INTERNATIONAL STATISTICAL INSTITUTE
INTERNATIONAL ASSOCIATION OF SURVEY STATISTICIANS

survey statistician n°9

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CONTENTS

1. editor's letter

The Editor and the Editing Board of the Survey Statistician thank the IASS representatives and members for the information and the papers they sent.

They would be grateful to them if they could forward new methodological papers to be published in the next issues.

They are plessed to announce that the Spanish version of the Survey Statistician n° 8 has been published by the Spanish National Institute of Statistics.

2. general information

2.1. Meetings announcements

2.1.1. 12th Regional Symposium of the International Council on Social Welfare, July 17.22, 1983, Dublin (Ireland)

The International Council on Social Welfare organizes its 12th Regional Symposium from July 17 to 22, 1983, at Trinity College, Dublin (Ireland). This symposium is open to interested and qualified persons from Europe, the Middle East and Mediterranean Area.

It will consist in plenary sessions and working groups. And its content will be based on the following considerations. :

- statistical data not be a central issue but just a starting point,
- changing demographic patterns are bound to mean changes in social problems,
- as the trends of development are not homogeneous, even inside Europe, cross-national comparisons are considered necessary and instructive,
- the Symposium aims at familiarising participants with the complicated interrelationship between demographic determinants and resulting social patterns,
- and to encourage new approaches in social policy and social services delivery.

For further information please contact the :

Secretariat
12, Pembroke Park,
Dublin 4
Ireland

2.1.2. International Conference on Renewable Resource Inventories for Monitoring Changes and Trends, August 15.19, 1983, Corvallis, Oregon (USA)

An International Conference is organized from August 15 to 19, 1983, at Corvellis, Oregon (USA), on Renewable Resource Inventories for Monitoring Changes and Trends.

The intent of this international conference is to create a foundation to develop and implement inventories to monitor changes and trends. Because of the wildland resources (timber, forage, wildlife, etc.) are being depleted most rapidly and are the most difficult to inventory, they will receive the most attention.

For further information, please contact :

Mr. Toby Atterbury, Programm Chairman
Crown Zellerbach Corporation
1500 SW. First Avenue
Portland, OR 97201
USA

2.1.3. "Question-answer" session of the Ibero-American Committee of Sample Surveys, September 12.22, 1983, Madrid (Spain)

"Comité Iberoamericano de Muestro, CIM, will hold a question-answer session in Madrid during the ISI/IASS meeting next september. Practical problems that arise during the practice of sample surveys by different practitioners is the aim. There will be a panel of experts to moderate the discussions which will be in spanish. Those interested in participating should write to,

EDMUNDO BERUMEN
Cerrada de Juan Cordero 19
Col. Noche Buena
Mexico, D.F. 03720
Mexico.

the precise date and meeting place will be forthcoming".

2.1.4. 6th Symposium of African Demography, september 1983, Cotonou (People's Republic of Benin)
The Institut de Formation et de Recherche démographiques (IFORD) plans to organize the next symposium of African Demography, during September 1983, in Cotonou (People's Rep. of Benin).

The general theme of the Symposium is"Mortality in Africa".

For further details, please contact the :

Direction de l'I.F.O.R.D.
BP 1556
Yaoundé
Cameroun

2.1.5. Conference of Governmental Statisticians of the Americas october 3.9, 1983, Buenos Aires (Argentina)

A Conference of Governmental Statisticians of the Americas will be held, from october 3 to 9, 1983, in Buenos Aires (Argentina)

The programm will notably deal with :

- Future for the forum of the heads of the national statistical systems
- Programs for the training of personnel of the national statistical systems
- Priorities for methodological development and work program for the biennium 1984/85
- Household Surveys
- Inter - American Standards
- Agricultural Surveys, Technical document submitted by Brazil.

For further information, please contact :

Secretariat de la CEGA
Professor Evelia o Fabbron
Casilla 10015
Santiago
Chile

2.1.6. Work session on budget consumption surveys November 15.25, 1983, Abidjan (Ivory Coast)

A work session on budget consumption surveys will be organized by the Governments of the Ivory Coast and France, from November 15 to 25, 1983, in Abidjan (Ivory Coast).

This session is open to a number of specialists in this field.

2.1.7. Regional Conference on Statistics and Probability, December 12.14, 1983 New Delhi (India).

A regional Conference on Statistics and Probability is organized by the Indian Statistical Institute and the East Asian and Pacific Regional Committee of the Bernoulli Society, from December 12 to 14, 1983.

It will be held at the Delhi Centre of the Indian Statistical Institute.

For further details, please contact :

Professor S.K. Mitra
Indian Statistical Institute Delhi Centre
7, SJS Sansanwal Marg
New Delhi 110016
INDIA

2.1.8. Chaire Quetelet 1983

Internal migrations : data collection and methods of analysis

- Département de Demographie, Université Catholique de Louvain
  September 6.9, 1983
  Louvain - La Neuve, Belgium.

The four work sessions will deal with the following topics :

. methods for collecting and measuring internal migration
. migration survey in developed countries
. " " in developing countries
. comparability between various sources and international comparability : utopia or reality ?

For further information, please contact :

Departement de Demographie
Chaire Quetelet 1983
Place Montesquieu 1, Bte 16
B 1348 LOUVAIN - LA - NEUVE
Belgium

2.2. Teaching

2.2.1. Continuing Education Center, from February 15, 1983, Trinity University, San Antonio, Texas (USA)

Trinity University in San Antonio, Texas, announces the opening of its continuing Education Center. This new facility, available after February 15, 1983, is ideally suited for educational programs up to 100 participants.

For further information, please write to : Dr Sarah A Hulett, Director
715 Stadium Drive - San Antonio - Texas 78284 U.S.A.

2.2.2. Sampling program for Survey Statisticians, Michigan (USA), June 27, August 19, 1983.

This eight week program will be held from 27 June - 19 August, 1983 at the University of Michigan as part of the Survey Research Center's 36th Annual Summer Institute in Survey Research Techniques. The Sampling Program, which is co-directed by Professors Leslie Kish and Graham Kalton, consists of two courses in Methods of Survey Sampling and a Workshop in Sampling Techniques. In addition, participants in the Program may opt to take a course in either Survey Research Design or Analysis of Survey Data.

For more information, write to Professor Graham Kalton, Institute for Social Research, University of Michigan, P.O. Box 1248, Ann Arbor, Michigan, 48106, U.S.A.

2.2.3. Summer course "Applied Statistics 83", August 17- September 2, 1983, Gembloux (Belgium)

A summer course "Applied Statistics 83" is organised by the Centre de Recherches Agronomiques de l'Etat in Gembloux (Belgium), from August 17 to September 2, 1983.

This course is intended for scientists, engineers, researchers, teachers... wishing either to acquire basic knowledge in applied statistics or to brush up or complete their knowledge in this field. No previous statistics training is necessary to begin this course.

It will be delivered in French. For further information, please write to :
Service des Relations Publiques du C.R.A., Avenue de la Faculté d'Agronomie 22,
B 5800 Gembloux (Belgium)

2.3. Session reports

2.3.1. Conference of European Statisticians, May 26.28, 1982, Geneva (Switzerland) : an Informal meeting on Timeliness, Cost and quality attributes of statistics of Households and Individuals.

A meeting was held in Geneva on 26.28 May 1982 sponsored by the European Economic Commission of the United Nations. A draft of an international guide for the presentation of the quality of statistics issued from Sampling surveys on households and individuals.

The participants estimated that it was important to distinguish statistics drawn from household surveys from other statistics. After pointing out other important distinctions, the meeting tried to define which information should at least in the publications aimed at non statistician-users. It dealt with individuals and household random sampling surveys. Most of the practices mentioned as examples concerned periodical surveys.

The group estimated that the recommandations apply to the first diffusion of the results of a single survey, in the form of printed volumes. The nine elements selected are the following :

(a) basic information on the data source and on definitions (including classifications) ;
(b) coverage of the data (e.g. adequacy of the frame) ;
(c) short description of the selection and estimation methods ;
(d) response rates (including their definition) ;
(e) sampling error (when applicable) and indication of how the computed standar errors and related measures should be interpreted ;
(f) indications of the size and direction of the likely major errors and of their relative importance and impact on the statistics ;
(g) information on significant changes in procedures and on other factors which would affect the comparability of statistics over time ;
(h) information (if any) on the comparability with statistics on the same subject compiled from other sources ;
(i) references to the availability of more detailed technical descriptions (e.g. technical reports).

The elements of information to be given are rarely quantitative, as for instance, with recourse to pre-tests, tests and (pilote) surveys to build the questionnaire, which contributes in reducing the response error in an important way.

The presentation of these elements, as a description of the methodology or as a review of the preparation or the taking place of the survey, does not seem to be best for the users.

The participants concluded that the estimation of the quality by comparison with other sources did not have to appear systematically in this summary.

The group proposed the same elements (except g) for the occasional surveys.

Concerning the other information supports (microforms, magnetic recordings), the participants did not decide if the working methods of the users needed another list, or just to choose a best adapted medium to present the same information.

The technical documents have to be as filled up as possible. The group concluded that an international recommendation was not necessary for the redaction of these detailed documents.

The group was also interested in the works of the Terminology Committee and of the International Association of Survey Statisticians. After Professor Sanchez-Crespo exposed the works of thie Committee and his own works, the participants wished that the Economic Commission for Europe be informed of how the works go on and that the Commission invites the national institutes to help them. The group pointed out that it was necessary to reach not only definitions internationally accepted, but also the redaction of a multilanguage lexicon.

2.3.2. A NOTE ON THE SMALL CONFERENCE ON THE IMPROVEMENT OF THE QUALITY OF DATA COLLECTED BY DATA COLLECTION SYSTEMS (November 11-12, 1982, Oak Ridge National Laboratory (USA))

TOMMY WRIGHT

In recent years, the number of active large data systems has increased sharply with the demands for more information from decision makers. While recent observations suggest that this number is decreasing, the need still exists to improve the quality of collected data. This need cuts across many fields including : agriculture, defense, economics, education, energy, environment, finance, health, labor, natural resources, population, transportation, and many others. Practical experience in dealing with different types of data shows that data usually contain different types of gross errors. These errors, if left unchanged, directly affect analyses and decisions based on the data by leading to faulty decisions, inappropriate actions and a loss of confidence in the data collection system.

For an effective approach towards improving the quality of data, a comprehensive program of Quality Control for Data Collection Systems is needed.

A small conference, sponsored by the Oak Ridge National Laboratory with funds from the Office of Naval Research, was held on November 11-12, 1982. This conference was planned primarily a) to bring together experts who have demonstrated an understanding of the problems of data collection systems so that state-of-the-art techniques could be discussed for handling these problems, and b) to determine the potential for development of a comprehensive research program aimed at improving the quality of data collected by data collection systems.

A list of the papers which were presented is given below :

"A Frame on Frames : An Annotated Bibliography"
- Tommy Wright,

"Reducing Response Errors in Reports of Behavior"
- Seymour Sudman,

"Errors and Other Limitations of Enumerative Sample Surveys"
- Tore Dalenius,

"Errors Profiles : Uses and Abuses"
- Barbara Bailar,

"Principles and Methods for Handling Outliers in Data Sets"
- Victor Barnett,

"Data Editing and Estimator Sensitivity"
- Larry Thibodeau,

"Influence Functions, Outlier Detection, and Data Editing"
- Michael Cherniok,

"Application of Pattern Recognition Techniques to Data Analysis"
- Ralph Gonzalez,

"Using Exploratory Data Analysis to Monitor Food Consumption Data Quality in Rural Indonesia"
- Paul Velleman and David Williamson

"On Using Exploratory Data Analysis as an Aid in Modeling and Statistical Forecasting"
- Thomas Curran,
Robert Small,

"Model-Based Multivariate Stratification"
- Robert Wright,

"Process Diagnostics from Data Editing as an Aid to Quality"
- Gordon Sande,

"Can Automatic Data Editing Be Justified ?"
- Gunar Liepins,

"Data Collections for Details over Space and Time"
- Leslie Kish,

"An approach to an Evaluation of the Accuracy of Motor Gasoline Prices"
- Arthur Silverberg,

"Health and Mortality Study Error Detection, Reporting, and Resolution System"
- Katherine Gissel,
Martha Hansard,
Martha Wray,

"Quality Control of Meteorological and Industrial Hygiene Monitoring Data"
- Rod Strand and Jon Goyert

"Imputation Issues Related to the EIA-782"
- Robert Burton and David Marker,

"Software for Large-Scale Data Collection and Analysis"
- B. V. Shah,

"Reducing the Cost of Studying Survey Measurement Error Is a Laboratory Approach the Answer ?"
- Judith Lessler and Richard Kulka,

"The Implications of Data Collection System Design on Data Analysis"
- Rick Williams, Lisa LaVange, and Ralph Folsom,

"Missing Values in Large Data Sets"
- Roderick Little, Donald Rubin

A paper by Tommy Wright
Mathematics & Statistics Research Department
Union Carbide Corporation
P.O. Box Y
Oak Ridge
Tennessee 37830

2.4. Other information

2.4.1. Section on Survey methodology in the Journal of the American Statistical Association : papers requested.

The Survey Research Section of the American Statistical Association invites papers on survey methodology for publication in a special section of the Journal of the American Statistical Association.

The central theme will be methodological issues of non-sampling errors of surveys. Articles that have previously been published or that are under review by another refereed journal will not be considered for publication. The papers should be in the format outlined in the American Statistical Association style guide. To be considered for this special section, papers must be mailed to Dr. Joseph Sedransk, Department of Mathematics and Statistics, State University of New York at Albany, 1400 Washington Avenue, Albany, New York 12222, no later than March 31, 1984. The review process will begin upon receipt of the manuscript and authors will be notified as to acceptance, recommended revisions, or rejection in accordance with the normal time schedule of JASA.

3. papers

AN EXPERIMENT WITH ENLARGED RECALL PERIOD OF THE TELEPHONE INTERVIEWS FOR SWEDISH TELEVISION AUDIENCE CENSUSES

- Anders Christianson -

The purpose

The Audience and Programme Research Department of the Swedish Broadcasting Company presents estimates of the audience sizes of the television programmes some 120 days each year. These estimates are based on telephone interviews with random samples (sample packages) of 175 persons each day from the Swedish population, 9 to 79 years old. The respondents are asked to recall their TV viewing for three days before the interview by means of a series of detailed questions concerning all the programmes broadcast.

A suggestion arose recently that the respondents should be asked to recall four days of viewing instead of three. Without reducing the sample size for a programme (525 persons) the daily sample size then could be decreased and costs thus reduced. However, the time between interview and programme day would on the average increase, which might increase the influence of recall bias on estimates.

The purpose of the experiment was to examine whether a four-day recall period would increase the bias seriously as compared with the current three-day recall period.

The survey design and the experiment plan

The survey design and the occasional additions to it during the experiment period are schematically described in the following diagram. An example may aid understanding of the diagram : The first row tells that the interviews with persons of sample package nr 24 started on Saturday, the 24th (1), continued Sunday, the 25th (2) and Monday, the 26th (3). The programme days for this package were Friday, the 23rd (A), Thursday, the 22nd (B) and Wednesday, the 21st (C), regardless of the day when the interview was completed.

The first sample package involved in the experimental study was nr 27, where an additional programme day was introduced : Friday, the 23rd (D).

Weekday and date (October/November 1981)

Sample package Nr	We 21	Th 22	Fr 23	Sa 24	Su 25	Mo 26	Tu 27	We 28	Th 29	Fr 30	Sa 31	Su 1	Mo 2	Tu 3	We 4	Th 5	Fr 6	Sa 7	Su 8
24	C	B	A	1	2	3													
25		C	B	A	1	2	3												
26			C	B	A	1	2	3											
27			D	C	B	A	1	2	3										
28				D	C	B	A	1	2	3									
29					D	C	B	A	1	2	3								
30						D	C	B	A	1	2	3							
31							D	C	B	A	1	2	3						
01								D	C	B	A	1	2	3					
02									D	C	B	A	1	2	3				
03										D	C	B	A	1	2	3			
04											D	C	B	A	1	2	3		
05												D	C	B	A	1	2	3	
06			← experiment period →											C	B	A	1	2	3

1 = first interview day
2 = second
3 = third

A = first programme day
B = second
C = third
D = fourth (D - observations occur only during the experiment period)

The D - observations were added for ten days, and audience size estimates based on all four packages were computed in addition to the regular ones, based on only three packages. Furthermore each audience size estimate was decomposed into four : A-, B-, C- and D-estimates, each one supposed to estimate the same parameter. This was meaningful since all the sample packages are drawn at least approximately independently of each other.

Main results

In only seven cases out of 270 did the estimate change significantly by the addition of a fourth sample package (risk level : 5 %). In four of the cases the audience size estimate increased, while in the remaining three it decreased.

The estimates of the average viewing time per day during the experimental period increased by 44 seconds, from 2 : 02 : 40 (hours : minutes : seconds) to 2 : 03 : 24.

These results, combined with the results of a series of questions, put to the interviewers and repondents concerning fatigue, irritation and difficulties in recall indicate that the method with four programme days may perform well as compared with the current method.

Reference

Christianson, A (1982) : Försök med fyra programdagar i tv-publikräkningarna. Swedish Broadcasting Company, PUB rapport nr 7-1982.
ISBN 91-7552-208-X
ISSN 0348-3126

SOME DIFFERENT ASPECTS OF THE NON-REPONSE PROBLEM - Irving Roshwalb

Investigation of the non-response problem has generally involved two issues - how to defin response (and non-response) rates (1) and how to increase response rates (2). This paper discusses two somewhat different aspects of non-response. The first treats response as a random variable and provides a mechanism for tracking the effect of non-response on the total error of the survey estimates. The second is concerned with those situations in which non-response is effectively a truncation of the distribution under study and the impact of this on the mean-square-error of the survey results.

Response as a Random Variable

Survey response rates tend to be treated as constants, separate and apart from all other estimates which are developed from the same sample and considered as random variables. But the response rate observed in a given study is also a chance variable and its calculated value is an estimate of what might have been experienced had a complete census been attempted. (3, 4)

For this model, let x_i = observed value of x for the ith individual ;
Let t_i = 1, if the ith individual responds ;
= 0, if the ith individual does not respend ; and,
$y_i = t_i x_i$, the observation value assigned to the ith individual.

Using procedures based ont the Taylor expansion, we find for the expected value and variance of y :

$$E(y_i) = E(t_i x_i) = TM + rS\left[T(1-T)\right]^{\frac{1}{2}}$$

Where T = universe response rate ;
M = universe mean of the x-variable
S = universe standard deviation of x
and r = the correlation between response, t, and x. (7)

The coefficient of variation (squared) of y is, then,

$$C_y^2 = C_x^2 + (1-T)/T + 2\left[(M_1 - M_2)/M\right](1 - T)$$

Where M_1 = mean of x among the respondents,
M_2 = mean of x among the non-respondents, and
C_x = coefficient of variation of x.

A second approach to calculating the variance of y = tx is due to Goodman (8). His results provide an exact statement of the variance of the product of two random variables. Using V'_y as the variance of the product of the response and measurement variables, y = tx,

$$V'_y = S^2 T^2 + M^2 T(1 - T) + 2TME_{11} + \left[2tE_{12} + 2ME_{21} + E_{22} - E_{11}^2\right]$$

and $C'^2_y = V'_y/(TM)^2$, where $E_{ij} = E\left[(t - T)^i (x - M)^j\right]$.

The corresponding formulation for the Taylor approximation is

$$V_y = S^2 T^2 + M^2 T (1 - T) + 2TME_{11}, \text{ and } C_y^2 = V_y/(TM)^2.$$

Response Rates, Truncation and Total Survey Error

The motivation for this discussion arises from at least two areas of response difficulties. One comes from standard multi-stage household sampling. Many urban areas have seen the construction of expensive high-rise apartment houses where access to residents is often very difficult, if not impossible. The greater the difficulty of access, the more likely it is that the distribution of income in the available frame is truncated.

The second problem area concerns the selection of a sample of retail outlets in a market. In some areas, a single chain of major outlets may, by management decree, be eliminated from participation in the study. As is often the case, such outlets may be the major retailers in a market and their elimination does also result in a truncation of the universe.

If non-response results in truncation, as in the above examples, then, as non-response is reduced, the truncation is reduced, the bias of the estimate is decreased, and the variance of the distribution is increased. The simplest demonstration of the effect of changes in bias and variance on the total survey error, is to use the model of the right triangle whose hypotenuse is the root-mean-square-error and whose legs are the bias and standard deviation terms of the expression, Mean-Square-Error = Variance + $(\text{Bias})^2$. (9) Since the variance and bias are inversely related in this expression, interesting consequences, depending ont the distribution's shape, follow. We consider three simple cases -- the rectangular, right-triangular and exponential distributions, in which the population range is 0 to 1.0 and in which the point of truncation is anywhere in this range, i.e., 0 t 1. The following table summarizes the means and mean-square-error terms for each of these distributions, as well as the value of t for which the mean-square-error is minimized.

Rectangular distribution

Mean = $t/2$

MSE = $t^2/12 + (1 - t)^2/4$

Min t= 0.75

Right-triangular distribution

Mean = $t(3 - 2t)/(6 - 3t)/$

MSE = $(t^2/18)\ \left[(6 - 6 + t^2)/(2 - t)^2\right] + (1/9)\ \left[t(3 - 2t)/(2 - t) - 1\right]^2$

Min t= 0.525

Exponential distribution

Mean = $\left[e^t - (t+1)\right]\ /(e^t - 1)$

MSE = $\left[(e^t - (t + 1)/(e^t - 1)\right]\ \left(2 - e^{-t}\ (t^2 + 2t + 2)\right)$
$- \left[(e^t - (t + 1))/(e^t - 1)\right]^2 + \left[(e^t - (t + 1))/e^t - 1) - (e - 2)/(e - 1)\right]^2$

Min t= 0.6435

The impact of the response level on total survey error (or, mean-square-error) depends, then, on the shape of the distribution, the tendency of non-response to bring about a truncation, as well as on the variability, bias and sample size. Furthermore, the impact will be especially critical in those cases where final results are the summation of data collected from individual clusters with small sample sizes.

More generally, if f(x) is the distribution under investigation, its mean and variance are defined as $E(x) = c\int xf(x)dx$ and $\text{Var}(x) = o\int(x - Ex)^2\ f(x)dx$, where $c = 1/\int f(x)dx$. The mean of the distribution truncated at t is $E(x(t)) = \int xf(x)dx/\int f(x)dx$, $0 \langle x \langle t$. Its variance is $S^2(t)=\int(x-Ex(t))^2 f(x)dx/\int f(x)dx$. The total error of x, or its mean-square-error, is $\text{MSE}(x(t)) = S^2(t) + (Ex(t)-Ex)^2$. The value of t for which MSE(x(t)) is minimized may be obtained from the expression $2(Ex(T) - Ex)\ (t - Ex(t)) = S^2(t) - (t - Ex(t))^2$. Further, for sample size n, the mean-square-error of the estimate $\bar{x}(t)$, the sample mean drawn from the truncated distribution, may be written as $\text{mse}(x(t)) = S^2(t)/n + (Ex(t) - Ex)^2$.

Summary

The problem of non-response has been treated from two points of view. One aspect of non-response treats it as any other estimator in its preparation, as much a sample estimate as any other statistic developed on the basis of the survey data. This approach leads to specific statements of the interaction between response and the other variables being measured and the effect of this relationship on the bias and

precision of the estimates being produced by the survey.

The second aspect of non-response deals with the truncation non-response may impose on the population and its effect on survey findings. The consequence of this truncation is to make the total mean-square-error, as well as the estimate of the mean, a function of the response rate. This leads to the finding that, for certain distributions, the most accurate data (i.e., with least mean-square-error) are obtained when the response rate is less than 100 %.

1. F. E. Wiseman and P. Mac Donald, The Non-Response Problem in Consumer Telephone Surveys. Marketing Science Institute, Cambridge, Mass., 1978.

2. M. H. Hansen and W. N. Hurwitz, The problem of non-response in sample surveys. Journal of the American Statistical Association, vol. 41, (1946), pp. 517-529.

3. H. O. Hartley, discussion of a paper bu F. Yates, Journal of the Royal Statistical Society, vol. 109 (1946), p. 137.

4. A. F. Politz and W. R. Simmons, An attempt to get the 'not-at-homes' into the sample without callbacks, Journal of the American Statistical Association, vol. 44 (1949), pp. 9 - 31.

5. W. G. Cochran, Sampling Techniques. John Wiley and Sons, Inc., New York, 1977 (3rd edition), p. 15.

6. W. E. Deming, Some Theory of Sampling. John Wiley and Sons, Inc., New York, 1950, p. 72 ; p. 133.

Information on income obtained from an interview survey compared with information given to taxation authorities - Mogens Christoffersen

1 INTRODUCTION

Question wording plays a special role when embarrassing or controversial topics are dealt with. In this connection, many authors mention income questions as an example of questions with both a low response rate and a high degree of inaccuracy. Investigations of this are often based on a mere comparison of two different question techniques. Responses to the traditional income question : "What was your taxable income last year ?" are compared with the results from a battery of questions revealing the total income situation. The Danish income tax return, which is in fact a detailed mail questionnaire, is a special case of the latter type of question technique.

2 SURVEY DATA

The survey of the living conditions of the Danish population aged 20-69 conducted in August-September 1976 comprised a nationally representative sample of well over 5000 persons. [1] Among the variety of questions on living conditions one dealt with the respondents' taxable income in 1975. The question read : "What was your own taxable income in 1975 ?"

Those interviewed were shown a card listing 20 income intervals after which they were asked to indicate which of the DKr 10,000-intervals applied to them.

In the traditional forms of reliability checks, knowledge of or an assumption of the reliability of alternative sources of data is utilized, after which these sources are collated, item by item.

Researchers often find themselves in the situation that there exist no alternative objective sources of data that can evaluate the validity of the data obtained from the interview. However, in Denmark there is a fairly reliable statistical record of taxable incomes. For a quantitative evaluation of the information on income, information relevant to the respondents was extracted from this record.

The final assessments of the taxation authorities were stated in intervals of DKr 100. dl.

3 SURVEY RESULTS

A comparison between the respondents' own information and that of the taxation authorities showed that, in relation to the final aseessments of the taxation authorities, 20-69-year-old Danes overstate their taxable income by 2.5 per cent. When viewed generally at the national level, there appears to be striking agreement between the simple question and the very thorough and detailed income tax return, which even has a control and sanction system in case of negligence in the completion of the tax return.

However, these general considerations obscure great differences between various population groups and income levels.

On the face of it, it seems difficult to describe the somewhat diffuse connection between the final tax assessment and the information on income derived from the survey (see Figure 1). However, the analysis showed that this more detailed information could be reduced to a simple linear regression :

$$y = a + bx \text{ (the solid line),}$$

where y is the taxable income disclosed during the interview and X is the income according to the final assessment.

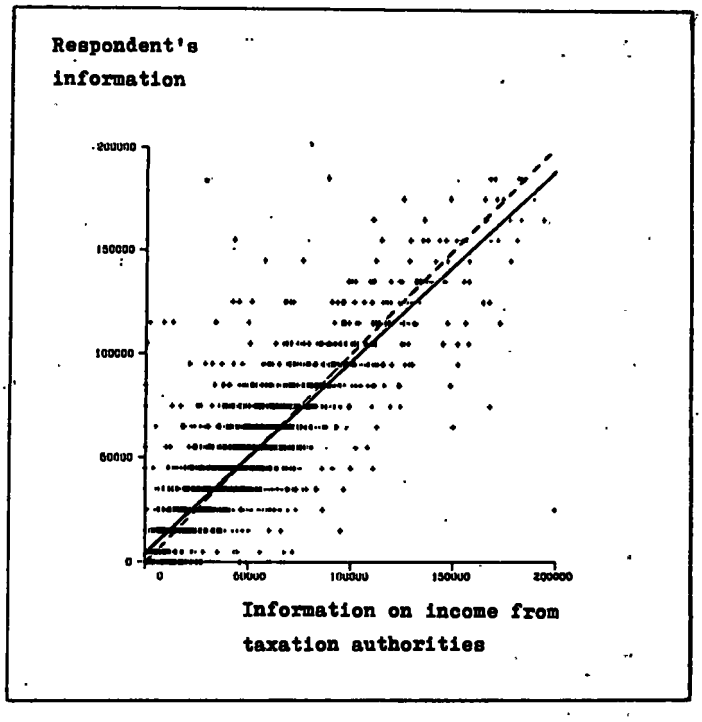
The analysis shows that 80 per cent of the variations in the answers to the simple income question can be predicted by means of the regression line based on taxable income[2].

95 per cent of all respondents stated incomes under DKr 200,000, and for these incomes the following relation was found between the income stated and the final tax assessment :

$$y = 4{,}400 + 0.92x \quad 3)$$

Figure 1

The final tax assessment plotted against the respondent's own information on income.



The dotted line shows the identity line where there is complete agreement between the information given by respondents and by taxation authorities. The solid line is fitted using linear regression techniques. The taxation authorities' information on income is stated in intervals of DKr 100. dl whereas the respondent's own information is giben on the basis of prompt cards with DKr 10,000-intervals.

The regression analysis shows that the slope is significantly less than 1.0, which implies a systematic trend of a slight overstatement of incomes in the very lowest income groups while those with above average incomes tend to understate their incomes when asked the traditional income questions[4] (d1)

While the respondents in the survey of living conditions who disclose their taxable income generally overstate this slightly, there is at the same time a tendency for those in the higher income brackets not to state their income. However, only 5 per cent of all the persons interviewed in the survey of living conditions were unwilling or unable to state their taxable income.

The average calculations conceal considerable differences between different occupational groups. While 97 per cent of wage-earners state their income, only 90 per cent of self-employed persons do so. The self-employed not stating their income in the survey of living conditions earn, on average, 80 per cent more than other self-employed persons.

Table 1

Percentage of respondents who answered the question on taxable income, distributed according to occupational status and social group[1]

	SOCIAL GROUP				
	I + II	III	IV	V+)	Number
	per cent				
OCCUPATIONAL STATUS :					
Self-employed	86	90	95	-	671
Salaried employees	94	97	97	-	1.587
Workers	-	-	99	96	1.362
Number	456	890	1.264	1.010	3.620

+) Unskilled workers

While practically all young people disclose their income, there is a tendency for the older age groups to be unwilling or unable to give such information. Among the economically inactive persons interviewed, only pensioners were reluctant to provide information on their financial circumstances. The unemployed, persons not employed outside the home and students willingly revealed their taxable income. These tendencies could be interpreted as confirming that the answering of the question on taxable income makes heavy demands on memory and assumes certain knowledge of the complicated nature of the concept seen from a technical-administrative point of view.

As far as sex differences are concerned, the material shows that different types of response are found among those not disclosing their taxable income. Whereas two thirds of those refusing to answer are males, almost two thirds of those stating that they do not know their taxable income are females.

NOTES

1. The material is described in great detail in Erik Jørgen Hansen : The Distribution of the Living Conditions in Denmark. Publication No. 110 of the Danish National Institute of Social Research, Copenhagen 1982.

2. Norman H. Nie et al. : SPSS, Statistical Package for the Social Sciences. New York 1975, Chapters 18.4 and 20.

3. The additive constant is given in 1975-Kroner.

4. The samples were drawn in two stages with stratified selection of the primary units, which makes the statistical calculations complicated. In the present analysis, regression analysis as well as chi-squared tests are used although these methods of analysis assume simple random sampling. A more detailed description of the sampling plan is to be found in Erik Jørgen Hansen (op. cit.).

Extract of the Asian and Pacific Census Forum - East-West Population Institute - August 1983

Post Enumeration check of the 1981 Indian Census - P. Padmanabha

The following is a condensed version of a report on India's PEC sent to the Census Forum by P. Padmanabha, Registrar General and Census Commissioner.

A Post Enumeration Check (PEC) was conducted soon after the 1981 census to assess the extent of omission and duplication in the census. Fourteen major states and the Union Territory of Delhi, which together accounted for 97 percent of the censused population, were covered in this survey.

The objective of the PEC was to determine the coverage error and the content error ; that is, how accurate was the census count and how precisely were the important characteristics of individuals recorded ?

Four thousand enumeration blocks were systematically selected for the PEC from the frame of enumeration blocks prepared for the national census. These were allocated to the various states in proportion to the projected population on the census date (1 March 1981). The PEC was not conducted in Assam, where disturbed conditions had prevented the census from being taken. Thus the effective sample size was 3,862 enumeration blocks.

The coverage error was of two types : omission or duplication of persons due to omission or duplication of entire households (type I error) ; and omission or duplication of individuals in a censused household (type II error). For measuring type I error, all households in the sample block were relisted. A 10 percent subsample was selected from each block for checking type II coverage error. For content error, a 10 percent subsemple of households in 50 blocks in each state was canvassed.

The PEC proceeded in three stages : listing and enumeration, desk match between PEC and the corresponding census records, and field reconciliation. In the first stage, all the houses in the selected enumeration block were listed and members of the 10 percent subsample of households were reenumerated. The particulars collected regarding each household were matched with those in the corresponding abriged houselist of the enumeration block. A match was established if house number, the use to which the house is put, and the name of the head of household tallied. The particulars of the individuals in the selecte household were compared with the corresponding census records entry by entry to see if name, relationship to head of household, and marital status tallied. Wherever the particulars did not match, a fresh team revisited the enumeration block to reconcile the discrepancies. After this stage, every household and person was classified as enumerated in the census, omitted in the census, or duplicated in the census.

Most of the supervisors and enumerators were drawn from the office of the State Director of Census Operations. This core group was supplemented by fresh recruits wherever needed. In a few States, experienced investigators of other agencies, such as the Bureau of Economics and Statistics, were also involved. On the basis of work norms and available resources, it was decided that each enumerator would canvass the schedules in two enumeration blocks. To ensure independence of operations, enumerators were interchanged in such a manner that persons doing basic relisting and reenumeration did not do desk match or field reconciliation of the same block.

The salient results of the PEC show a net underoount in the census. The net omission rate is 17.95 persons per thousand with a percentage relative standard error (PRSE) of 4.69. The difference between the net omission rates for males and females is not significant : for males the rate is 17.10 per thousand, and for females 18.85 per thousand. The rural-urban difference, however, is significant. In the rural areas, the net omission rate is 15.0 per thousand, while in the urban areas it is 27.6 per thousand.

Omission rates by age groups were derived from the PEC and show that they are highest for the 0-4 age group (26.98 per thousand). Omission rates do not differ significantly by literacy : they are 17.75 per

thousand for literates and 18.06 for illiterates. The omission rate is 11.53 per thousand in the case of members of nuclear families and 39.86 per thousand for others. (A nuclear family is defined as consisting of the head of a household, the wife or husband, and sons and daughters).

The accompanying tables show omission rates for five zones of the country and omission rates by marital status.

Omission Rates by Zone for the 1981 Census of India (per thousand)

	Female	Male	Total
Central	28.64	22.66	25.50
Northern	23.20	19.70	21.81
Western	16.95	17.09	17.03
Southern	14.71	15.55	15.14
Eastern	11.95	11.52	11.72
All India	18.85	17.10	17.95

Central Zone : Madhya Pradesh and Uttar Pradesh
Northern Zone : Delhi, Haryana, Punjab, and Rajasthan
Western Zone : Maharashtra and Gujarat
Southern Zone : Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu
Eastern Zone : Bihar, Orissa, and West Bengal

Omission Rates by Marital Status for the 1981 Census of India (per thousand)

	Female	Male	Total
Widowed, divorced, or separated	25.51	17.92	23.64
Never married	19.85	20.51	20.20
Married	16.65	12.53	14.65

4. news of the association

4.1. IASS program Committee - 1985 Session

The centenary ISI Session will be held in The Hague in 1985. The Program Committee for the IASS component of the Session is as follows :

Chairman : Dennis Trewin
Australian Bureau of Statistics
PO Box 10
BELCONNEN 2616 AUSTRALIA

Committee members : Luigi Biggeri (Università Degli Studi di Firenze, Italy)
J.B. Coker (Federal Office of Statistics, Nigeria)
David Dodds (Statistics Canada, Canada)
Tim Holt (University of Southampton, United Kingdom)
M.N. Murthy (Statistical Institute for Asia and the Pacific, India)

Any member wishing to suggest subject areas, topics, and names of potential organisers should write to the Chairman or any member of the Committee as soon as possible. The program will be finalised during the 1983 Session in Madrid.

4.2. Obituary : Léopold BODART

The Bureau deeply regrets to have to announce the death of our colleague :
Léopold BODART (Belgium)

L. BODART pursued a long and successful statistical career in Central Africa and was a Professor at the University of Mons (Belgium).

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The papers sent to the Journal should not exceed 5 pages. They have to be typed with a double space. Two copies of these papers (in French or English) have to be sent to Mr Damiani at the IASS secretariat (see address above).

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