estimation under complex sampling schemes.

Jairo Arrow
Economic Statistics and Surveys
Central Statistical Service
274 Schoeman Street
Pretoria, South Africa
E-mail: jairoa@css.pwv.gov.za
Website: <http://www.css.gov.za>



**SUDAAN®, Software for the Statistical Analysis
of Survey and Correlated Data**
Rick L. Williams and Gayle S. Bieler,
Research Triangle Institute

1. Introduction

SUDAAN is a single computer program for the analysis of data from complex sample surveys and experimental studies involving repeated measures and cluster-correlated data. A *complex* sample may be multistage, stratified, unequally weighted, or clustered. SUDAAN's strength lies in its ability to compute standard errors of ratio estimates, means, totals, regression coefficients, and other statistics in accordance with the sampling design. SUDAAN is valuable because it enables the user to obtain valid estimates and inferences when analyzing survey data and other types of clustered data.

SUDAAN was specifically designed for the analysis of data from multistage sample designs, stratified designs, unequally weighted data, and without-replacement samples. In addition, the analysis methods apply to cluster-correlated data from studies involving recurrent events, longitudinal data, repeated measures, and multivariate outcomes.

SUDAAN fits marginal or population-averaged regression models using generalized estimating equations (GEE). Robust variance estimates are computed that fully account for intraclass correlation, unequal weighting, stratification, and without-replacement sampling.

SUDAAN is the only software package that offers three popular robust variance estimation methods:

- Taylor series linearization (this generalizes to GEE in the regression context)
- Jackknife
- Balanced repeated replication (BRR)

Thus, SUDAAN can be used to analyze nearly any complex sample survey.

In addition, SUDAAN Release 7.5 adds more compatibility with SAS® and SPSS®. SUDAAN is now SAS-callable under Windows 95 and NT, and Sun Solaris. Thus, SAS users are able to execute SUDAAN procedures within their SAS programs, just like any SAS procedures, using SAS data sets. Also, SUDAAN will read SPSS files on PCs and Sun/Solaris workstations. Thus, SPSS users can use the standalone version of SUDAAN to analyze their SPSS data sets quickly and easily.

2. SUDAAN and Survey Research

SUDAAN contains multiple design options which allow users to analyze data from most of the commonly used stratified, multistage sample designs. Sample members may have been selected with unequal probabilities, and either with or without replacement. SUDAAN is flexible enough to handle any number of sampling strata and stages, with or without stratification, and with switches of with/without replacement and of equal/unequal probabilities of selection across the various sampling strata and stages. A different sample design may be specified within each stratum.

Such designs complicate the statistical analysis since the observations are not independent and identically distributed (*iid*). Unlike standard statistical packages, SUDAAN is specifically designed to handle non-*iid* observations drawn from finite populations. In general, most other statistical software packages will produce variance estimates that are biased (in general they will be too small)

since they do not account for complex sample design features. On the other hand, SUDAAN will produce correct variance estimates. Proper estimation of variances is important so that tests of hypotheses and confidence intervals maintain the desired significance level.

3. SUDAAN and Correlated Data

SUDAAN is also a key statistical resource for researchers analyzing data observed in clusters. SUDAAN fits marginal or population-averaged models using Generalized Estimating Equations (GEE). For example, the individual responses in a data set might represent:

- longitudinal responses or repeated measurements observed on an individual
- multiple sites (e.g. teeth or eyes) studied per patient
- group or community randomized trials
- observations on related family members
- observations on littermates in toxicology experiments
- multiple subjects within a cluster such as a physician clinic or school classroom.
- cross-over clinical trials.

Such data complicate the statistical analysis since the observations are not independent and identically distributed (*iid*). Unlike standard statistical packages, SUDAAN uses a robust variance estimator to handle non-*iid* observations observed in clusters. SUDAAN offers both Taylor series linearization (GEE in regression models) and Jackknife robust variance estimators.

4. SUDAAN Procedures

SUDAAN includes both descriptive procedures and regression procedures for the statistical analysis of correlated data. All of the following procedures are designed to analyze data from complex sample surveys or other cluster-correlated and repeated measures studies.

Regression Procedures

These procedures supply estimates and tests of the model coefficients, as well as tests of single and multiple degree-of-freedom hypotheses (main

effects, interactions, and user-specified hypotheses).

MULTILOG Fits logistic and multinomial logistic regression models to ordinal and nominal categorical data and computes hypothesis tests for model parameters; estimates odds ratios and their 95 percent confidence intervals for each model parameter; offers GEE (Generalized Estimating Equation) modeling capabilities for efficient parameter estimation, with a choice of robust or model-based variance estimation.

REGRESS Fits linear regression models to continuous outcomes and performs hypothesis tests concerning the model parameters; includes GEE modeling methods for efficient parameter estimation, with a choice of robust or model-based variance estimation. Also estimates least-squares means and their standard errors.

LOGISTIC Fits logistic regression models to binary data and computes hypothesis tests for model parameters; also estimates odds ratios and their 95 percent confidence intervals for each model parameter.

SURVIVAL Fits proportional hazards models to correlated failure time data; also estimates hazard ratios and their 95 percent confidence intervals for each model parameter.

Descriptive Procedures

CROSSTAB Computes frequencies, percentage distributions, odds ratios, relative risks, and their standard errors (or confidence intervals) for user-specified cross-tabulations, as well as chi-square tests of independence and the Cochran-Mantel-Haenszel chi-square test for stratified two-way tables.

DESCRIPT Computes estimates of means, totals, proportions, percentages, geometric means, quantiles, and their standard errors; also computes standardized estimates and tests of single degree-of-

freedom contrasts among levels of a categorical variable.

RATIO

Computes estimates and standard errors of generalized ratios of the form $\Sigma y_i / \Sigma x_i$, where x and y are observed variables; also computes standardized estimates and tests single-degree-of-freedom contrasts among levels of a categorical variable.

5. Supported Platforms

Versions of SUDAAN are available for a variety of computing platforms. The same procedure statements are used for all versions, and all produce the same output. SUDAAN will read SAS and SPSS files on some platforms and may be installed as an add-on to SAS (SAS-callable) on other platforms. An extensive on-line help facility is included with most versions.

SAS-Callable Versions (SUDAAN installed as an add-on to SAS)

Release 7.5

- PCs under Windows 95 and NT
- Sun workstations under Solaris

Release 7.0

- IBM mainframes under MVS

Stand-alone Versions (SUDAAN installed as an independent program)

Release 7.5

- PCs under DOS, Windows 3.1, 95, NT (reads SAS and SPSS files)
- Sun workstations under Solaris

Release 7.0

- IBM mainframes under MVS (reads SAS files)
- DEC VAX mainframes and workstations under VMS (reads SAS files)
- DEC Alpha workstations under Open VMS

6. SUDAAN Training

RTI offers a 3-day SUDAAN Basics Course which includes hands-on computer labs, to introduce SUDAAN to new users and to allow experienced users direct face-to-face interaction with SUDAAN's designers. Each course is taught by at least two qualified instructors: senior-level statisticians who use SUDAAN for analysis of clustered data on a regular basis. The small class sizes allow one-on-one consultation. This course prepares students to run SUDAAN on every available operating system. Attendees are encouraged to bring their own analysis problems for class discussion.

Open enrollment classes are taught several times each year. In addition, on-site training is available and has been conducted for several organizations.

7. Obtaining SUDAAN

SUDAAN is a product of the Research Triangle Institute. Annual licenses are available for all versions of SUDAAN. Annual license prices for PC users start at \$800 for the first user and \$260 for each additional user for the first year. Volume discounts are available for large orders. Renewal years are 50 percent of the first year price. University discounts are available. Universities with a 5 or more user PC license are granted free student use for degree required educational purposes. To obtain further information about SUDAAN please contact

SUDAAN Business Coordinator
Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709
Phone: 919-541-6602
Fax: 919-541-7431
E-mail: SUDAAN@RTI.ORG
Website: www.rti.org/patents/sudaan.html

The SUDAAN Website contains extensive information about SUDAAN including several analysis examples that may be downloaded.



Question/Answer

As always, we welcome alternative views on the issues raised, comments on the answers provided, and especially other good and practical questions. Please send questions and observations to:

Prof. Vijay VERMA, ESRC Research Centre
University of Essex
Colchester CO4 3SQ, U.K.
Fax: (44 1206) 873 151
or
105 Park Road
Teddington, Middlesex TW11 OAW, UK
Fax: (44 181) 943 4056
E-mail: vjverma@compuserve.com

Q38.1 I would like some advise on how to deal with PSUs of greatly differing sizes. In Poland, for instance, communities (defined as the lowest administrative self-government unit managing the local population register) may be used as PSUs. However, these units differ greatly in size, from 5-10,000 to almost a million inhabitants in large city communities. Can we use this kind of units as PSUs without serious loss in sample efficiency, and if so, how?

(Jaroslav Gorniak, Poland)

This raises a very important issue since the type of units chosen to serve as the PSUs can greatly affect the quality, cost and operations of the survey. I offer some practical advice. Please also see Survey Statistician Q/A28.1 "What are good PSUs?" by Kish.

1. It is neither necessary, nor always efficient, to insist on using units of the same type or size as PSUs in all the domains. In a multi-stage design, the choice of appropriate PSUs is determined by considerations of statistical efficiency, cost, operational procedures and the type of primary frame available, though sometimes also by administrative convenience. These considerations may differ from one sampling domain to another within the same survey (such as across regions of a country or urban and rural areas). Indeed, it is quite common to use relatively large area units as PSUs in rural areas (where local travel is more difficult and detailed maps unavailable), but to

use small segments as PSUs in urban areas (with high population density and detailed maps). The important thing is to divide such domains into explicit strata, with the sample designed and selected independently from each.

2. Do not confuse the formal administrative label with the actual type of units involved. It is quite common for very different type of units to have the same administrative label. For instance, 'localities' may refer to anything between a small settlement or village to a megacity. Clearly, while the former may serve as appropriate PSUs for sample selection in rural areas, the latter are often self-selected (or 'self-representing') and serve as strata, within each of which some smaller, more appropriate units (such as districts or neighborhoods) form the PSUs. This type of distinction is likely to apply to 'communities' you refer to in Poland. These should be classified by type and size. While smaller communities may serve as individual PSUs, the larger ones may be divided into smaller areas for the purpose.
3. The type and size of units appropriate to serve as PSUs depends upon circumstances and objectives of the survey. Various practical considerations noted above need to be considered simultaneously in the choice. A thorough understanding of the diverse considerations can be obtained only on the basis of a good knowledge of sampling theory and plenty of practice. For an area sample, the units need to be well-defined, with clear boundaries, good maps and descriptions for identification and demarcation, and up-to-date information on size and characteristics. The areas should cover the survey population exhaustively and without overlap. The PSUs should be of an "appropriate" size, in line with the arrangement and cost-structure of the survey data collection operation. If the units are too large, it may not be possible to include a sufficient number of them to obtain a good spread of the sample; furthermore, the costs of listing, subsampling and data collection within big units may also become excessive. On the other hand, if the units are too small and compact, it may be difficult to ensure sufficient spread within the units to obtain an efficient sample. Small area units also tend to lack clear boundaries and stability over time. When the same units are to be used repeatedly, such as

for rounds of a periodic survey or as a 'master sample' for multiple surveys, the units have to be large enough to meet this requirement. The units' stability over time is another important requirement, especially if their use must extend over a long period of time.

4. Nevertheless, the choice is constrained severely by what is available in the sampling frame. Normally it is not feasible to reconstruct the primary frame, which must cover the entire survey population, optimized to meet the requirements of a single survey. (This can be much easier for lower stages of selection in a multi-stage design, which require frames only within the units selected at the preceding stage.) Of course, modification (segmentation, grouping, updating etc.) of existing units is often necessary and possible so as to make them more suitable PSUs for the particular survey.
5. As the appropriate choice depends on circumstances, there is no standard or single practice to be recommended. It is instructive to note that several patterns can be identified from national household survey practice in different countries:
 - a. At one extreme, some surveys use very large PSUs. The total number of units in the population is often not large and only a small number of them are selected for the sample. Each unit represents a substantial investment in mapping, listing, recruiting and stationing field staff. Often one or more enumerators are assigned to work exclusively in each area. Therefore, while little or no travel between PSUs may be involved, extensive travel and mobility is often necessary within each (relatively large) area, requiring cheap and convenient transport facilities (such as personal car) at the local level.
 - b. At the other extreme, many samples are based on numerous very small PSUs. Each PSU may be a small cluster of households, some or all of which are taken into the sample. Such a system may be suitable in densely populated urban areas where lists of housing units and/or very detailed maps of small area segments are available, and where, because of well-developed transport

facilities and short distances involved, travel between units presents no particular problems.

Several examples of such choice exist in household surveys in developed countries, as well in urban areas in some developing countries. For example, the CPS and some surveys in the US use small segments of type (ii) as PSUs in metropolitan areas, and large areas of type (i) elsewhere.

- c. Neither of these two extreme variants are common in surveys in developing countries because usually the basic conditions for their efficient operation are not met. Lack of personal mobility precludes the use of enumerators each covering a very large and extensive PSU. On the other hand, the use of numerous small PSUs is also precluded by the absence of good maps and other materials to define suitable small area units; the number of PSUs also has to be limited to control travel and supervision costs. Indeed, a common requirement in choice of the design is to ensure that each PSU yield a large enough sample to keep the enumerators occupied for a sufficient length of time (say a few days) in each area. This requirement becomes even more limiting when the enumerators are deployed to work together in teams.

It is for such reasons that so many surveys in developing countries use census EAs as the PSUs, where an EA typically consists of 100-300 households.

- d. Nevertheless, there are examples in developing countries of surveys using a small number of very large units as PSUs. Often the reason is some perceived administrative convenience of this type of design. Examples are the use of counties in China, districts in India, or provinces in some surveys in Thailand. I personally doubt whether the choice of such large units as PSUs is actually justified or efficient. Of course, there are situations in which administrative, supervision or travel considerations dictate the use of fewer and larger PSUs than typical census EAs, but still not as few and as large as whole provinces, districts or counties.

Q38.2 Most sample surveys in Nepal, except a few standard ones, provide no information on variance, defts, rohs or confidence intervals of estimates. How can we improve the situation?

(Bhim Suwal, Nepal)

The importance of including information on sampling errors in survey reports cannot be over-emphasized. Such information is needed both for the correct interpretation of the survey results and for evaluating and improving the survey design. Yet surveys in Nepal are not the only instance in which no such information is included. The primary reason for this must be a lack of appreciation among producers as well as users of survey data of the significance and utility of such information. With the availability of simple practical procedures and computer software for computing sampling errors, at least for the most common estimates in large-scale surveys, there is no excuse for this state of affairs. How can we improve the situation?

1. Use probability and measurable samples. These are an essential basis for the computation of variances. These concepts have been discussed in practical terms in Survey Statistician Q/A13-15; see also *Statistical Design and Research*, section 7.1 (Kish, 1987). Probability sampling means the use of randomized procedures in sample selection which assign calculable non-zero probability to each element in the population, and avoids the use of arbitrary and subjective procedures such as purposive and quota sampling or seriously incomplete sampling frames. Measurability refers to a set of practical criteria which "allow the computation, from the sample itself, of valid estimates or approximations of its sampling variability".
2. Define the sample structure appropriately to ensure 'measurability' in the practical sense. Generally, the available practical variance estimation procedures require the presence of two or more 'replicates' in each domain or stratum of the sample requiring separate estimation, selected independently and with replacement. For a stratified multi-stage design, this implies the selection of at least two PSUs per stratum. In practice it is sometimes necessary to redefine the actual structure to fit this model. For instance, the 'collapsed strata

technique' is commonly used to suitably combine the actual strata each with only one sample PSU, so as to define new computing strata each with 2 or more PSUs. The same applies to 'implicit strata' obtained with systematic sampling. Though without-replacement sampling of PSUs is more common in practice, it is assumed to be with-replacement as that can greatly simplify the variance computation procedure. In surveys involving many small PSUs per stratum, the units are sometimes grouped randomly within strata to form fewer, larger, more uniform or otherwise more convenient replicates for computational convenience/efficiency. Units may also be randomly grouped across strata to form replications for computational purposes. Obviously, any such redefinition has to be done such that any resulting bias in the variance estimates produced is practically unimportant; this requires access to necessary sampling expertise and experience. Fortunately, a lot of practical experience and advice is available in the literature on the use of these techniques.

3. Ensure that all information on the structure of the sample necessary for variance computation is readily available, most desirably coded as an integral part of the survey data file. For designs typically used in practical large-scale household surveys this minimum information consists of the identification, for each analysis unit in the survey (such as individual household or person), of its (i) stratum, (ii) PSU or other 'replicate', and (iii) sample weight used in the estimation. Also needed will be (iv) the unit's domain or subclass, if separate estimates by these are required. Other details, such as on subsampling within PSUs, are typically not necessary.
4. Use general and simple procedures where possible, which can provide useful variance estimates for many different types of designs, variables and subclasses. The use of more specific and complex procedures, even if more accurate, is secondary to the production of at least approximate estimates of sampling errors for many different types of estimates and subgroups in multi-subject surveys. General and simple procedures are available and widely used; see for instance *Sampling Errors in Household Surveys* (United Nations, 1993). Suitable software is also readily and freely available for the purpose; see for instance the

review by Lepkowski and Bowles in *Survey Statistician* 35.

5. Aim at large-scale computation, analysis and 'modeling' of sampling errors. In typical multi-subject surveys, it is generally insufficient to confine the computations to a few arbitrarily selected statistics from among the thousands which may be produced for different variables, measures and subgroups. The pattern and magnitude of sampling errors can vary greatly for different statistics in the same survey. Hence large-scale computation is normally desirable, routinized to the extent possible. At the same time, however, it is necessary (i) to be selective in performing the computations from among the numerous estimates of interest, (ii) to summarize the results from detailed computations, (iii) to 'smooth' the results from individual variance computations which are themselves usually subject to large sampling variability, (iv) to provide for extrapolation of the results to other statistics for which it is not possible or worthwhile to perform separate computations, and (v) to analyze the information in a form useful for sample design and evaluation. These various requirements are closely related because all are served by an exploration of the pattern of variation of the sampling errors (standard errors as well as derived measures such as coefficients of variation, design effects and intra-cluster correlations) for diverse statistics, computed over different domains and subclasses of the population. For detailed empirical studies, see for instance (Kish et al, 1976) and (Verma and Lê, 1996).

Kish, L., Groves, R. and Krotki, K. (1976). *Sampling Errors for Fertility Surveys*. WFS Occasional Papers, No. 17. The Hague: International Statistical Institute.

Kish, L. (1987). *Statistical Design for Research*, John Wiley & Sons, Inc.

United Nations (1993). *Sampling Errors in Household Surveys*, Department for Economic and Social Information and Policy Analysis INT-92-P80-15E.

Verma, V., and Lê, T. (1996). "An Analysis of Sampling Errors for Demographic and Health

Surveys". *International Statistical Review*, 64(3), 265-294.



Country Reports

AUSTRALIA (from Susan Linacre)

Frank Small and Associates, a private market research firm in Australia, conduct market tracking for a number of large clients involving daily CATI interviews with target market respondents. Clearly the reporting and analysis requirements are significant. Underpinning our analysis capabilities is the MarketMind™ reporting platform. This platform provides the analyst and end user with an interactive tool for investigating market trends and future movements.

The software is easy to use and a modified version can be located at a client's premises to allow them to interrogate the data in real time. Presentation is largely visual with trend graphs being the basis for eye ball analysis. The platform has a number of nice features. The database is updated weekly and provided to the clients weekly. Updating is quick and largely automated and non survey data (such as retail spending, sales and other industry data) can be easily integrated to enhance the diagnostic capabilities. Market event data can also be stored and easily accessed (this data could include sales promotions, ads on TV, competitive activity, environmental and government events, etc). Mouse driven features include the ability to hide individual series; to roll data on various periods (one, two, three, four week rolls); to reduce the window to a period of time of most interest; and statistical features which allow users to easily plot trend lines, calculate basic univariate and multivariate statistics, test hypotheses and determine relationships between variables.

More information on the MarketMind™ reporting platform can be obtained from Mr. Michael Sparkes (e-mail: fsamelb@ibm.net).

A key issue in the development of the design of a repeated survey is the rotation pattern. For example, the Australian Monthly Labour Force Survey (ALFS) includes selected dwellings for 8 consecutive months. This is a special case of an in-for-m rotation pattern, where m=8. The US

Current Population Survey includes households for 4 months, then leaves them out for 8 months and reincludes them for a further 4 months. This is a special case of an a-b-a(m) rotation pattern, in which a=4, b=8 and m=8. We have considered the effect of different rotation patterns of the in-for-m and a-b-a(m) types on the sampling variance of seasonally adjusted and trend estimates obtained from X11 and X11ARIMA. An appropriate correlation model and values based on ALFS estimates of the proportion of persons unemployed and employed was used.

Our results show that using rotation patterns with low or no monthly overlap is an important factor in reducing the variance of the level of a trend estimate and also the difference between two consecutive trend estimates. Specifically, the 1-2-1(m) rotation patterns performed well for both reducing the variance of the level of seasonally adjusted and trend estimates and also the difference between two seasonally adjusted and trend estimates. In fact, the 1-2-1(m) rotation patterns performed better than those currently used in practice and better than an independent sample each month.

For more information please contact: Craig McLaren, School of Maths and Applied Statistics, University of Wollongong, Wollongong, Australia, NSW 2522.

CANADA (from Gordon Brackstone)

In October and November of 1997, Statistics Canada conducted a voluntary telephone **Survey on Readiness of the Canadian Business Community for the Year 2000** computer problem on behalf of a Ministerial Task Force addressing this issue. Follow-up surveys are planned for May and September of 1998 to assess the progress firms have made in addressing this problem, to provide more detailed information on the actions being taken and to provide accurate statistics for selected industries. The problem stems from the susceptibility of many computers to malfunction at the turn of the next century because they store and make computations on calendar dates omitting the first two digits of the calendar year. The first survey taken in the fall of 1997 found that more than 9 out

of 10 firms were aware of the problem, although the majority of the firms unaware of the problem were small in size. On the other hand, businesses already implementing formal or informal plans to prepare their technology for the date change represented less than one half (46%) of the business population. The first survey consisted of a random sample of approximately 3500 enterprises selected from Statistics Canada's central frame of businesses, of which approximately 500 were found to be out of scope and 1,000 did not respond leaving an effective sample of 2000 enterprises. For the second survey, a larger sample of 5,000 businesses will be drawn. For more information contact Mary March, Business Survey Methods Division, Statistics Canada, Ottawa, Ontario, K1A 0T6. Tel: (613) 951-1473. Internet: marcmr@statcan.ca

Statistics Canada has undertaken to enhance its **Services Industries Survey** program by making the transition to probability sampling and developing new surveys to fill critical data gaps. This endeavor is a direct result of an initiative by the Agency to disseminate more reliable and detailed provincial economic statistics for all industrial sectors by the end of 1998. In total, approximately 250 industry classes (according to the new North American Industry Classification System) are in scope for services related activities and half of them will be surveyed for reference year 1997 using 19 distinct survey vehicles. The use of the Canadian Business Register and methodologically sound systems for sampling, imputation and estimation are applied on a standard basis. Substantial efforts were made to ensure the quality of the survey frame by assessing the quality of critical information such as industry coding, administrative data and provincial distribution of operations. Stratification and sample allocation have been performed using the Lavallée-Hidiroglou method and a generic approach was developed for the survey sample designs. Statistics Canada generalized software is being used for several stages of survey design and processing and tax data will supplement the direct survey portions. Mail-out for the 1997 reference year is planned for late March 1998 and results are expected to be published by the end of next year. For further information, contact Serge Legault, Business Survey Methods Division, Statistics Canada, Ottawa, Ontario, K1A 0T6. Tel.: (613) 951-1460. E-Mail : legaser@statcan.ca.

CENTRAL AFRICA (from François Guerenga)

In October 1997, the Central African Republic released the 1996 Multiple-Indicators Survey results. The survey covered the issues of health, education, water and sanitation. For data collection purposes, and in order to facilitate the differential analysis by area of residence, the country was stratified into 5 health regions and each stratum divided into an "urban-rural" sub-stratum. The two-stage sampling method was used and the sample frame was that of the 1994 Demographic and Health Survey - with the assumption that the household structure did not vary between the two surveys. Unfortunately, after the field operations, we noticed a large decrease of the number of households in rural areas compared to urban areas, hence the over-representation of urban households. This situation prompted the analysts to give up the analysis by area of residence. This illustrates the difficulties encountered in survey development in Africa, in terms of use of outdated sample frames and lack of mastery of certain sampling tools for sample adjustment through post-stratification.

For further information, please contact Mr. Moloua, Central Bureau of the Census (Bureau central du recensement), B.P. 696, Bangui, Central Africa. Tel.: 236-612554.

CENTRAL AMERICA AND PANAMA (from David J. Fitch)

Guatemala's Instituto Nacional de Estadística (INE) has begun data collection on a two million US dollar income and expenditure survey (ENIGFAM) which will collect data from 7,500 households from March 1998 thru March 1999. About half of the financing is from one of the international banks.

Perhaps it would be of interest to describe how this work has developed as it would give some insight as to how things can go in a developing country like Guatemala. INE has no statisticians. They have received advice from time to time from a variety of donor organizations. The one group that has made a solid, lasting, contribution as I see it is the UN group that helps developing countries with their censuses. INE has a good cartographic unit which I assume this UN group helped establish. Some years ago they received help from the international people at the US Census Bureau which has led

them to use IMPS, a package produced by the Bureau. They used this for data entry in the 1994 census and plan to use it for the present survey. The sample design that INE is using for ENIGFAM was mostly worked out by a consultant from their lender, and called for the creation of some 10 strata with the selection probabilities of clusters varying from stratum to stratum. Also it was recommended that clusters be selected with replacement, and a cluster selected 2 or 3 times should be sampled 2 or 3 times. For 1994 census purposes Guatemala was divided into enumeration districts, which we call sectors, of some 100-150 households. Within each stratum a sample of these sectors was selected with probability proportional to size. The size figures were the number of households found in the 1994 census. The plan is to select a fixed number of houses - 15 rural, 18 urban - from within each selected sector. The recommendations contained in the reports of consultant make no reference as to how the data should be analyzed. It seems likely that he was not aware of programs such as PC CARP for making estimates from surveys of complex designs. The current plan, as presented in a recent meeting of the advisory group, is to analyze the data as if they were from a simple random sample.

I will try to help them although I may well fail. I shall try to lead them in the direction of using the modification CENVAR, of PC CARP, which was described by David Megill in the December 1997 Survey Statistician. This would help them, and me, to become more familiar with the complete IMPS package. Here as so often, I see that people seem to be afraid of using weights. I shall try to encourage them not only to correctly weight for different strata selection probabilities but also to weight up or down for those sectors that have grown or shrunk. Although I'm not completely clear, my understanding is that there is no bias, and more efficiency, in not sampling a second time in a sector that, in with replacement sampling, has been selected a second time. Possibly a reader might help me on this so that I in turn can give them good advice should they ask.

Through correspondence with Gordon Brackstone, our Country report editor, I have learned that Guatemala is one of the countries that the Government of Canada is prepared to help. I've conveyed this information to INE but they have not shown much interest. It is hard for a statistical

organization without statisticians to want to acquire the expertise that we would be inclined to think they need.

I hope this information might give insight, helping us to better help the people in developing countries. I would be most pleased to receive thoughts from readers on these things.

For any feedback or more information, please contact: David J. Fitch, Instituto de Nutrición de Centro América y Panamá, Apartado Postal 1188, Guatemala, Central America, or by e-mail at: dfitch@incap.org.gt

CHAD (from Bandoumal Ouagadjio)

Chad is not a country with a long-standing statistical tradition. This is because of the political instability the country experienced shortly after it got its independence in 1960. Since the return of civil peace in 1990, the government has initiated the process of setting up a database for development planning purposes.

The Statistics and Economic & Demographic Studies Branch [Direction de la statistique, des études économiques et démographiques (DSEED)], the official agency responsible for data collection and analysis, has so far conducted two national-scale operations; a general census of the population and dwellings, the first ever to be held by the Central Bureau of the Census [Bureau central du recensement (BCR)] of the above-mentioned Branch in April 1993. The results of this analysis, available since 1994, are judiciously used by national and international development agencies.

In January 1995, and following the general census, the government decided to conduct a Demographic and Health Survey, the very first ever undertaken in the country. This survey was to provide a number of indicators to assess health programs. The main issues covered by the survey are: maternal and infant mortality, family planning, AIDS, contraception, breastfeeding and nutrition, causes of child mortality, fertility preferences, social and health infrastructures, etc.

Preliminary proceedings of the survey began in April 1996, followed by the data collection and

computer processing. The preliminary results have been available since November 18, 1997. A final report will be published in early 1998. The survey is conducted by the Central Bureau of the Census, Statistics and Economic & Demographic Studies Branch, with the technical assistance of Macro International.

Finally, the government has just wrapped up negotiations with financial backers to conduct a survey on migration and urbanization in Chad. The work is expected to begin in early 1998. The survey will be conducted by the Central Bureau of the Census, Statistics and Economic & Demographic Studies Branch.

For more information, please contact Mr. Bandoumal Ouagadjio, Technical Director of the Central Bureau of the Census, Statistics and Economic & Demographic Studies Branch [Bureau central du recensement, Direction de la statistique et des études économiques et démographiques], B.P. 453, N'Djaména, Chad. Tel.: 235-52-31-64, Fax: 235-51-51-85.

HUNGARY (from László Mihályffy)

Since 1995, an adjustment technique based on generalized iterative scaling (GIS) has been used in Hungarian household surveys such as the Labour Force Survey to compensate for non-response and partly also for some deficiencies of coverage. Examples of similar applications of this method going back to a famous paper by Darroch and Ratcliff (1972) are, among others, the consumer expenditure surveys in Italy and in the United States. Adjustment by GIS uses updated census counts of age-sex groups and dwellings in some geographic breakdown as exogenous information, and ensures that adjusted survey estimates conform with those updated census counts. In the Hungarian applications of GIS, timeliness of exogenous information was a permanent problem, since the most recent update of available exogenous information usually referred to some date one year before survey time. An obvious remedy for this problem was to use time series based forecasts of totals of age-sex groups and dwellings in place of actual but obsolete updated census counts. In the majority of cases, however, only 6-8 years of annual data were available instead of a monthly time series of the

same span. For those cases, a heuristic method imitating the forecasting with time series was introduced. A great number of simulation computations showed that the new method, when used with proper care, was suitable for producing the forecasted totals needed for adjustment. The use of forecasted totals of age-sex groups and dwellings in adjusting LFS estimates was introduced in January 1998.

For more information, please contact László Mihályffy, Hungarian Central Statistical Office, P.O.B 51, H-1525 Budapest, Hungary. E-Mail: laszlo.mihalyffy/office@office.ksh.hu

ITALY (from Claudio Quintano)

In 1996 the National Statistical Office adopted a new strategy to develop the dissemination of official statistical information with the aim of satisfying users' needs for new technologies in the treatment and exchange of statistics. This new strategy has two objectives: to improve the computing and electronic communication environment through which products are delivered; and to classify products by "theme" to help users to choose from among the information available.

The information products are subdivided into several collections, each one characterized by its contents, means of distribution and timing of release.

As regards dissemination, on the one hand we have a complimentary and discount policy towards particular categories of users. On the other hand, commercial channels have been developed: it is possible to have information and to buy products in twenty ISTAT information Centers throughout Italy.

To offer a commercial service able to satisfy user demands for ease and rapidity in obtaining statistical information, ISTAT has improved its means of subscription. The information products are arranged by "themes" and subscription for a theme comprises the shipping of all the products which report statistical information on that subject.

For further information, contact Donatella Fazio, Diffusion Department, ISTAT, via Torino 6, 00100 Rome (Italy)

The "minimal mixed distant donor" methodology has been applied to impute the (qualitative and quantitative) missing data during the "VII Industrial and Services Census" of 1991. This methodology suggests the selection of the missing information from a donor unit that minimizes the distance-function. Such a function is a sum of several distance indicators weighted with the CHI-SQUARE (mixed distance indicator, MDI), that is a measure of each variable's independence from the variable with missing data. We can reduce the imputation time making use of a file stratification, that is constructed by using the variables with maximum CHI-SQUARED weights in order to avoid the MDI calculation for the greater distant units.

For further information, contact Corrado Abbate, Servizio CEA, ISTAT, via Ravà 150, 00142 Roma (Italy), tel. ++39 6 54900257, fax ++39 6 54900257.

KOREA (from Jong-Joon Ryu)

A new sample for current household surveys was introduced in September 1997. The frame of this sample was based on the 1995 Population and Housing Census. We redesign the sample for current household surveys every five years in order to reflect current socio-economic changes. From 1969, we have used a multi-purpose sample for the current surveys, the Economically Active Population Survey (EAPS) and the Family Income and Expenditure Survey (FIES), to minimize the manpower and financial budget of those surveys. EAPS is used to collect information on the economic status of the population and changes in the activity pattern of the labor force needed. The purpose of FIES is to collect up-to-date information on urban households' income and expenditures.

Sample Design: the data and materials from approximately 22,029 ordinary enumeration districts (ED's) which are 10% of the 1995 Population and Housing Census are used for the sample selection. Islands and social institutions are excluded from the sample selection. According to the classification of major administration regions, the country is divided into 15 strata, i.e., six large cities and nine provinces. They are further divided into urban and rural areas.

Within each stratum, ED's (PSU) are systematically selected with probability proportional to a measure

of their size. Each selected ED consists of a corresponding number of segments with 8 (for EAPS) and 10 (for FIES) households on average. Within the primary sampling unit, three contiguous segments (SSU) are randomly selected, and all households in each selected segment are the ultimate sampling units of the survey.

As a result, about 29,256 households for EAPS and 6,970 households for FIES are selected for the sample with the overall sampling rate of about 1/430 and 1/1,437, respectively. These surveys have been conducted with the new sample since January 1998 following a three month pilot survey conducted simultaneously with the old sample last year.

For more information, please contact Mr. Ryu-Yeung Kim, National Statistical Office, Hanta Bldg., 647-15, Yoksam-dong, Kangnam-gu, Seoul, 135-080, Korea. Tel. 82-2-222-1852, Fax: 82-2-538-5970. E-mail: kkyoung@nsohp.nso.go.kr.

NEW ZEALAND (from Len Cook)

Statistics New Zealand has received funding to carry out a feasibility study for a **Longitudinal Survey of Income Dynamics**. The funding covers the development and testing of a survey methodology. No funding has been assigned for carrying out the survey at this stage.

The survey objectives are currently being discussed with users but will focus in the areas of income dynamics, labor market dynamics, assets and savings and major contributory factors such as labor market experience, health, disability, caring responsibilities and household characteristics. The aim will be to provide information that assists in policy formation in the areas of income adequacy, retirement income provision, labor market participation and support to families. The development project began in August 1997 and will be completed in June 2000 with the production of a report recommending survey design options. The project will include development of: Sample design; Classifications; Questionnaire design; Collection methodology; Database design; Processing systems; and Estimation methodology.

A major design consideration will be panel length, which will be determined primarily on final agreed

objectives and testing experience with non-response, response fatigue, recall ability etc. Also to be determined is what cross-sectional data should be produced each year as well as longitudinal data.

A two wave pilot study will be undertaken preceded by cognitive testing of the questionnaire and testing of tracking and other methodologies.

For further information contact: Jenny Sanders at 64 4 495 4629; or by E-mail at Jenny_Sanders@stats.govt.nz

The New Zealand Government has asked Statistics New Zealand to undertake a feasibility study into the costs and benefits of **integrating administrative data** across sectors to produce new social statistics. Administrative data results from the interactions of individuals and groups with government departments. Information can be collected for, or as part of, service delivery, an application, membership, regulation or registration.

For the purposes of the study, data integration is defined broadly, from the application of common tools, practices and definitions to enable data from multiple datasets to be relatable, to statistical matching where it is not possible to use unique identifiers to link datasets, to linking of records based on unique identifiers. This definition includes linkages between administrative and survey data.

Statistics New Zealand has been chosen to do the study because of its legislation and practices relating to protection of confidentiality, and will be the custodian of any linked data providing access to researchers. One means of providing this access will be through the newly established Data Laboratory.

The five key tasks in the feasibility study are to: identify and assess barriers to data integration; produce a "road-map" of data sources which could usefully be integrated, identifying those that can and cannot be integrated and suggesting ways of overcoming barriers to integration; address the issue of access to integrated datasets by individuals and organizations outside Statistics New Zealand (this will include consideration of suitable protocols, procedures, software, technology and legislative, ethical and privacy requirements); undertake a focused case study investigating the

integration of two datasets from two government agencies (the Department of Social Welfare and the Inland Revenue Department); and identify other examples of possible dataset integration.

Statistics New Zealand must report back to government on the outcome of the feasibility study by June 30, 1998. Because of the time and resource constraints imposed on the study, it has been decided to focus on the six sectors of government encompassing the critical social policy areas. These are the education, employment, welfare, health, housing and justice sectors. The most important administrative collections held by agencies operating in those sectors are being examined as part of the study.

For further information contact: Anne Spellerberg at 64 4 495 4664; or by E-mail at Anne_Spellerberg@stats.govt.nz

PERU (from Leonor Laguna)

In Peru, since the 1970's work on **opinion surveys and market research** has been undertaken with much success. Currently, there are many enterprises engaged in this work.

The subject of the surveys undertaken are: Public opinion on different political issues; Appraisal of the quality of goods; Appraisal of publicity campaigns (pre and post test); Institutional image from different points of view; and Public opinion on actions undertaken by an institution.

The methodologies used are: pilot studies (focus group); directed interviews, and normal surveys. They use a mixture of probabilistic and non probabilistic samples and the sample size depends mainly on the budget for the survey.

For more information, contact Lic. Bernardo Verjovsky, Asociacion Peruana de Empresas de Investigacion de Mercados (APEIM), 252 Julio Becerra, Lima-18, Peru. Fax No.: 14-46-7474

PHILIPPINES (from Gervacio G. Selda, Jr.)

The National Statistics Office (NSO) of the Philippines is embarking on a pilot run of the Annual Poverty Indicators Survey (APIS) to address the

need to develop an integrated poverty indicator and monitoring system. At present, poverty indicators in the country are generated every three years through the conduct of the Family Income and Expenditures Survey (FIES). The APIS is a survey aimed at providing proxy indicators on poverty during non-FIES years. Major data items to be collected are the socio-economic profile of the families such as employment, income, family planning and health practices, housing, membership in peoples' organizations, cooperatives, family expenditures and savings, and other information related to the families' living conditions. The 1998 APIS will be conducted in April 1998 in five selected provinces in the country and will cover 3,604 households. A stratified multi-stage sampling design will be used with the barangay (smallest geographical unit), enumeration area and household as the primary, secondary and tertiary sampling units, respectively. Also, the survey will make use of hand-held PCs wherein data are encoded by the interviewer during the actual interview process. This is the first time that such an IT-device will be adapted in a data collection by the NSO and hence will usher the country to the era of computer-based data collection. For more information on the above survey, contact Mr. Tomas P. Africa, Administrator, National Statistics Office, Manila, Philippines, Fax Nos. (632) 713-7073 and 715-6502 or e-mail address: T.Africa@mail.census.gov.ph.

The Philippines will host the 3rd Conference on Statistical Computing of the Asian Regional Section (ARS), of the International Association of Statistical Computing (IASC). The event which is slated on December 2-4, 1998 at the Shangri-La's EDSA Plaza Hotel in Manila, aims to provide a forum to stimulate international exchange of scientific information, knowledge and experiences on statistical methods and statistical computing, and to discuss recent developments and current issues involving these fields. The theme of the conference is "Statistical Methods and Statistical Computing Towards the Third Millennium". It will feature invited and contributed papers on the following topics: (a) multivariate statistical modeling and data analysis; (b) statistical software for education; (c) computer intensive methods in statistical modeling; (d) applications in policy analysis; (e) statistical methods for large or complex data sets; (f) biostatistics and clinical trials; (g) remote sensing and the environment; (h) statistical process control;

(i) experimental designs; (j) graphical models; (k) environmental statistics; (l) demographic and health statistics; (m) GIS applications; (n) exploratory data analysis; and (o) on-line statistical data bases. For more information, please refer to ARS web page: <http://ics.uplb.edu.ph/~ars3rd> or contact Dr. Romulo A. Virola, Secretary-General, National Statistical Coordination Board (NSCB), Fax No. (632) 890-9408 or e-mail address: nscbg@mozcom.com.

SWEDEN (from Anders Christianson)

During the last four years, Statistics Sweden has improved its processes by means of introducing Total Quality Management thinking for its production processes. In the systematic approach of improving the processes, the emphasis has been laid upon:

- customer focus
- stressing the processes rather than products
- reducing process variation
- focusing on continuous rather than ad hoc improvement
- involving all staff

Lars Lyberg, head of the R&D department has been coordinator of the TQM program. In cooperation with Westat, Statistics Sweden staff has been educated and trained in TQM thinking. Sixty TQM pilots have been undertaken, all top management have received at least two weeks training, and middle management have been given a two day course.

Since the start in 1994, 115 TQM projects have been initiated at Statistics Sweden. Of these, 65 have been concluded with a final report. Some of them, like those for nonresponse and editing, have led to the creation of CBM (Current Best Methods) standard routines. Evaluation of concluded TQM projects indicates that improvements have been achieved through quicker publishing times, reduced costs, reduced amount of redundant work, and increased involvement of customers and users.

For more information, Birgit Glimenius will be glad to answer questions. (birgit.glimenius@scb.se, Fax +46 783 45 99, Phone +46 783 42 59.)

UNITED STATES (from Dan Kaskprzyk)

The Bureau of Transportation Statistics (BTS) is an operating administration of the United States Department of Transportation. BTS is a statistical agency, a mapping agency, and an organization for transportation analysis. Transportation statistics require BTS to deal with a wide variety of data sources, such as households, establishments, vehicles, airline tickets, and electronic data bases; each source poses its own unique methodological challenges.

As a statistical agency, BTS is involved in data collection, quality assurance, and dissemination of statistical products. BTS is also a mapping agency involved in geographic data and geographic information systems (GIS) technology. BTS does not centralize the Department of Transportation's many statistical and mapping programs, but rather develops bridges for those programs to provide a complete, accurate picture of transportation.

The Bureau's largest data collection programs are the Commodity Flow Survey (CFS) and the American Travel Survey (ATS), conducted by the U.S. Census Bureau, to describe where freight and people go by all modes of transportation. The CFS obtains data on shipments by domestic establishments in manufacturing, wholesale, mining, and selected other industries. The ATS collects detailed travel data from 80,000 U.S. households.

BTS compiles and disseminates inventories of all transportation data resources available to the public. BTS publications are available to government agencies, private industry, and the public at minimal or no cost. Most BTS data products and publications are available for downloading from the BTS homepage on the internet (www.bts.gov).

BTS also hosts the U.S. Federal Committee on Statistical Methodology (FCSM) homepage (www.bts.gov/fcsm). This committee of U.S. methodologists aims to improve knowledge and use of statistical methods through its working paper series and conferences.

For more information about BTS programs, contact Lee Giesbrecht of the Bureau of Transportation Statistics at: lee.giesbrecht@bts.gov

Fertility Survey, was used to compute sampling errors using the proper statistical methodology.



VIETNAM (from Nguyen Quoc Anh)

The National Committee for Population and Family Planning (NCPFP) and the General Statistical Office (GSO) have set up a population change and family planning sample survey with a reference date of April 1 every year during the period 1995-2000.

Based on experiences with demographic surveys in many countries and the recommendations of the ESCAP advisor on census and surveys, a sample survey which includes a total of 4,000 households is representative enough for a single population. So, the sample survey with more than 200,000 households (or more than one million people) is large enough to produce estimates for the 61 provinces, urban/rural and seven regions in the country.

The sampling unit in urban areas is the urban block with a total of about 140 households, while in the rural areas it is the village with a total of about 200 households. The sampling scheme is of the compact cluster type, where all households within the boundaries of an EA are included. The stratified random sampling method of selection is used, with each province forming a major stratum. There are 61 major strata in which the rural and urban areas of each province formed a lower level of stratification. The allocation of EAs to the various major strata is implemented by the inverse ratio method.

Assuming the variances are the same for all the 61 provinces/cities, the inverse ratio allocation to population size method determines the sampling fraction; F_i , from the formula

$$F_i = A_i * F_1 / [1 + (A_i - 1) * F_1] \text{ in which: } i = 2, 3, \dots, 61; \\ A_1 = P_1 / P_1 = 1; A_i = P_i / P_1$$

If the sample had been selected as a simple random sample, it would have been possible to use straightforward formulae for calculating sampling errors. However, with a two-stage stratified design it is necessary to use more complex formulas. The computer package, CLUSTERS, developed by the International Statistical Institute for the World

IASS Satellite Conference on Small Area Estimation

Riga, 20-21 August 1999

The Satellite Conference on Small Area Estimation will follow the ISI session in Helsinki. It is intended to cover aspects of both theoretical background in small area estimation and practical application of different estimation methods for small area statistics. This includes sample design for small area statistics (national experiences), new developments in the field of estimation for small area statistics, and successful applications of small area estimation techniques, including those that use data from administrative systems. Small area statistics is a subject of great interest in many countries. Several statistical agencies in Western countries have introduced vigorous programs to meet this new demand, with a view toward producing efficient and high quality statistics. Several international conferences and seminars have been organized in the last years and others are yet to be organized. Furthermore, significant research on both the theoretical and practical aspects of small area estimation is conducted at various universities and some national statistical offices.

The Conference is organized on the initiative of the Baltic countries, and is aimed at improving knowledge transfer of new methods. The proceedings of the Conference should be of interest to all statisticians working in this field but it is of particular interest for the economies in transition in Central and Eastern European countries and the former Soviet Union countries. In these countries, complete reporting and complete statistical investigations are or have been replaced with sample surveys, and the production of reliable small area statistics has emerged as a pressing, difficult and costly problem.

The conference proceedings will be opened by Dr. Danny Pfeffermann, who will provide an overview of New Developments in Small Area Estimation. Initial plans also include holding a one day Short Course on Small Area Estimation

immediately preceding the Conference to allow some participants to acquire the basic knowledge that would allow them to appreciate fully the proceedings of the conference.

The meeting is sponsored by the International Association of Survey Statisticians (IASS), the Central Statistical Bureau of Latvia (CSBL), and the University of Latvia (UL).

The members of the International Programme Committee are: Ödon Éltető (Hungary), Wayne A. Fuller (USA), Jan Kordos (Poland, chair), John Kovar (Canada), Juris Kruminš (Latvia), Janis Lapinš (Latvia), Danny Pfeffermann (Israel), Richard Platek (Canada), J.N.K. RAO (Canada), Carl-Erik Särndal (Canada), Dennis Trewin (Australia) and Janusz Wywiał (Poland).

Abstracts of proposed papers should include full information on authors and their affiliations, and the contact address (including E-mail and fax) and a text of 200-300 words. The deadline for submission is October 31, 1998. Earlier submissions are encouraged and notifications of acceptance will be sent out as soon as possible. Acceptance is conditional on the attendance of the meeting by at least one of the authors. Abstract should be submitted, preferably via E-mail (in ASCII or Word 6.0), by fax or by mail to the address below or to any member of the Programme Committee:

Jan Kordos
Al. Niepodległości 208
00-925 Warsaw, Poland
Fax: (0048-22) 25-03-95
E-mail: kordos@gus.stat.gov.pl.

It is the intention of the Programme Committee to publish the papers presented at the Conference in a special Proceedings of the Conference issue. The papers may also be published in any journal after the Conference.



Recent Trends in the Methodology for Social and Business Surveys

A Pre-session Workshop of the 52nd ISI Session

The Department of Statistics of the University of Jyväskylä will arrange a series of seminars in survey sampling from 5 August till 10 August 1999. The idea is to combine the traditional short courses on survey sampling organized by the IASS with a high-level workshop for students and researchers.

The working title of the workshop is "Recent Trends in the Methodology for Social and Business Surveys." Its idea is to gather together undergraduate and postgraduate students, and researchers in survey sampling to present their studies and participate in the lessons and comments given by distinguished researchers. The following well-known scholars have already promised to participate: Prof. J.N.K. Rao (Canada), Prof. Harvey Goldstein (UK), and Prof. Chris Skinner (UK). We especially welcome students and their supervisors to attend this workshop together.

Short courses sponsored by the IASS have proven very fruitful. It is important that young students and researchers taking their first real challenges can meet and discuss with famous and very experienced professionals. In her presidential letter at the beginning of this issue, Nanjamma Chinnappa describes the short courses and instructors that are planned for the 1999 meetings.

The local organizers promise a good atmosphere and different types of leisure activities to let the participants experience the Finnish social life. We are seeking financial support for the participants from developing and transition countries. Further information will be available by the next issue of *The Survey Statistician*. Our home page will be on the net in early May. It will contain the most up-to-date information on the event. The page can be found at: <http://www.stat.jyu.fi/wshop99jy>.

Welcome to Finland and Jyväskylä in August 1999.

Local Organizing Committee

Erkki Pahkinen
University of Jyväskylä
P.O. Box 35
FIN-40351 Jyväskylä
Tel.: 358-14-602988
Fax: 358-14-602981
E-mail: pahkinen@jylk.jyu.fi

Kari Djerf
E-mail: Kari.Djerf@stat.fi

Risto Lehtonen
E-mail: Risto.Lehtonen@stat.fi



Istanbul 1997 Booklet to Appear by Midyear

The IASS is publishing a booklet containing the invited papers of the ISI session in Istanbul, August 1997. For the booklet, authors have been invited to publish full-length papers (maximum 20 pages) to replace the 4-page versions that appear in the ISI bulletin, thus increasing their readability. The Australian Bureau of Statistics is printing the booklet, which will be distributed to IASS members around midyear:

The contents of the booklet is divided into five parts according to the invited topics addressed at the session, each one reflecting a particular operation of the survey process:

1. Improvement of the Production of Gender Statistics
 - Questionnaire Design, Computerized Interviews, and Data Quality
 - Imputation and Missing Values
 - Generalized Estimation in Survey Sampling and Associated Software
 - Metadata and the Internet

As chair of the organizing committee, I want to express my thanks to colleagues from all over the world who contributed to the high quality of the sessions and the booklet as presentators, authors, and discussants. In particular, I want to thank the session organizers for their excellent job:

H. Öztas Ayhan, Middle East Technical University, Ankara, Turkey; Antonio Giusti, Department of Statistics, Firenze, Italy; J. N. K. Rao, Carleton University, Canada; David A. Binder, Statistics Canada; and Cathryn S. Dipbo, U. S. Bureau of Labor Statistics.

Anders Christianson, Statistics Sweden



Barcelona GIE Seminar

On November 30 and December 1, 1998, a group of statistical researchers from 7 Catalan universities (UAB, UB, UG, UPC, UPF, URLL and U. Perpignan) and the Statistical Institute of Catalonia (IDESCAT) will be holding the "Generacion de Informacion Estadistica. Calidad y limitaciones (GIE)" seminar in Barcelona, Spain. The aim of the seminar is to highlight quality issues in data collection for surveys, censuses or developing registers. This seminar represents an opportunity to discuss the problems that arise in data production, and to establish a dialogue between university statisticians, administration statisticians, social science researchers and practitioners working in the business milieu.



Benefits of Membership in the International Association of Survey Statisticians (IASS)

1. Members may attend:
 - The International meetings held every two years in conjunction with the International Statistical Institute. These meetings provide a forum to discuss survey statistics and include sessions on recent advances in survey and census methodology and their applications.
 - Regional meetings and seminars devoted to specific aspects of surveys.
2. Members receive publications on a regular basis or on request without charge and have the opportunity to subscribe to certain journals at reduced rates.

All members receive the following publications free of charge:

- *The Survey Statistician*, the newsletter of the Association, which is issued twice a year in English, French and Spanish. It includes general information about the activities of the Association (meetings, seminars, etc.) and about meetings arranged by other organizations around the world that are likely to be of interest to members. It also includes various technical sections on issues related to surveys (e.g., short technical papers, survey terminology, bibliographies, reviews of computer software, and country reports).
- *International Statistical Information*, the newsletter of the International Statistical Institute and its five sections. This newsletter is issued three times a year.
- "Short Book Review" of the International Statistical Institute.
- Proceedings of papers relating to surveys and censuses presented at sessions of the International Statistical Institute.
- *International Statistical Review*, the journal of the International Statistical Institute. The journal covers all branches of statistics.
- A Directory of the members of the Association.
- The pamphlet *42 Questions/Answers*, which contains Leslie Kish's contributions to *The Survey Statistician* from 1974 to 1994.

The members are entitled to reduced subscription rates for the following journals:


- *Survey Methodology / Techniques d'Enquêtes*, which is published twice a year by Statistics Canada in both English and French. The Journal publishes articles on the theory and practice of surveys.
- *Journal of Official Statistics*, which is published four times a year by Statistics Sweden. The journal publishes articles on the methodology and policies associated with all aspects of official statistics.
- "A Celebration of Statistics," which is a special volume published in 1985 to mark the centenary of the International

Statistical Institute. The discounted price is US \$26 (instead of US \$39).

3. IASS members can obtain expert technical assistance on surveys and censuses from IASS experts by submitting questions to the "Question and Answer" section of *The Survey Statistician*.



INTERNATIONAL ASSOCIATION OF SURVEY STATISTICIANS



The Survey Statistician

No. 38
June 1998

J. Michael BrickEditor

Section Editors

Gordon BrackstoneCountry Reports
 Vijay Verma Question/Answer
 James Lepkowski Software Review
 Ann Marie Vespa-Leyder Circulation
 Angelia Murphy Production

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:

Secrétariat de l'AISE/IASS
 c/o Insee-CEFIL
 Att. Mme Claude Olivier
 3, rue de la Cité
 33500-Libourne, FRANCE

Comments on the contents or suggestions for articles in *The Survey Statistician* should be sent via E-mail to BrickM1@Westat.com or mailed to:

J. Michael Brick
 Westat
 1650 Research Blvd., Room 490
 Rockville, MD 20850 USA



In Other Journals

Journal of Official Statistics
 An International Review
 Published by Statistics Sweden

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.

Contents Volume 14, Number 1, 1998

Data Collection Mode Effects on Responses to Attitudinal Questions <i>Peter Lynn</i>	1
Effects of Interview Mode on Measuring Depression in Younger Adults <i>William S. Aquilino</i>	15
Space/Time Variations and Rolling Samples <i>Leslie Kish</i>	31
Examining the Revisions in Monthly Retail and Wholesale Trade Surveys Under a Rotating Panel Design <i>Patrick J. Cantwell and Carol V. Caldwell</i>	47
Random-Effects Models for Smoothing Poststratification Weights <i>Laura C. Lazzeroni and Roderick J. A. Little</i>	61
Estimation of Identification Disclosure Risk in Microdata <i>Guang Chen and Sallie Keller-McNulty</i>	79
Book and Software Reviews	97
In Other Journals	113

All inquires about submissions and subscriptions should be directed to the Chief Editor:

Lars Lyberg, R&D Department
 Statistics Sweden
 Box 24 300
 S - 104 51 Stockholm, Sweden

Survey Methodology
 A Journal Published by Statistics Canada

Volume 23, Number 2, December 1997

1. CONTENTS

In This Issue	79
P.S. KOTT and D.M. STUKEL Can the Jackknife Be Used With a Two-Phase Sample?	81
G. DECAUDIN and J.-C. LABAT A Synthetic, Robust and Efficient Method of Making Small Area Population Estimates in France	91
P. RAVALET An Adaptive Procedure for the Robust Estimation of the Rate of Change of Investment	99
F. COTTON and C. HESSE Sampling and Maintenance of a Stratified Panel of Fixed Size	109
P.J. FARRELL Empirical Bayes Estimation of Small Area Proportions Based on Ordinal Outcome Variables	119
A. GELMAN and T.C. LITTLE Poststratification Into Many Categories Using Hierarchical Logistic Regression	127
K.K. SINGH, A.O. TSUI, C.M. SUCHINDRAN and G. NARAYANA Estimating the Population and Characteristics of Health Facilities and Client Populations Using a Linked Multi-Stage Sample Survey Design	137
J. DUFOUR, R. KAUSHAL and S. MICHAUD Computer-assisted Interviewing in a Decentralized Environment: The Case of Household Surveys at Statistics Canada	147
F. SCHEUREN and W.E. WINKLER Regression Analysis of Data Files That Are Computer Matched - Part II	157
Acknowledgements	167

CONTENTS

From the Editor.....1

Censuses and Surveys of Agriculture

A. LINDNER: Uses of agricultural statistics by OECD and experiences made with transition economies3

J. VISEUR: Current status of the program for the World Census of Agriculture 2000.....25

L. SIVERS and T. E. HOLLAND: Census of Agriculture in the United States33

L. ZALEWSKI: Agricultural Statistics in Poland43

H. WANKE: Censuses of Agriculture in Poland....57

J. KORDOS and L. KURSA: Agricultural Sample Surveys in Poland.....75

Z. BOCHENEK, A. CIOLKOSZ, A. FABER and K. FILIPIAK: Application of Remote Sensing Methods for Estimating Area of the Main Crops in Poland109

R. T. BASS, M. R. PALLESEN, A. STOYKOV and M. DIMITROVA: Design and evaluation of sample surveys for agricultural statistics in Bulgaria123

J. HRBEK: Census of Agriculture and its Position in the System of Statistical Surveys in the Czech Republic.....143

R. GARIBAY, M. STEINER, and M. GONZALEZ: Area Frame Point Sampling: An Exploratory Study to Measure Nicaragua Agricultural Production ... 153

O. SHEVCHUK, A. REVENKO and O. PROKOPENKO: Preparatory work for conducting the agricultural census in Ukraine..... 169

Other Articles

R. PLATEK and K.W. STUDNICKI-GIZBERT: Some remarks on technical assistance and training programs..... 175

V. VEHOVAR: The Labor Force Survey in Slovenia 191

E. ORTIZ, G. SOLDEVILLA: Risk and returns in the South American emerging stock market..... 201

Book Reviews

THE POCKET STATISTICIAN. A Practical Guide to Quality Improvement, Arnold, London 1996, 252 pp. (J. Podgórski) 223

RESEARCH METHODS. Guidance for Postgraduates, T. Greenfield (Ed.), Arnold, London 1996, 306 pp. (J. Kordos). 227

Report

Fifteenth International Statistical Conference: Multivariate Statistical Analysis, Lodz, Poland, December 4-5, 1996 (J. Korzeniowski)..... 233

CONTENTS

From the Editor.....	235
Jean-Louis BODIN: Meeting Users' Needs by Developing Annual and Multi-year Statistical Programs: the Example of INSEE in France	239
Sample Survey Issues in Transition Countries	
J. KORDOS: Introductory Remarks on Applications of Sampling Methods in Transition Countries.....	251
S. DRÁPAL: Utilization of Sampling Methods in the System of Statistical Surveys in the Czech Statistics	259
Ö. ÉLTETŐ, A. MARTON, L. MIHÁLYFFY, L. TELEGDI, Sampling Surveys in Hungary.....	267
J. LAPINŠ: Sampling Surveys in Latvia: Current Situation, Problems and Future Developments ...	281
D. KRPAVICKAITE: Sampling Surveys in Lithuania	293
V. VEHOVAR, M. ZALETEL: Sampling in Official Statistics in Slovenia - Development and Perspectives.....	301
A. BALICKI and M. SZREDER: Usefulness of Official Registers in Sample Surveys in Poland ..	315
J. KORDOS: On Applications of Sampling Methods in Official Statistics in Poland	329

Other Articles

S. CHOWDHURY: Integrated Weighting for Estimation in Household Surveys	335
P. D. FALORSI and S. FALORSI: The Italian Generalized Package for Weighting Persons and Families: Some Experimental Results with Different Non-Response Models	357
J. SAHOO, L.N. SAHOO, and J. WYWIAL: Some Thoughts of Reduction of Estimation Bias Using Auxiliary Information in Sample	383

Book Review

THE PRACTICE OF BAYESIAN ANALYSIS, Edited by S. French and J. Q. Smith, Arnold, London 1997, (Reviewed by W. Sadowski)	403
REGIONAL STATISTICS: SAMPLING AND INTEGRATION OF DATABASES, Edited by J. Paradysz, Poznań 1997, (Reviewed by M. Wozniak and Z. Ziolo).....	407

Report

Health Measurement: Contemporary Needs and Possibilities (By J.B. Karski)	411
---	-----

International Associations

The International Association of Survey Statisticians.....	415
--	-----

